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The Effects of Scenario Planning on Participant Decision-Making Style: A Quasi-Experimental Study of Four Companies

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Abstract

This research examines changes in participant decision-making styles as a result of participation in scenario planning. Results indicate that participants tend to shift toward more intuitive-based decision-making styles after participating in scenario planning. These findings support and add further evidence to previous investigations into decision-making style and scenario planning. To explore this relationship, we employed a quasi-experimental pretest-posttest one-group design with scenario planning as the intervention. Confirmatory factor analysis provided validity of measurement scores and pair samples t tests were used to test hypotheses on the five factors of the General Decision-Making Styles Survey (GDMS). This study documents the responses from participants (n = 170) from 10 organizations using the General Decision-Making Style Survey.

Keywords: Scenario planning, decision-making styles, mental models, strategic thinking, long-range planning

Introduction

Making effective decisions in changing and complex environments is a concern of many organizations, and this topic has captured the interest of both scholars and practitioners (Cummings & Worley, 2009; Georgantzas, 1995; Visser & Chermack, 2009). A multitude of issues, limited time, and existing and potential competitors contribute to the complex environments where decisions must be negotiated (Simon, 1979). Decision making is challenged by the wide differences of people and their unpredictable behavior, distinctive traits within departments, changing technologies, and organizational and individual goals (Bolman, 2008; Phadnis, Caplice, Sheffi, & Singh, 2014). Good decision making requires an understanding of theoretical foundations, the use of valid managerial tools, wise application of skills, and grace (Bolman, 2008). Decisions made well are likelier to move complex organizations forward, away from troublesome situations (Bolman, 2008; Epstein & Widener, 2010; Malone, 2003; Salaman, 2003; Wise, 2010).

The process of making decisions is inherent to organizations and ostensibly an important responsibility of organizational administrators (Browne, 1993). Several authors have suggested that the decision making process involves an orderly series of steps (Allison, 1971; Anderson, 1973; Isenberg, 1986; Mintzberg, 2004; Mintzberg, Raisinghani, & Theoret, 1976). Typically these steps are defining the issue, clarifying the important characteristics of the problem, discussing and creating possible choices, judging and selecting a best choice, and finally acting on that choice (Mintzberg, 2004). Others have proposed that decisions are made based on individual values and beliefs that influence the framing of the problem, the collection of data, and the evaluating of possible decision choices (Fredrickson, 1985; Kreiner, 1976; March, 1994). Further, different types of decisions require different styles of decision-making (Chermack & Nimon, 2008). Although some decisions may best be made using a logical analytical style, others would be better made using creative thought. While some decisions require a "vigilant, analytical information processing style, others call for creativity and novelty" (Chermack & Nimon, 2008, p. 351). Planning in today's high-velocity business context requires unique capacity for decision making, including thinking differently and approaching decisions with flexibility and agility (Chermack & Nimon, 2008).

Strategic planning involves gathering information, exploring alternatives, and understanding the future implications of present decisions (Bryson, 2004). This two phase process includes: (1) formulating ideas and strategies associated with opportunity, competence and resources, personal values and aspirations, and acknowledged obligations, and (2) implementing through structure, processes and behaviors, and leadership (Andrews, 1971). The responsibility for this process rests with the executives, who in turn allocate the necessary resources to managers to put the plan into action (Chandler, 1990; Georgantzas, 1995). Breaking from this thinking, Mintzberg (2004) argued that the process was more involved and needed to account for the interactions between planners, managers and the resources.

As thinking shifted, an alternative model for planning and decision-making, scenario planning, gained attention, notably for its ability to account for the uncertainty prevalent in business (Burt & van der Heijden, 2003; Chermack, 2005; Wack, 1985a). Practitioners of scenario planning have proposed that innovation, creativity, and ongoing organizational learning may have important implications for

decision making and encourage thinking about uncertainty (Schwartz, 1996; van der Heijden, 1997; Wack, 1985b). Wack (1985a) captured this shift in thinking:

> *Scenarios can be used to deal with two worlds: the world of facts and the world of perceptions. They explore for facts but they aim at perceptions inside the heads of decision makers. Their purpose is to gather and transform information of strategic significance into fresh perceptions. This transformation process is not trivial – more often than not it does not happen. When it works, it is a creative experience that generates a heartfelt "Aha!" and leads to strategic insights beyond the mind's previous reach. (p. 3)*

As an intervention, scenario planning attempts to provide the participants an opportunity to explore ideas and challenge existing points of view (Chermack, 2011; Schwartz, 1991; Wack, 1984a). This is possible because scenario planning encourages participants to develop and articulate stories about alternative future situations. In this environment they are free to imagine and test how their decisions may take shape and eventually implemented (Schwartz, 1991).

