Available online at www.sciencedirect.com
ScienceDirect
Futures 39 (2007) 1–15
FUTURES
www.elsevier.com/locate/futures

Disciplined imagination: Building scenarios and building theories

Thomas J. Chermack*

The Pennsylvania State University, 301 Keller Building, University Park, PA 16802, USA

Available online 21 April 2006

Abstract

This article outlines a relationship between scenario construction and theory building. This is done in two key ways: (1) it is argued that a deficiency of theory and theory building exists with regard to the phenomenon of scenario construction and (2) it is also argued that scenario construction may constitute a form of theory building. These arguments are developed using foundational works that label both scenario construction and theory building as processes of disciplined imagination. Drawing from other core works in management and organizational change perspectives the argument is developed that scenario construction might most appropriately be thought of as a process of developing and changing theories-in-use. Conclusions and implications for management professionals are drawn.

1. Introduction

Bain and Company's 2003 Management Tools Survey [1] found strategic planning to be the tool of choice in 2002. Executives indicated that in the midst of an "economy in turmoil, investors in retreat, and managers under attack" [1, p. 4] they needed some way to cope with devastating circumstances. Scenario planning is grouped with strategic planning in the Bain survey, and while the survey does not break these two interventions apart in terms of their use, it seems clear that executives are increasingly struggling to understand and anticipate changes in their environments.

A problem arises in that scenario planning—one of the most highly used tools—is without supporting research. To clarify, it is unclear if scenario planning is really effective

*Corresponding author. Tel. : + 1 814 863 5795.
E-mail address: tjc18@psu.edu.

0016-3287/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.futures.2006.03.002

in delivering a clearer path through uncertain times. For example, Pearce et al. [2] have called the link between planning and firm performance "tenuous" and provided research results spanning a decade that suggest planning is not significantly linked to firm performance. Research regarding scenario planning in particular is limited to classic stories from Royal Dutch/Shell, and a handful of anecdotes that stress the insights of a few individuals after participating in the process.

This article assumes a general working knowledge of scenario planning, however, an integrative definition states that scenario planning is "a process of positing several informed, plausible and imagined alternative future environments in which decisions about the future may be played out, for the purpose of changing current thinking, improving decision making, enhancing human and organization learning and improving performance" [3, p. 373].

Scenario planning has been in use for several decades yet there is no empirical research to refute, support, or explain the effectiveness of the process. Thus, it seems that there exists a general reluctance to study scenario planning with positivistic methods. The reason for this reluctance is unknown, but could be that positivistic methods, which are predictive in their orientation, are thought of as inappropriate in the context of scenario planning.

The misinterpretation evident in such an assumption is that studying scenario planning with positivistic methods and attempting to *predict* that they are effective is the same as to trying to predict the future. While using positivistic methods presents the challenge of how best to measure abstract characteristics and qualities, attempts to do so are desperately needed. The difficulties encountered in such attempts should not be enough to dismiss the utility of empirical methods all together. Thus, one aim of this article is to illustrate a distinction that can be articulated as follows:

Predicting that futures-oriented tools are effective and predicting the future are two different things.

Empirical studies are also imperative in building theory. Christensen and Raynor [4] argued that theory building proceeds from descriptive and conceptual studies to correlational studies and finally to studies that attempt to establish causality. To clarify, the best research currently offered with regard to scenario planning is descriptive. While there is one empirical study that must be mentioned [5] the rest of the scenario planning literature contains no attempts to establish correlation or causation.

This article also promotes the idea that there must be a more thorough analysis of the relationship between theory and scenario planning. The relationship that exists between theory and scenario planning at this point is undefined and misunderstood at best. Classic definitions of theory [6–13] suggest that a core aim of theory is to explain or predict a phenomenon. However, the use of empirical methods is meant only to predict the *effectiveness* of scenario planning—NOT to predict the future itself. Therefore, this article provides the argument that it is not only appropriate to study scenario planning and other futures-oriented tools with empirical methods, but also that the lack of such studies have led to a gap in the theory base of those tools. An early conclusion is that empirical studies are needed to inform a quantitative approach to building a theory of scenario planning.

A second problem, whilst related to the first is equally as complex. That is, varying theory building methods may be used to generate theory or theories of scenario planning, and, at the same time, it can be argued that scenario planning generates theories about the future. It is unclear if the practice of scenario planning as a theory construction exercise can be thought of in the same way as traditional academic theory construction, but seems worth

investigation. It is therefore important to consider different approaches to theory and theory building before discussing scenario planning as a potential theory building exercise.

