# Fail to Plan, Plan to Fail: The Effects of Forecasting Valence on Creativity

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**Abstract**

Forecasting is a central component of evaluating creative ideas for their success. Little is known, however, about variables that influence the effectiveness of predicting outcomes while evaluating creative ideas. Previous literature has shown that forecasting prior to implementation improves the creativity of final solutions and vision statements (e.g., Byrne et al., 2010; Dailey & Mumford, 2006; Lonergan et al., 2004). The present effort empirically addresses how individuals forecast and why it leads to better creative performance. A total of 146 participants were asked to forecast positive or negative outcomes and subsequently develop an implementation plan for a creative idea. The impact of predicting positive and negative outcomes on creative performance is addressed by considering the attributes of forecasting and how it affects factors considered during implementation planning. Findings revealed that a combination of positive and negative forecasting led to more extensive forecasting, whereas forecasting only positive outcomes decreased its extensiveness. Positive forecasting also resulted in implementation plans that were less extensive – notably, positive forecasts were less focused on competitors and obstacles. The implications of these findings are discussed to understand better the degree forecasting valence affects the focus of certain factors while planning for implementation.

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**Fail to Plan, Plan to Fail: The Effects of Forecasting Valence and Creativity**

Former entrepreneur, Elizabeth Holmes, began her biotechnology startup with the ambitious goal of revolutionizing the blood-testing industry. She did so by innovating standard blood testing technology to be quicker and more accessible. She said her device would make it easier to obtain medical information, which in comparison to the expensive blood tests required by conventional machines, would have transformed medicine. Describing her vision in the popular HBO documentary, *The Inventor: Out for Blood in Silicon Valley* (2019), Holmes described a future where fewer people would not "have to say goodbye too soon to the people they love." While her motivation and vision matched other entrepreneurs for embarking on such an endeavor, her inability to deliver a usable product transpired in a massive failure of her organization. This instance of failure emphasizes the crucial aspect that creativity in organizations cannot just be a vision but must also be implemented successfully to be considered innovative (Anderson et al., 2014).

Innovation can only be achieved through the successful implementation of a creative solution (Mumford & Gustafson, 1988). Finding a distinction between what is innovative becomes vitally important for organizations when considering the high stakes of innovation and higher likelihood of failure. These distinctive characteristics may not be readily apparent in the organizational context, making the identification of innovative ideas that should be pursued more difficult (Mumford & Lucuanan, 2004). To determine which ideas should be pursued, individuals can evaluate ideas by forecasting outcomes based on available information and resources. As creative problems become more complex, forecasting is considered a critical skill for generating innovative ideas in organizations and overcoming the challenges of implementation (Hunter et al., 2006).

## Creativity

The fundamental question of creative theory is how individuals form the basis of forecasting to produce creative solutions to novel problems. The creativity literature has pointed out and defined theory (Mumford & McIntosh, 2017; Mumford et al., 1991), and also addressed creativity in how we develop (Hunter et al., 2008), assess (Lonergan et al., 2004), and manage (Mumford et al., 2018) creative ideas in a dynamic setting (i.e., organizations). Mumford and colleagues (e.g., Baughman & Mumford, 1995; Mumford et al., 1991; Mobley et al., 1992) used the identification of cognitive processes to refine creative performance further and describe how individuals seek out and evaluate creative ideas. The eight core processes of creativity have become the standard for creative theory, and the present work will examine the relationship of forecasting and creativity in relation to this framework.

Creative problem-solving is defined as the generation of novel and useful ideas to solve complex and ill-defined problems (Amabile, 1988; Lovelace & Hunter, 2013; Lovelace et al., 2019). In an organizational context, creativity is considered a multi-step and dynamic process that occurs over an extended period of time (Drazin et al., 1999; Hunter et al., 2006). Mumford and colleagues conceptualized creative problem-solving as a set of eight interrelated and dynamic steps (Baughman & Mumford, 1995; Hunter et al., 2007; Mumford et al., 1997; Mumford et al., 1991). Respectively, these eight core processes of the creative process are 1) problem construction, 2) information gathering, 3) concept selection, 4) conceptual combination, 5) idea generation, 6) idea evaluation, 7) implementation planning, and 8) monitoring. Lovelace and Hunter (2013) further simplified the eight-core processes into early, middle, and late stages of the creative process, each with a fundamental focus and framework requiring specific skills and understanding of that stage. Early stages of the creative process lay the groundwork for