As a tool for learning, scenario planning can help an organization grow so it becomes cognitively healthier, more perceptive with a heightened awareness of itself or its industry and is less likely to get caught off guard in an environment of uncertainty (Chermack, 2011; Schwartz, 1991; van der Heijden, 1997).

The need to address increased uncertainty is clearly evidenced in both the decision making and scenario planning literature. Moreover, the case has been made to suggest scenario planning presents a viable development tool for decision making (Chermack, 2004; Chermack & Nimon, 2008; Schoemaker, 1995; van der Merwe, 2008; Wack, 1985a). However, scholarship has yet to establish substantial empirical evidence to support this notion.

Purpose of the Study and Research Question

The highly volatile and unpredictable nature of the environments in which decision makers operate suggests certain decision-making styles might be more productive and positively impactful over time. The purpose of this study is to contribute additional research to the scenario planning and decision making literature by evaluating the relationship between scenario planning and decision-making styles. This inquiry replicates previous studies that have sought to understand this relationship (Chermack, 2004; Chermack & Nimon, 2008). Thus, our research question is:

> *RQ1: Does scenario planning affect individual decision making styles as measured by the General Decision Making Style Survey?*

To satisfy this research question, we used the GDMS to see if scenario planning encouraged greater use of any particular style; each of the five decision-making styles is framed with a corresponding hypothesis. Additionally, we provide background on the instrument selected for the investigation. The five decision-making styles have been identified as rational, intuitive, dependent, avoidant, and spontaneous (Scott & Bruce, 1995). These styles are described in the following section and include research hypotheses.

Decision Making Styles

Research on decision-making in organizational contexts has had a primary focus on the tasks and situations that influence decision outcomes rather than on the characteristics of decision outcomes (Scott & Bruce, 1995). Decision-making style is defined as "a habitual pattern individuals use in decision making" (Driver, 1979, p. 12). Further, decision-making characteristics refer to personality traits which govern the person's perception of the tasks and situational factors (Harren, 1979).

Most people have a preferred decision-making style that they will resort to unless situational factors interfere (Harren, 1979). From their prior theorizing and empirical research, Scott and Bruce (1995) identified five behavioral terms that are referred to as decision-making styles: (1) rational, "characterized by a thorough search for and logical evaluation of alternatives" (p. 820); (2) intuitive, "characterized by a reliance on hunches and feelings" (p. 820); and "focusing on an intuitive sense of "rightness" about decisions" while being "open to alternatives in problem formulation" (p. 823); (3) dependent, "characterized by a search for advice and direction from others" (p. 820); (4) avoidant, is "characterized by attempts to avoid decision making" (p. 820); and (5) spontaneous, which is characterized by having a "sense of immediacy and a desire to get through the decision-making process as soon as possible" (p. 823). They found consistently that individuals predominantly prefer one style, and that while some individuals might combine styles under various circumstances, conflicting styles are rarely used together (Scott & Bruce, 1995). As a result of their research the General Decision-Making Style Survey (GDMS) was developed.

The intent of the GDMS is to measure participant decision-making tendencies (Chermack & Nimon, 2008). Scott and Bruce (1995) found that "individuals do not rely on a single decision-making style" but "use a combination of decision-making styles in making important decisions" (p. 829). With this in mind, it was imperative that an instrument (GDMS) be developed that could distinguish between each of the decision making styles in order to identify the most prevalent style used at that time.

In summary, the General Decision Making Styles Survey measures the "habitual pattern individuals use in decision making" (Driver, 1979, p. 59). The use of the GDMS may help explain the extent scenario planning influences an individual's decision-making style. A brief description of each style is provided here, and a summary comparison is provided in Table 1.