2. Purposes of the article

There are three purposes of this article: (1) to provide a strong case for the use of empirical methods in examining scenario planning with an eye toward theory building, (2) to outline multiple approaches to building theory or theories of scenario planning and to explore scenario planning as a theory building exercise, and finally (3) to discuss the implications of this equation for scenario planning practices. In order to accomplish these three purposes, it will be necessary to provide some background discussion of development and change in organizations, theory, theory building and particularly, the notion of "theories in use" as described by Argryis and Schon [14].

2.1. Theoretical framework

This article outlines a gap in the research base of scenario planning, and thus, discusses the benefits of using empirical studies to take the next steps toward theory building and validating scenario planning practices. To make the case for linking scenario planning and theory building, this article will first describe scenario planning as a development and change intervention. Building on Van de Ven and Poole's [15] general approaches to development and change, and also on Argyris' work concerning action science, the case will be made that scenario planning aims to bring about change and does so with an action-oriented perspective. Based on these foundational works, the argument proceeds to suggest that the use of varying theory building methods to construct theories of scenario planning is needed, and that scenario planning can be conceived as a theory building exercise, however, the kind of theory generated must be classified after a detailed tour of different approaches to the idea of theory itself. It is first important to define and discuss the phenomenon of scenario planning.

2.2. Research question

The question that formed the basis of this analysis was:

(1) How are scenario building and theory building linked?

The distinction between *scenario planning* and *scenario building* is also quite important. For the purposes of this article, *scenario planning* is taken to indicate the overarching process of positing plausible alternative future environments and using these environments for strategy development. *Scenario building* is taken to mean the process of constructing the stories themselves, as a component of the larger scenario planning process.

2.3. An example

A clear example can help to establish the nature of scenario planning and the circumstances under which scenario planning can be helpful. Shoemaker [16] wrote:

> In 1921 when someone suggested that airplanes might sink battleships by dropping bombs on them, U.S. Secretary of War Newton Baker remarked: "That idea is so

> damned nonsensical and impossible that I'm willing to stand on the bridge of a battleship while that nitwit tries to hit it from the air.'' Josephus Daniels, Secretary of the U.S. Navy was also incredulous: ''Good god! This man should be writing dime novels.'' Even the prestigious *Scientific American* proclaimed in 1922 that ''to affirm that the aeroplane is going to 'revolutionize' naval warfare of the future is to be guilty of the wildest exaggeration'' [17, p. 44].

Quite clearly, the nature and intent of scenario planning is aimed at bringing about change within an organization—specifically, a change in the assumptions and expectations of decision-makers about what the future can possibly hold. This example shows that our assumptions and ingrained modes of thinking can prevent us from seeing or even considering what is possible. Scenario planners try to instill learning, with the idea that learning leads to more informed decisions based on expanded and changed mental models that ultimately lead to better firm performance. Ultimately, the goal of scenario planning is to provoke change in the way organizational leaders view their environments and what they assume is true about the rules for operating within them.

3. Development and change in organizations

Scenario planning is necessarily about development and change. Scenario planning is also necessarily about examining and reconstructing mental models of how the world works. The task of this section is therefore to describe the assumptions of scenario planning as a development and change effort.

Van de Ven and Poole [15] provided an assessment and classification of four core approaches to development and change in organizations, namely, (1) life-cycle, (2) teleological, (3) dialectical and (4) evolutionary. Each of these has utility in classifying change in organizations and scholars often integrate varying aspects of these typologies to explain change events.

3.1. Life-cycle approach

The life-cycle approach to organizational change suggests that change follows a set of phases. Van de Ven and Poole [15] stated: ''According to life-cycle theory, change is imminent: that is, the developing entity has within it an underlying form, logic, program, or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is prefigured in the present state'' (p. 515).

3.2. Teleological approach

Teleology is a philosophical doctrine that promotes the idea that a goal or purpose is what guides the alteration of any entity. That is, any entity moves toward a goal or purposeful end state. Most models of strategic planning are centered on this approach to change—specifying the goal or desired future state and then implementing and developing plans to achieve it. ''Proponents of this theory view development as a repetitive sequence of goal formulation, implementation, evaluation, and modification of goals based on what was learned or intended by the entity'' [15, p. 516].

3.3. Dialectical approach

Based on the distribution of power, the dialectical approach to change suggests "the organizational entity exists in a pluralistic world of colliding events, forces, or contradictory values that compete with each other for domination and control" [15, p. 517]. Dialectical theory is based on Hegel's philosophical work. At its essence, Hegel's view suggested that for every thesis, there exists an anti-thesis, and that synthesis finds some balance or alternative between the two. Organizational change from this perspective requires "two distinct entities that embody these oppositions to confront and engage one another in conflict" [15, p. 517].

3.4. Evolutionary approach

In the evolutionary approach, change proceeds "through a continuous cycle of variation, selection, and retention" [15, p. 518]. That is, selection happens in industry and organizations according to scarce resources, environmental factors, and competition. While there are a variety of specific viewpoints regarding evolution, its application in the context of organizational change simply promotes the idea of some continuous process of novelty, choice, and then competition to replicate it (Table 1).

4. Scenario planning and organizational change

Scenario planning is an intervention aimed at individual and organization change. Its fundamental orientation toward individual re-perceptions, changing mental models, and integrating with strategy illustrate this point with clarity [18–22]. As such, scenario planning appears to exhibit characteristics of more than one of these approaches to development and change in organizations.

In particular, the Dialectic and Teleological approaches to organizational change seem to provide many of the foundational assumptions on which scenario planning practices are thought to stand. For example, scenario planning relies on a goal orientation and the purposeful cooperation of multiple members, units, or groups within the organization to achieve those goals. However, this purposeful cooperation cannot be achieved without the construction of shared ideas about the future and the exposure of individual

Table 1
Approaches to organizational change (based on Van de Ven and Poole, [15])

Approaches to Organizational Change				
Family	Life-Cycle	Evolution	Dialectic	Teleology
Key metaphor	Organic growth	Survival	Conflict	Purposeful cooperation
Logic	Imminent program Prefigured sequence Complaint adaptation	Natural selection among competitors in a population	Contradictory forces Thesis, antithesis, synthesis	Envisioned end state Social construction Equifinality
Force	Predestination	Competition	Opposition	Goals

assumptions and mental models within the organization. Thus, the dialectical approach to change in organizations supports the conflict and opposition that are thought to lead to shared mental models and cooperative understandings of the organization, how it functions in the current environment, and how it may function in multiple plausible future environments.

To clarify, scenario planning is meant to bring about a change in the ways in which organization members view the world in which they are operating. This shift in thinking is thought to provoke other shifts in learning, decision-making and ultimately in the domain of the performance of the organization. It is not enough, however, to build excellent scenarios. The scenarios must have relevance and solicit buy-in from multiple levels in the organization.

5. Theory and theory building

A core challenge for theory building is to explain and predict the occurrence of various phenomena. When people point their attention toward the future, theory is often viewed as unimportant because the notion of prediction is considered irrelevant in the context of an unknowable future. However, it may be a problem to *completely* throw out the notion of prediction because it is important in the discussion of ideas that *result* from having considered multiple futures. That is, people must be willing to deal with prediction and anticipation in terms of their *responses* to potential future circumstances that they might face.

Further, there are many tools to help individuals and organizations think about the future and a refusal to study these tools with positivistic techniques because of a predictive orientation has gone too long unchecked. To clarify, it may be a mistake to work toward the ability to predict the future—but the ability to predict that processes aimed at coping with the future are effective is extremely important.

Theory can be described as "a coherent description, explanation and representation of observed or experienced phenomena" [10, p. 587]. While there is no agreement on a single definition of theory, the fact that multiple differing definitions exist requires that any discussion of theory or theory building clarify its orientation to the term. Theory building is the ongoing process of producing, confirming, applying, and adapting theory [23].

Recent contributions include several options for building theory. These options are (1) theory building through grounded theory research [24], (2) theory building through meta-analysis research [25], (3) theory building through social construction research [26], (4) theory building through case study research [27], and (5) theory building through quantitative research [23,28]. This, however, may not be a comprehensive list of the expanding and developing options for theory development. Weick [29] argued that most theory building methods have "little appreciation of the often intuitive, blind, wasteful, serendipitous, creative quality of the process" (p. 519), and has argued for the development of less mechanistic approaches to building theory. Thus, this article attempts to address Weick's concern by suggesting an alternative mode of theorizing that provides an explicit process, but features the intuitive and creative components.

5.1. Theory building through grounded research

Egan [24] provided an analysis of grounded theory research as a method for building theory. In doing so, he revealed that grounded theory research is a process that allows the

researcher to discover theory ''through the rigors of social research'' (p. 277). Egan [24] also stated that grounded theory research is not based on a specific theoretical framework. Thus, the theoretical framework emerges and changes as new data are gathered. Grounded theory research contributes most effectively to creating, refining, coding, and categorizing themes as they emerge from data [24]. The theory resulting from grounded theory research can be a set of propositions, and while grounded theory research ''has been identified as having the capacity to predict'' [24, p. 280] grounded theory research does not require the identification of specific research hypotheses.