Table 1. *Five Decision-Making Styles*

Style	Rational	Intuitive	Dependent	Avoidant	Spontaneous
Key features	Driven by logic; prefers ordered steps to reach conclusions. Believes there is one "best" decision or option.	Driven to listen to "hunches" or "gut feelings." Able to leverage prior experience to inform thinking.	Reliant on input from others; advice seeking orientation and desire to collect information from a variety of sources.	Evasive tendency to dodge challenging problem-solving situations.	Dominated by a sense of urgency to make decisions as quickly as possible; prone to "snap" judgments.
Pitfalls	More likely to overlook potentially viable solutions if they do not fit the "best" or "most logical" mold.	Difficult to explain decision-making pathway to others; potentially biased emotionally.	Less confident decision making potentially limits options.	Unlikely to engage or take necessary steps to make decisions in critical situations.	Impulsivity may lead to failure to connect vital information from different sources.

Rational Decision-Making Style

The Rational Decision-Making style relies on a system of thinking based on logic and ordered steps to reach conclusions. Characteristic of this style is the belief that sound judgment leads to reliable and correct inferences. According to Mintzberg (2004), issues are reduced to separate components followed by orderly steps taken to analyze the information in each component. The conclusions arrived at by following these steps can be applied to a variety of situations.

Inherent in this style is the belief that there is one decision that is more advantageous than others – or a "best" decision. Thus, those who prefer this decision-making style assume it ensures the most advantageous outcome will result from its' use (van der Heijden, 1997).

Scott & Bruce (1995) suggested the rational decision-making style limits the variety of viable decisions. The features of this style preclude how the problem is expressed and as a result, desirable solutions are overlooked. In essence, the use of this style supposes that the information available is accurate, absolute, stable and without political bias. Through scenario planning, participants contemplate potential outcomes through a series of stories about the future. Though they are able to think logically about the future, they are also forced to consider broader ranging, divergent, and less rational possibilities. As such, we suggest in our first hypothesis:

> Hypothesis 1: *Individuals who engage in scenario planning will tend to use a less rational decision-making style.*

Intuitive Decision-Making Style

The Intuitive Decision-Making Style depends on educated guesses, or hunches, from past experience to come to a decision. Intuitive decision makers are often perceived as making decisions without conscious reasoning. However, individuals using this style have vast experiences that provide them with cognitive awareness of prior situations and relevant data to make a decision. This wealth of past experience and data led them to "…feel the rightness about decisions..." (Scott & Bruce, 1995, p. 823).

This style relies on emotion and feeling to direct decisions; consequently, the process used to arrive at the decision cannot be explained by others. According to Burke and Miller (1999), using emotion or gut feeling based on past experience is "an increasingly viable approach in today's business environment" (p. 91).

Emotional bias might affect this style, and those who gravitate toward it base decisions on personal past experiences (MacCrimmon & Wehrun, 1990). As a result, their reflections on past situations and patterns of making decisions affect their viewing of the current situation. Because the scenario planning experience encourages participants to consider a wide range of possibilities, the process actually bolsters intuition while at the same time providing a context in which collaboration is strengthened through dialogue and conversation. As such, we framed our second hypothesis as follow:

> Hypothesis 2: *Individuals who engage in scenario planning will tend to use a more intuitive decision-making style*.

Dependent Decision-Making Style

Basic to the Dependent Decision-Making style is an attempt to find assistance on how to proceed in making a decision. According to Scott & Bruce (1995), "An external orientation, or the belief that one's fate is not self-controlled, is likely to be associated with dependent decision-making, where responsibility for decisions are projected onto others" (p. 822). In short, dependent decision-makers are likely to abdicate the responsibility of decision making to others they view as more competent than they are.

Scott & Bruce (1995) suggested that although dependent decision-makers grapple with problems, they are inclined to do so with less confidence. This lack of confident struggling limits alternative ways to shape problems and ultimately, limits the possible decisions that could be made. In scenario planning, participants must work together to discuss critical uncertainties in their environments. This highly collaborative and engaging process compels them to see each other's perspectives more openly. Thus, our third hypothesis:

> Hypothesis 3: *Individuals who engage in scenario planning will tend to use a more dependent decision-making style*.