5.2. Theory building through meta-analytical research

Defined as: ''the application of statistical procedures to collections of empirical findings from individual studies for the purpose of integrating, synthesizing, and making sense of them'' [30, p. 15], meta-analysis research has not often been used as a tool for theory building in HRD. A key strength of meta-analysis research in theory building is a powerful capacity to synthesize multiple existing empirical studies [25]. In this way, meta-analysis research is valuable in building reliability and validity for existing theories. Yang [25] noted that meta-analysis is much less useful in ''developing and testing a revolutionarily new theory'' (p. 315) because of its reliance on multiple existing empirical studies.

5.3. Theory building through social constructionist research

Social constructionist research replaces the notions of validity, reliability and generalizability with the notions of confirmability, and authenticity [26]. The social constructionist builds theory with a goal of understanding ''how actors intersubjectively create, understand, and reproduce social situations'' [26, p. 319]. Overall, social constructionist research stands on vastly differing assumptions than those of quantitative research. Social constructionist research particularly lends itself to the individual's ability to understand the phenomenon under investigation [26] and is therefore valuable in deriving the concepts that might later formulate a quantitative model with specified research hypotheses.

5.4. Theory building through case study research

''Case study research is one method that excels at bringing us to an understanding of a complex issue and can add strength to what is already known through previous research'' [27, p. 335]. Some important advantages of case study research are that it can include multiple cases, can include quantitative, qualitative or mixed data, and can accommodate multiple research paradigms [27]. Case study research also provides an immediate tie to evidence, although an inability to recognize which are the most important relationships is a common problem. Case study research presents its greatest strength as a strategy for ''holding together multiple methods'' and multiple cases.

5.5. Theory building through quantitative research

Theory building through quantitative research, specifically Dubin's [28] detailed method, is an empirical view of theory building from start to finish. That is, Dubin's [28] method is comprised of (1) developing the units of the theory, (2) specifying the laws of

interaction describing the relationships among the units, (3) determining the boundaries within which the theory is expected to function, (4) identifying the system states in which the theory is expected to function, (5) specifying the propositions, or truth statements about how the theory is expected to operate, (6) identifying the empirical indicators used to make the propositions testable, (7) constructing hypotheses used to predict values and relationships among the units, and (8) conducting research to test the predicted values and relationships. Dubin's [28] method is comprehensive and sees the process through from the designation of the theory components, to the empirical testing of hypothesized relationships.

5.6. Summary

Each of these research methods is useful in building theory. While standards and criteria for steps of theory building in each method described have yet to be formulated, each marks a distinct approach to theory construction. Examining each of these in relation to scenario planning leads to some interesting insights. Any of these methods could be used to develop a theory of scenario planning, but scenario planning does not necessarily produce theories that could be classified as any of the above. Some authors have argued that scholars must differentiate between mainstream, traditional theories and theories of action [31].

6. Action science

Scenario planning as an intervention aimed at organizational change has been established through a discussion of Van de Ven and Poole's [15] work. Argyris has provided a framework for linking organizational change and theory through what he has termed "action science". Argyris' extensive body of work around action science and theories-in-use began with a core conception of "human beings as designers of action" [31, p. 80]. The action science orientation advocated by Argyris further suggests that individuals "design action to achieve intended consequences, and monitor themselves to learn if their actions are effective" [31, p. 80].

The focus on action to achieve "intended consequences" clearly reflects assumptions from the teleological approach to development and change in organization. That is, theories of action appear to stress the outcomes of the change as designed by humans within organizations. "Designing action requires that agents construct a simplified representation of the environment and a manageable set of causal theories that prescribe how to achieve the intended consequences" [31, p. 81]. The "simplified representation of the environment" can be equated with any given scenario, and the "set of causal theories" might be thought of as the contingencies or possible actions given the factors presented in any one scenario. Argyris' work has established an additional general group of theories—theories of action—which include both espoused theories and theories-in-use. Argyris [31] stated: "Human beings manifest two kinds of theories of action. One that they espouse, and the second that they actually use (theory-in-use)" (p. 79).

6.1. Espoused theories

According to Argyris, espoused theories are simply the principles that individuals claim guide their behavior—the way people think they act. Of course, how people *think* they act

is not always how they actually act. They key to understanding espoused theories is to understand that they are perceptions, first and foremost [21].

6.2. Theories-in-use

Theories-in-use can be described as the principles that guide human action and behavior—something that according to Argyris [31] can differ from the principles *claimed* to guide human action and behavior. Argyris [31] clarified: "Put simply, people consistently act inconsistently, unaware of the contradiction between their espoused theory and their theory-in-use, between they way they think they are acting and the way they really act" [23, p. 89–90]. Lynham [23] wrote:

> Every time we encounter a new issue we first experience it, then we try to observe and understand how that issue presents itself and works. Next we begin to develop a system of ideas, informed from our experience and knowledge of the world and the issue, about how to address the issue. Then we put those ideas to the test by applying them to the issue. If these ideas work then the issue or problem gets satisfactorily addressed. If not, we go back to our own internal drawing boards, and begin the process of problem-solution formulation and application all over again. In effect what we are continuously doing is developing informed knowledge frameworks about how to act on things in our world, thereby formulating ways in which to understand and address issues and problems in the world around us [32]. These informed knowledge and experience frameworks that we apply to our world are simply personal theories-in-use [14].

The importance of discussing "theories-in-use" is that it specifies another domain of theory—particularly theory that can be observed in the actions and behavior of individuals. To clarify, this additional domain of theory is less academic than those others discussed and

Findings—linking scenario construction and theory building.

Linking scenario planning and theory building may not initially seem like a logical connection, and the intricacies of the task provide a considerable challenge. For example, it seems that a process of developing several different plausible futures is akin to developing several different "theories" about the future. Referring to the original problem of prediction, this connection becomes a paradox. But, by introducing Argyris' notion of theories of action (and particularly, theories-in-use) the connection can be made while avoiding the problem of prediction—at least, for the time being.

Argyris stated: "theories-in-use are often tacit cognitive maps by which human beings design action. Theories-in-use can be made explicit by reflecting on action" [31, p. 82]. Thus, if theories-in-use can be described as cognitive maps, the link to scenario planning becomes much more clear as one key goal of scenario planning is to alter the cognitive maps of participants [33, 34, 21,35].

The key means for linking scenario construction and theory building are (1) equating "theories-in-use" with mental models, (2) describing both processes as forms of "disciplined imagination", and (3) examining the parallels between both documented processes.

6.3. Scenario planning to reveal, analyze, share and reconstruct mental models

Argyris used the term "cognitive maps"; however, more recent work has replaced this term with "mental models" (for a discussion of the distinction between these terms, see [36, 29]. Senge [19] identified three stages of an effective organizational learning process: (1) mapping mental models, (2) challenging mental models, and (3) improving mental models. Scenario planning has been shown to meet all three of these stages [37] and the planners at Royal Dutch/Shell Oil had several insights as they pioneered the scenario planning technique. After becoming masters at designing technically magnificent scenarios they realized that by focusing on the scenarios themselves, they were overlooking the core purpose of their work—to alter the mental models of the management teams for whom they were developing plans [19]. Thus, it can be argued that scenario projects that fail, often fail because project participants have not challenged their assumptions about what is true. In short, their mental models have not changed—in this context, their theories-in-use have not changed. Thus, the overall analysis of these bodies of work leads to a general conclusion that scenario building generates "theories of action".

6.4. Disciplined imagination

Both the process of theory building [29] and the process of scenario construction [38] have been described as *disciplined imagination.* Karl Weick [29] wrote: "When theorists build theory, they design, conduct and interpret imaginary experiments. In doing so, their activities resemble the three processes of evolution: variation, selection and retention" (p. 519). After describing an evolutionary process involving a ship and its marine navigation by radar, Weick further stated:

> Theory building involves an analogous process. There is a context which, for the sake of this illustration, will be marine navigation by radar. However, the context now takes the form of a representation built from interviews, accident reports, firsthand observation and intuitions. The problem is why marine captains who use radar often collide with the objects they see on their screen, including other ships that also have radar [39]. To solve this problem, variations in the form of conjectures simulate possible scenarios that could explain the collisions, such as lack of ability, poor equipment design, visual illusions, stress, fatigue, and insurance settlements [29, p. 520].

Let us now consider that the ship in Weick's example is an organization and the navigation system its planning system. The problem is now that organizations often experience problems and "collide with the objects"—some that are obvious and others that are hidden. The scenarist builds scenarios that could explain possible collisions, such as lack of resources, poor organization systems design, lack of expertise and poor leadership or folly. We begin to see some clear parallels between the process of building scenarios and the process of building theories.

6.5. The parallels between scenario construction and theory building

The easiest way to draw the parallel between scenarios and theory building is to describe scenarios as thought trials. The logic is quite simple; the process of building scenarios is

very much like the process of building theories—both are processes based on formulating multiple plausible solutions to a problem. This section details the scenario planning process developed by Schwartz [40]. At each step, similarities and differences between steps in the both processes are considered.