Avoidant Decision-Making Style

The avoidant decision-making style is characterized by efforts to evade thinking through problems and their solutions. Possibly, avoidant decision-makers expect resolution to the problem without personal effort. As Scott & Bruce (1995) suggested, "…the avoidant decision-making style may result, in part, from a lack of confidence in one's decision-making ability…" (p. 822). The avoidant decision-makers' lack of confidence hinders their involvement in both the process of problem

formulation and developing a list of potential solutions. The process of scenario planning forces participants to work together to confront the uncertainty and volatility in their decision-making context. Therefore, our fourth hypothesis is:

> Hypothesis 4: *Individuals who engage in scenario planning will tend to use a less avoidant decision-making style.*

Spontaneous Decision-Making Style

The spontaneous decision-making style is typified by a "sense of urgency to reach a decision as soon as possible" (Scott & Bruce, 1995, p. 823). Spicer and Sadler-Smith (2005) described spontaneous decision-makers as "impulsive and prone to making snap or spur of the moment decisions" (p. 138). Just as it requires participants to work together, scenario planning also dictates that participants will think thoroughly through different options in a variety of possible futures. As a result, the fifth hypothesis in our study is:

> Hypothesis 5: *Individuals who engage in scenario planning will tend to use a less spontaneous decision-making style.*

The Intervention: Scenario Planning

Scenario planning has been described as a tool for strategic thinking that promotes an exploration of future imagined outcomes and a variety of potential options that can be readied and applied to a wide range of issues (Chermack, 2011; Malaska, 1985; Mitchell, Shepherd, & Sharfman, 2011; Schoemaker, 1995; Wiltbank, Dew, Read, & Sarasvathy, 2006). Improved or changed decision-making ability is generally purported to be one of the key outcomes of scenario planning (Chermack & Lynham, 2002; Ogilvy, 2005; Schoemaker, 1991; Schwartz, 1996).

A variety of scenario planning methods are described in the literature, but for this study, the approach chosen came from the work of Chermack (2011) in his foundational study on the practice and application of the process. This model was selected because of its specific step-by-step guidelines, as well as for its increasingly well-established reliable and replicable results in the literature. Chermack (2011) based his method on the process created at Royal Dutch Shell and detailed in the writings of Pierre Wack (1984) and Peter Schwartz (1991).

In this approach, there are five phases of work: project preparation, scenario exploration, scenario development, scenario implementation, and project assessment. Given the timeline for this study, the first four phases were included. Project assessment is an ongoing and longer-term process typically undertaken by the organization following the completion of the formal consultant project (Chermack, 2011). A brief description is provided here for each of the four included phases.

Project Preparation

During project preparation, the research team engaged with the client groups to outline the scope of the project. This included working with organization leaders to craft a framing question for the scenario projects. Additionally, interviews were conducted with leaders to discuss their major critical uncertainties about their organizations and environments.

Scenario Exploration

In the scenario exploration phase, often referred to as "breathing in" (Wack, 1984), the research team worked to develop a clear understanding of the organizations operating environment and history (van der Hejden, 1996; Wack 1984). This is accomplished through literature review, SWOT or STEEP analysis, and analysis of the organization's background (Chermack, 2011).

Scenario Development and Implementation

To develop the scenarios, the research team hosted a series of workshops with organization participants. While the workshop structure can be customized to the available time for each organization, the standard approach includes two to three workshops. In the first workshop, participants brainstorm all critical uncertainties in their industry, focusing on the framing question provided by their leaders. They force rank these items according to impact and uncertainty, and generate a 2x2 matrix with two of the high-impact, high-uncertainty variables for axis labels. Finally, they create a guiding theme or metaphor, naming each quadrant.

In the second workshop, participants read the scenarios created by the research team. The scenarios leverage all the critical uncertainty items from the first workshop, as well as details and information from the breathing in process. Participants respond to the scenarios, providing feedback around plausibility.

In the final workshop, participants read the revised scenarios and then work through key decisions they must make as an organization, plotting the risk and return of different decisions in each of the four scenarios. The output of this process is a graph showing the risk and return ranking of each decision in each potential version of the future. This information guides the organization in implementing the scenarios – using the stories to craft strategy for next steps.

Method

This section describes the sample, instrument, data collection, and analysis procedures. It then presents the hypotheses that were the basis of this study along with the results of the survey of decision making styles.

Sample

The sample population for this study was derived from participants involved in scenario planning projects conducted over the past two years. Participants in this study consisted of line workers, mid-level and senior managers, and executives from ten organizations located in four geographic regions in the United States. From this sample, a total of 170 matched pre/posttest respondents were utilized in the research. An added element of the research design was to gather a comparison group. Additional input was collected from 44 participants who did not participate in the scenario planning intervention. The comparison group participants were chosen based on their willingness to participate and to complete both the pre- and posttests. No data were missing in any of the collected surveys.

Demographic data representing organizations and participants being reported here does not represent the entire population and is a limitation of this study. We were able to obtain demographic data from 87 of the 170 scenario planning participants and all 44 of the comparison group participations, reported in Table 2.