6.5.1. Identify the issue

The importance of identifying the key issue or decision in practical business situations seems obvious and clear. But a lack of articulating the key issue or decision has resulted in problems or failure in the scenario process [39].

Similarly, a lack of articulating a clear problem statement in the conduct of research often leads to vague or misguided findings. Weick [29] clearly stressed the importance of developing clear and concise problem statements in theory building exercises and these are equally as important in any management intervention.

6.5.2. Identify key factors

Key factors are the result of interviews with a cross-section of people within the organization. Interviews are designed to elicit the strategic organizational agenda of executives and managers. Often, line workers and others in the organization are interviewed to get additional perspective. Remarkable people (experts in various disciplines completely unrelated to the issue under examination) are also often used to foster new thinking.

6.5.3. Research driving forces

Driving forces are "the elements that move the plot of a scenario, that determine the story's outcome, the motive, the things that influence the outcomes of events" [40]. These driving forces are identified through research external to the organization. These forces might include things like population demographics, social trends, or new and innovative technologies.

6.5.4. Rank key factors and driving forces

In this step, scenario planners work with members of the organization to rank the key factors and driving forces in terms of their importance and potential impact on the organization. The primary issues are then ranked again according to (1) uncertainty and (2) potential impact.

The identification of key factors, driving forces and the ranking of these items all serve a core purpose that is also evident in theory building. In essence, these steps of the scenario construction process all work to establish the context of the scenarios that will be formed later. These are also critical items in that they must relate to the core concerns of the organizational decision makers.

These items can be thought of Whetten's "Whats as constructs", and the ranking exercise established a categorization that addresses Weick's [29] concerns about heterogeneity among thought trials by providing a multi-level classification system. To clarify, these steps of the scenario construction process provide the constructs that will eventually be the key ideas in the scenarios. Further, the detailed method for reducing these factors to key concerns for a company acts as a complex categorization system that leads to significant variety among the final scenarios, thus introducing considerable variance in the potential solutions to the initial business issue.

6.5.5. Develop scenario logics

The results of the ranking exercise are placed on two axes along which the eventual scenarios will differ. The development and selection of the general scenario logics according to the matrix resulting from the ranking exercise provides the basic plot or defining situation for each scenario. The logic of a given scenario will be characterized by its location in the matrix. "It is more like playing with a set of issues until you have reshaped and regrouped them in such a way that a logic emerges and a story can be told" [40, p. 172].

Developing scenario logics can be likened to the "Hows as relationships". The goal of this phase is to identify how certain variables might interact in a way that challenges or provokes new perceptions and thinking about potential courses of action with regard to the initial business issue. These relationships are described in more detail as the scenario is written in the next step.

6.5.6. Develop scenario details

Step six, fleshing out the scenarios, returns to steps two and three. Each key factor and driving force is given attention and manipulated within the matrix developed in the scenario logics of step four. Plausibility should be constantly checked from this point, for example, "if two scenarios differ over protectionist or non-protectionist policies, it makes intuitive sense to put a high inflation rate with the protectionist scenario and a low inflation rate with the non-protectionist scenario" [40, p. 178]. Implausible scenarios accomplish little in the minds of organization decision-makers because they are simply not believable or relevant to the issue under examination.

The development of scenario details further establishes the relationships among key variables in the story, and also provides the contextual assumptions for the plausibility of the scenario itself. Using "if…then" logic, scenarios are constructed such that the assumptions under which the story stands are made quite clear. That is, the state of certain variables is made clear as well as the conditions that led to the establishment of that state. The logic that undermines the entire process of developing scenario details is like identifying the selection criteria described by Weick [29] for each plausible scenario.

Each scenario, once developed in detail, can be thought of as a theory about the future. Moving forward in the scenario planning process required the investigation of current decision-making and action in light of each of the scenarios developed. Thus, at this point, the scenario *construction* process is complete. The remaining steps consider the robustness of varying organizational courses of action.

6.5.7. Consider implications

Step seven examines the implications of the developed scenarios. The initial issue or decision is "wind tunneled" through the scenarios. It is important to examine the robustness of each scenario through questions such as: Does the decision look good across only one or two scenarios? What vulnerabilities have been revealed? Does a specific scenario require a high-risk, bet-the-farm strategy?

The implications of the scenarios for the organization and its decision-makers are much like the formulation of hypotheses in specific theory building methods [28]. Not all approached to theory building explicitly require the specification of hypotheses, and it could be argued that the identification of hypotheses is beyond the conceptual development phase.

6.5.8. Identify indicators

The final step is to select "leading indicators" that will signify that actual events may be unfolding according to a developed scenario. Once the scenarios have been developed, it is worth spending some time selecting identifiers that will assist planners in monitoring the course of unfolding events and how they might impact the organization [40].

These indicators are also considered to be beyond the conceptual development phase of theory building, but are clearly important components in testing or examining further research agendas in theory building research.

7. Conclusions and implications

The implications of designating scenario planning as a method of theory construction are difficult and unclear. It would be inappropriate to substitute scenario planning for empirical research, however, we might do our best to call scenario planning a mode of "theorizing" [41]. That is, scenario planning seems to have utility in extracting, developing, examining, and refining individual theories-in-use. Thus, linking the two phenomena as has been done in this manuscript may be more beneficial for the practice of scenario planning than for the practice of theory building. However, it seems that there are parallels between these two processes, and theory builders might gain some insight through a look at the process of scenario building as well.

Of particular interest for scenario planning practitioners might be the application or use of theory building techniques in their scenario planning projects. That is, practitioners may provoke discussion in organizations by incorporating case study or empirical techniques. For example, planners at Royal Dutch/Shell were posed with a question of whether or not to build an offshore oil drilling rig in 1973. The process of data gathering is akin to any other kind of research project in organizations, and uses the same kinds of methods. However, the data analysis process, and how these data are reported are where these two phenomena are divided. Scenario construction relies on highly intuitive, ill-defined, and often unknown methods for what events to include in a given scenario, how these events play out in the storyline, and what the culminating conclusion will be for the designated "horizon year". On the other hand, theory building relies on well-documented processes (such as statistical analysis, case study research, grounded theory, meta-analysis, or comparative analysis) to work data toward statements of truth about the events or phenomena. The key conclusion that can be asserted as a result of the arguments presented in this article is that scenario construction can be viewed as an appropriate mode of theorizing. That is, the scenario construction process can be used as a means for developing ideas, concepts and clarifying the thinking in various stages of theory building.

8. Contributions to new knowledge

Scholars have advanced the literature and thinking on theory building considerably [27, 24,9,10,23,42–45, 25]. While there is still much more work to be done in terms of defining specific theory building processes and models [44, 29], the work that has been done provides a strong foundation on which to do so. However, most of the theory building work has drawn specifically from classic authors and attempting to revive their work through updating and further examination and in most cases, and rightly so. It may be worthwhile to examine other means of contributing to the varying methods of theory

building (such as organizational processes like scenario planning, action research, critical inquiry, interviewing, and other modes of assessment and analysis in organizations). This article has provided one such means. Further, this article has described scenario construction as a mode of theory building and suggested that multiple modes of theory building are needed to provide a stronger theoretical basis of scenario planning in general. Ultimately, it seems that the processes of scenario construction and theory building can inform each other and it may be concluded that further modes of "theorizing" are needed as well as are more studies that document the effectiveness of scenario planning with an eye toward building theories of effective scenario planning practice.

References

[1] D. Rigby, Management tools survey 2003: usage up as companies strive to make headway in tough times, Strategy and Leadership 31 (5) (2003) 4–11.
[2] J.A. Pearce, E.B. Freeman, R.B. Robinson, The tenuous like between formal strategic planning and financial performance, Academy of Management Review 12 (4) (1987) 658–675.
[3] T.J. Chermack, S.A. Lynham, Definitions and outcome variables of scenario planning, Human Resource Development Review 1 (3) (2002) 366–383.
[4] C.M. Cristensen, M.E. Raynor, Why hard-nosed executives should care about management theory. Harvard Business Review September (2003) 1–9.
[5] R. Phelps, C. Chan, S.C. Kapsalis, Does scenario planning affect performance? Two exploratory studies, Journal of Business Research 5 (1) (2001) 223–232.
[6] S.B. Bacharach, Organizational theories: Some criteria for evaluation, The Academy of Management Review 14 (4) (1989) 496–515.
[7] R. Carnap, Logical foundations of the unity of science. In: International Encyclopedia of Unified Science, vol. 1, no. 1. University of Chicago Press, Chicago, (1938).
[8] R. Dubin, Theory building in applied areas, in: M.D. Dunnette (Ed.), Handbook of Industrial and Organizational Psychology, Rand McNally, Chicago, 1976, pp. 17–39.
[9] K.M. Eisenhardt, Building theories from case study research, Academy of Management Review 14 (4) (1989) 532–550.
[10] D.A. Gioia, E. Pitre, Multiparadigm perspective on theory building, The Academy of Management Review 15 (4) (1990) 584–602.
[11] K.R. Popper, Objective Knowledge: An Evolutionary Approach, Clarendon Press, Oxford, 1972.
[12] W. Stegmuller, The Structure and Dynamics of Theories, Springer, New York, 1976.
[13] W. Stegmuller, The Structuralist View of Theories, Springer, New York, 1979.
[14] C. Argyris, D.A. Schon, Organizational Learning II. Theory, Method, and Practice, 1996.
[15] A.H. Van de Ven, M.S. Poole, Explaining development and change in organizations, Academy of Management Review 20 (3) (1995) 510–540.
[16] P.J.H. Shoemaker, Disciplined imagination: from scenarios to strategic options, International Studies of Management and Organizations 29 (2) (2001) 43–70.
[17] C. Cerf, V. Navasky, The Experts Speak: The Definitive Compendium of Authoritative Misinformation, Pantheon Books, New York, 1984.
[18] G. Ringland, Scenario planning: Managing for the future, Wiley, New York, 1998.
[19] P. Senge, Learning to alter mental models, Executive Excellence 11 (3) (1994) 16–17.
[20] K. van der Heijden, Scenarios: The Art of Strategic Conversation, Wiley, New York, 1997.
[21] T. Uotila, H. Melkas, V. Harmaakorpi, Incorporating futures research into regional knowledge creation and management, Futures 37 (8) (2005) 849–866.
[22] P. Wack, Scenarios: shooting the rapids, Harvard Business Review 63 (6) (1985) 139–150.
[23] S.A. Lynham, The general method of theory-building research in applied disciplines, Advances in Developing Human Resources 4 (3) (2002) 221–241.
[24] T.M. Egan, Grounded theory research and theory building, Advances in Developing Human Resources 4 (3) (2002) 277–295.
[25] B. Yang, Meta-analysis research and theory building, Advances in Developing Human Resources 4 (3) (2002) 296–316.