Although the demographic data is limited, it does provide some insights about both the organizations and participants represented in this study.

Some organizational demographics of note include a respondent population (n = 53, 60.9%), representing companies from the west. Of the participating organizations, 89.6% have less than 1000 full-time equivalent (FTE) employees with 93.1% of those organizations having annual revenues between $1 million and $500 million. Overall, participating organizations were small to mid-size companies with less than 1000 employees.

Table 2. *Description of the Organizations*

Demographic Variable	*N*	%	*valid* %
Organization Age			
0 - 5 years	34	19.1	39.1
6 - 10 years	7	3.9	8.0
11 - 15 years	6	3.4	6.9
16 - 20 years	19	10.7	21.8
20 + years	20	11.2	23.0
Total	87	48.4	100
Number of Full-Time Equivalents (All Locations)			
100 or less	23	12.9	26.4
101 - 500	29	16.3	33.3
501 - 1000	26	14.6	29.9
1001 - 10,000	7	3.9	8.0
10,001 +	0	0	0
Total	87	48.4	100
Geographic Location			
Northeast *	15	8.4	17.2
Midwest	4	2.3	4.6
South	14	7.9	16.1
West	53	29.8	60.9
Total	87	48.4	100
Annual Revenue (Rounded to Millions)			
Less than $1 million	0	0	0
$1 million - $10 million	30	16.9	34.5
$11 million - $50 million	27	15.2	31.0
$51 million - $500 million	24	13.5	27.6
$501 million - $1 billion	5	2.8	5.7
$1 billion - $10 billion	0	0	0
$11 billion - $50 billion	0	0	0
$51 billion +	0	0	0
Total	87	48.4	100
Classification			
For Profit	54	30.4	62
Not-for-Profit	33	18	38
Total	87	48.4	100

In addition to collecting the organization demographics, table 2 reports the participant demographic data. Overall, 39.1% of participants had been in their organization for two years or less, with 64.4% of responses coming from female participants. 36.8% of participants identified themselves as mid-level managers, and 74.7% of participants had no prior experience with scenario planning.

Instrument

The instrument used in this study was the General Decision-Making Style (GDMS) Survey, developed by Scott and Bruce (1995) and further evaluated by Loo (2000), Spicer and Sadler-Smith (2005), Thunholm, (2004), and Gambetti, Fabbri, Bensi and Tonetti (2008). The General Decision-Making Style Survey consists of twenty-five items that measure decision-making tendencies based on five independent styles: (1) rational, (2) intuitive, (3) dependent, (4) avoidant, and (5) spontaneous. Each item is scored on a five-point Likert-type scale, with response categories ranging from strongly disagree to strongly agree (Chermack & Nimon, 2008).

Validity. The authors of the GDSM thoroughly analyzed the instrument, assessing the validity and reliability of their original survey scores. Initial exploratory factor analysis results showed five unique factors. Independent researchers have also reviewed the GDSM and have ascertained it to have face and content validity.

Reliability. Further studies have used the GDMS and have added to the validity and reliability strength of the instrument. The one consistent point of feedback to enhance the acceptability further is to test is across cultures, since different cultural standards for decision-making may provide additional information (Thunholm, 2004; Chermack & Nimon, 2008). When the instrument was developed and validated, coefficient alpha scores were all above .79, showing a reasonable reliability of data (Scott & Bruce, 1994).

Table 3. *Demographic Data for Treatment and Control Groups*

	Treatment		Control	
Demographic Variable	*N*	%	*n*	%
Tenure in Organization				
0-2 years	34	19.1	7	15.9
3-5 years	25	14.0	4	9.1
6-10 years	16	9.0	15	34.1
10+ years	11	6.3	18	40.9
Total	87	100	44	100
Gender				
Female	56	31.5	20	54.5
Male	30	16.9	20	45.5
Total	87	100	44	100
Position			21	47.7
Line Worker	15	8.4	21	47.7
Mid-Level Manager	32	18.0	8	20.5
Senior Manager	25	13.5	9	20.5
Executive	15	8.4	5	11.4
Total	87	100	44	100
Prior Experience with Scenario Planning				
None	65	36.5	18	40.9
Some (1-3 scenario exercises)	18	10.1	16	36.4
Moderate (3+ scenario exercises)	2	1.1	5	11.4
Total	87	100	44	100

Data Collection

The purpose of using the pre-test posttest method was to determine to what level scenario planning impacted the participants' decision-making style. Prior to beginning the initial scenario planning work session, participants were asked to complete the GDMS survey to assess their preferred decision-making styles. Participants were asked to complete the same survey again at the end of the scenario planning work session. Survey data were entered into IBM SPSS, Version 19 for Windows software for statistical analysis.