[26] S. Turnbull, Social construction research and theory building, Advances in Developing Human Resources 4 (3) (2002) 317–334.
[27] L.M. Dooley, Case study research and theory building, Advances in Developing Human Resources 4 (3) (2002) 335–354.
[28] R. Dubin, Theory Building, rev ed., The Free Press, MacMillan, New York, 1978.
[29] K.E. Weick, Theory construction as disciplined imagination, Academy of Management Review 14 (4) (1989) 516–531.
[30] R.G. Niemi, in: F.M. Wolf (Ed.), Quantitative Applications in the social Sciences, vol. 59, Sage Publications, Beverly Hills, CA, 1986, pp. 07–059.
[31] C. Argyris, Action Science: Concepts, Methods,and Skills for Research and Intervention, Jossey-Bass, San Francisco, 1985.
[32] M. Alvesson, S. Deetz, Doing Critical Management Research, Thousand Oaks: Sage Publications, London, 2000.
[33] J.D.W. Morecroft, Rationality in the analysis of behavioral simulation models, Management Science 31 (7) (1985) 900–916.
[34] T.J. Chermack, S.A. Lynham, W.E.A. Ruona, A Review of Scenario Planning Literature, Futures Research Quarterly 17 (2) (2001) 7–31.
[35] K. Warren, Exploring competitive futures using cognitive mapping, Long Range Planning 28 (5) (1995) 1–9.
[36] D.N. Ford, J.D. Sterman, Expert knowledge elicitation to improve formal and mental models, Systems Dynamics Review 14 (4) (1998) 309–340.
[37] N.C. Georgantzas, W. Acar, Scenario-driven Planning: Learning to Manage Strategic Uncertainty, Quorum, Westport, CT, 1995.
[38] P.J.H. Shoemaker, Scenario planning: a tool for strategic thinking, Sloan Management Review 37 (2) (1995) 25–40.
[39] C. Perrow, Normal Accidents: Living with High Risk Technologies, Princeton University Press, Princeton, NJ, 1999.
[40] P. Schwartz, The Art of the Long View, New York, Doubleday, 1991.
[41] K.E. Weick, What theory is not, theorizing is, Administrative Science Quarterly 40 (3) (1995) 385–390.
[42] R.A. Swanson, The foundations of performance improvement and implications for practice, Advances in Developing Human Resources 1 (1) (1999) 1–25.
[43] R.J. Torraco, Theory-building research methods, in: R.A. Swanson, E.F. Holton III (Eds.), Human Resource Development Research Handbook: Linking Research and Practice, Berrett-Kohler, San Francisco, 1997, pp. 114–137.
[44] R.J. Torraco, Challenges and choices for theoretical research in human resource development, Human Resource Development Quarterly 15 (2) (2004) 171–188.
[45] A.H. Van de Ven, Nothing is quite so practical as good theory, Academy of Management Review 14 (4) (1989) 486–489.