Analysis

This study was based on a quasi-experimental, pretest-posttest design with a treatment group and a control group (Shadish, 2002). Two data analysis strategies were conducted and included paired samples t-tests, to support or refute the five hypotheses and a confirmatory factor analysis (CFA), for assessing how significant survey questions related to the five decision-making styles constructs (Field, 2009). Each paired t-test compared pre-test mean scores to posttest mean scores for each of the five decision-making styles in both the treatment and control groups. In both the treatment and control groups, data were found to be normally distributed.

Results

This section presents the results of a reliability analysis for each factor and the five paired samples t tests with effect size. Table 4 presents the comparison of treatment and control groups across all decision-making styles for both pre- and posttests.

Table 4. *Comparison of Treatment and Control Groups on Decision-Making Styles*

Variable	*Mpre*	*Mpost*	*M*	*SD*	*t*	*df*	*p*	*d*
Rational								
Treatment	3.78	2.71	1.06	.99	14.00	169	.000	1.31
Control	2.97	2.96	.01	.81	.08	42	.940	.01
Intuitive								
Treatment	2.91	4.02	-1.11	.92	-15.74	169	.000	1.51
Control	2.68	2.66	.03	.86	.21	42	.833	.02
Dependent								
Treatment	2.85	3.57	-.73	.89	-10.61	169	.000	1.03
Control	2.89	2.96	-.07	1.31	-.35	42	.730	-.05
Avoidant								
Treatment	2.36	1.67	.69	1.21	7.37	169	.000	.73
Control	2.31	2.77	-.46	1.01	-2.95	42	.005	-.46
Spontaneous								
Treatment	2.54	1.85	.69	1.23	7.27	169	.000	.73
Control	3.01	2.94	.07	.78	.55	42	.59	.09

* Significant at $\alpha < .05$
**Significant at $\alpha < .01$

Table 5. *Medians for Decision-Making Styles by Condition*

DM Style	Treatment (n=107)			Comparison (n=44)		
	Pretest	Posttest	Delta	Pretest	Posttest	Delta
Rational	3.78	2.71	-1.07	2.97	2.96	-.01
Intuitive	2.91	4.02	1.11	2.68	2.65	-.03
Dependent	2.85	3.57	.72	2.89	2.96	-.07
Avoidant	2.36	1.67	-.69	2.31	2.77	.46
Spontaneous	2.54	1.85	-.69	3.00	2.94	-.06

Hypothesis One – Rational Decision-Making Style

A paired samples *t* test was conducted to compare Rational Decision-Making (RDM) pretest and posttest scores for both treatment and control groups. There was a significant difference in treatment group for the RDM pretest ($M = 3.78$, $SD = .83$) and posttest ($M = 2.71$, $SD = .80$) scores; $t\ (170) = 14.01$, $p < .001$, $d = 1.31$. The change is statistically significant with a greater than large effect size (Cohen, 1988). In the control group, there is not a significant difference between the pretest

and posttest results (p = .940). Specifically, the results suggest that when individuals engage in scenario planning they will tend to use less rational decision-making.

Hypothesis Two – Intuitive Decision-Making Style

A paired samples t test was conducted to compare Intuitive Decision-Making (IDM) pretest and posttest scores for both the treatment and control groups. There was a significant difference in the IDM pretest (M = 2.91, SD = .87) and posttest (M = 4.02, SD = .58) scores; t (170) = -15.74, p < .001, d = 1.51. The change is statistically significant with a greater than large effect size (Cohen, 1988). In the control group results, there is not a significant difference between pre- and posttest (p = .833). These results suggest that when individuals engage in scenario planning they tend to use more intuitive decision-making.

Hypothesis Three – Dependent Decision-Making Style

The paired samples t test was conducted to compare Dependent Decision-Making (DDM) pretest and posttest scores in both the treatment and control groups. There was a significant difference in the DDM pretest (M = 2.85, SD = .72) and posttest (M = 3.57, SD = .68) scores; t (170) = -10.61, p < .001, d = 1.03. The change is statistically significant with a greater than large effect size (Cohen, 1988). Once again, in the control group, there was not a significant difference between pretest and posttest (p = .730). Such results suggest that when individuals engage in scenario planning they tend to use more dependent decision-making.

Hypothesis Four – Avoidance Decision-Making Style

A paired samples t test was conducted to compare Avoidant Decision-Making (ADM) pretest and posttest scores. There was a significant difference in the ADM pretest (M = 2.36, SD = 1.21) and posttest (M = 1.67, SD = .57) scores; t (170) = 7.37, p < .001, d = .73. The change is statistically significant with a large effect size (Cohen, 1988). In this test, the control group showed a significant difference between the pre- and posttest (p = .005, M = -.46, SD = 1.21). However, there was a small effect size (d = -.46) (Cohen, 1988). These results suggest that when individuals engage in scenario planning they tend to use less avoidant decision-making.

Hypothesis Five – Spontaneous Decision-Making Style

A paired samples t test was conducted to compare Spontaneous Decision-Making (SDM) pretest and posttest scores. There was a significant difference in the SDM pretest (M = 2.54, SD = 1.13) and posttest (M = 1.85, SD = .73) scores; t (170) = 7.27, p < .001, d = .73. The change is statistically significant with a large effect size (Cohen, 1988). In the control group, there was not a significant difference between pre- and posttest results (p = .590). Specifically, our results suggest that when individuals engage in scenario planning they will tend to use a less spontaneous decision-making style.

A confirmatory factor analysis was run on the twenty-five items to determine how well the data fit the five decision-making styles (constructs). Table 6 presents factor loadings for each of the items.

Table 6. *Summary of Confirmatory Factor Analysis of Five Decision-Making Styles Scores*

	Factor Loading					
Factor	Rat	Int	Dep	Avo	Spn	Com
1. I plan my important decisions carefully.	.62					.46
2. I double-check my information sources to be sure I have the right facts before making decisions.	.88					.80
3. I make decisions in a logical and systematic way.	.84					.79
4. My decision making requires careful thought	85					.77
5. When making a decision, I consider various options in terms of a specific goal.	.79					.65
6. When making decisions, I rely upon my instincts.		.88				.75
7. When I make decisions, I tend to rely on my intuition.		.85				.84
8. I generally make decisions which feel right to me.		.70				.64
9. When I make decisions, it is more important for me to feel the decision is right than to have a rational reason for it.		.55				.55
10. When I make a decision, I trust my inner feelings and reactions.		.74				.68
11. I often need the assistance of other people when making important decisions.			-.57			.57
12. I rarely make important decisions without consulting other people.						.31
13. If I have the support of others, it is easier for me to make important decisions.			-.76			.63
14. I use the advice of other people in making my important decisions.			-.95			.70
15. I like to have someone steer me in the right direction when I am faced with important decisions.				.72		.57
16. I avoid making important decisions until the pressure is on.				.88		.82
17. I postpone decision making whenever possible.				.90		.89
18. I often procrastinate when it comes to making important decisions.				.76		.89
19. I generally make important decisions at the last minute.				.76		.85
20. I put off making many decisions because thinking about them makes me uneasy.				.68		.86

21. I generally make snap decisions.						-.66	.86
22. I often make decisions on the spur of the moment.						-.81	.88
23. I make quick decisions.						-.86	.88
24. I often make impulsive decisions.						-.65	.83
25. When making decisions, I do what seems natural at the moment.						-.75	.82
Eigenvalues	10.45	4.33	2.07	1.54	.96		
% of variance	40.99	16.21	7.14	4.95	2.87		

Note. Factor loadings < .4 are suppressed

Discussion

These results confirm previous findings on the influence scenario planning has on participant perceptions of decision-making style. As we hypothesized, participants perceived their decision-making style to become more intuitive and dependent, as well as less rational, avoidant, and spontaneous decision-making styles. The increased tendency toward intuition illustrates the outcome of scenaric thinking: working through multiple complex and divergent future possibilities is, in a way, like creating memories of the future. By reading the stories and considering the potential outcomes of different strategic choices in various versions of reality, participants essentially get to live through what could be, and they gain an insight and awareness about how their choices might play out in any version of their world. They become more intuitive because they get better at piecing together and seeing clearly through the available information from their environment.

Similarly, the movement toward dependent thinking signals the highly collaborative, intensely interactive nature of the scenario planning process. Because they have the opportunity to hear each other's assumptions as they work to divulge their own, participants come to see their decisions – even their thoughts and actions – as deeply interconnected to those around them. The nature of this experience leads participants to recognize the need for stronger collaboration in their decision making. Ultimately, it becomes increasingly apparent that decision-making in a vacuum is a particularly risky action; the invaluable information that can be attained through communication with others is thrown into high relief.

Summary

There is evidence that individuals experienced shifts in their decision-making styles after engaging in scenario planning sessions. While not all individuals experienced the same level of change, scenario planning seems to be an effective method to move individual decision-making styles from pretest levels. Further, the control group illustrates that a degree of increased rigor over simple pre- and post-tests with a treatment group was achieved.

Limitations

There are six limitations to this research that should be considered, those being,1) lack of a control group, 2) no random assignment, 3) the use of perception-based measures, 4) possible pre-test influences, 5) social desirability of responses, and 6) partial demographic data. Each of these limitations is discussed below and includes suggestions for improving future research.

Perception-based measures

This study was based on self-reported, non-objective measures of decision-making style. In a similar study, Chermack and Nimon (2008) identified this same limitation and explained, "this study is working with perception-based data, which are less reliable in general than objective, observable measures of decision-making style and performance" (p. 367). They further described decision making as a "complex phenomenon" for which "there is no agreement on how to measure, assess, and evaluate decision-making performance" (p. 367).

Pre-test influence

There appears to be three issues that may be at play here. First, it is possible that merely taking the pretest prior to the scenario planning workshops may have influenced posttest results. Second, the time interval between survey administrations may have affected the underlying concepts being measured. Third, test-retest "memory" in which subjects remember their responses from the initial trial and are able to reproduce on subsequent trials (Carmines, 1989). To counter the influence of "memory", adjusting the time interval between pretest and posttest may help to minimize those affects (Carmines, 1979).

Social desirability of responses

A drawback with self-reported measures is their probable susceptibility to social desirability and response bias, thus impacting the validity of data (Arnold & Feldman, 1981). To counter this, researchers will insert specific questions in their surveys that can determine susceptibility to faking (Chermack & Nimon, 2008).

Partial demographic data

It is not uncommon in social science research to find missing data. According to Adèr, Mellenbergh, & Hand (2008), "missing information may seriously threaten data quality and thus, complicate the data analysis and a reliable interpretation of the results. …Sometimes, information cannot be obtained during the administration of a survey" (p. 310). Various situations in this study did not allow for the collection of demographic data. Although this was the case, the missing demographic data did not impact answering the overarching research question in this study.

Conclusions and Implications for Future Research

This study demonstrated that scenario planning has an effect on participant decision-making style. Specifically, scenario planning decreased rational decision-making, avoidant decision-making, and spontaneous decision-making and increased intuitive decision-making and dependent decision-making. These shifts in decision-

making style indicate a move from relying on predictive, linear, and logical assumptions (Chermack & Nimon, 2008) to a more intuitive and creative decision-making style.

These findings confirm assertions in the practitioner-based literature that scenario planning can affect an individual's ability to imagine possible futures where once they may have been ignored, to look at available evidence in alternative ways with a shared view and an increased confidence and ultimately move their organization toward greater learning (Bradfield, 2008; Schoemaker, 1995; van der Heijden, 2005; Wack, 1985a). Additionally, this study provides confirmation of the previous theoretical and analytic work, in particular, Chermack's and Nimon's (2008) findings that "scenario planning produces a shift in participant decision-making styles – particularly that they become more intuitive" (p. 369).

Finally, it seems clear that the use of scenario planning as an intervention in the decision-making process can produce a change in our ability to broaden perceptions, reduce the propensity for bounded rational thinking and lead to developing more innovative options to draw from when making decisions. Future studies involving organizations from a variety of industries, may provide insight as to the effect scenario planning has on the decision-making styles of industry-specific populations. Further, it would be fascinating to understand the impact of the specific type of scenario planning practiced, and how the formatting and delivery of the intervention may have implications on the outcomes. While the scenario planning method practiced for this study followed a well-developed structure from practice, there are a wide variety of techniques available to practitioners, and the potential benefits of other models would be an intriguing area of study.

Note

1. NORTHEAST= Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania. MIDWEST=Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Wisconsin, South Dakota. SOUTH= Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia. WEST= Alaska, Arizona, California, CHawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Wyoming, Washington

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