understanding and addressing the problem of interest. It covers problem construction, information gathering, and concept selection – all of which require careful analysis and organization of the problem (Hunter et al., 2006). The middle stages of the creative process include conceptual combination and idea generation. During the middle stage processes, individuals grasp the broader context and apply their knowledge from previous experience to the current situation (Hunter et al., 2006; Mumford et al., 1997; Mumford & Gustafson, 1988). The late stages of the creative process include idea evaluation, implementation planning, and monitoring.

## Idea Evaluation

Idea evaluation is a particularly important step in the creative process, even though it has received less attention in the literature (Basadur et al., 2000; Dailey & Mumford, 2006; Hunter et al., 2006; Lonergan et al., 2004; Runco & Chand, 1994). Researchers, in fact, regard idea evaluation as essential for the overall success of the creative solution (Guildford, 1951; Merrifield et al., 1962; Mumford et al., 2002). Proper evaluation requires individuals to consider important contingencies or resource limitations that help determine if the idea will be successful and if it should be pursued. In an organizational setting, idea evaluation becomes even more imperative, assuming the resources available are limited and the outcomes of creative solutions are often not easily recognizable. This renders innovative ideas susceptible to failure, making idea evaluation a mechanism for developing the idea for implementation. Once the idea has been implemented, monitoring provides feedback to guide additions or adjustments to the creative solution. As ideas are being evaluated, they are discarded based on the likelihood of success while also considering the resource limitations of implementing the creative solution. When evaluating the creative solution on its potential effectiveness, individuals, in part, use past case

examples and experiences. An important caveat is that the novel idea is different from the challenges faced in past ideas, making the evaluation of the current idea more difficult (Mumford et al., 2001).

Mumford (2002) further broke down idea evaluation into three sub-processes beginning with forecasting, followed by idea appraisal, and idea revision. The sub-processes within idea evaluation can be interdependent with implementation, such that individuals evaluate ideas by predicting the outcomes of implementing the idea before going through with it (Lonergan et al., 2004). Idea evaluation begins with forecasting, which is considered a generative process where individuals can produce a wide range of possible outcomes that are considered when evaluating the idea (Byrne et al., 2010; Mumford et al., 2002). After factoring in forecasted processes and outcomes, the idea is appraised on the likelihood of successful implementation, then a decision is made to either reject or revise the idea.

## Forecasting

Byrne and colleagues (2010) defined forecasting as an individual envisioning the different outcomes associated with the alternative action plan or implementation of the current plan. In other words, when individuals forecast, they predict the effects of their actions or their alternative action plan on future outcomes of the creative solution prior to the idea being implemented (Mumford et al., 2002; Mumford et al., 2001). Forecasting reliable outcomes is difficult when evaluating ideas because future outcomes are usually based on a dynamic environment where resources shift throughout the creative process. Recent literature on forecasting suggests that predicting outcomes becomes more effective when one has the expertise to do so (Dailey & Mumford, 2006; Mumford et al., 2002; Pant & Starbuck, 1990).

However, despite its capability to improve creative performance, little is known about how different forecasting strategies impact creative performance.

Despite the lack of research on forecasting, there is some consensus about how forecasting contributes to better creative problem-solving. Byrne and colleagues (2010) asked participants to predict the outcomes of implementing the ideas prior to developing a final plan, participants' forecasts were then rated on the extensiveness of their forecasts and the creativity of their final plans. They found that several factors (e.g., number of cases, temporal orientation, analysis of causes versus goals) contributed to forecasting performance, and forecasting improved the level of creativity in the participant's final plan. Other studies on forecasting have found several other factors (e.g., considering implications versus facts, key causes versus key goals, reflection versus no reflection, deliberation versus implementation) that affect forecasting and, subsequently creativity (Shipman et al., 2010). Mumford and colleagues (2015) developed a forecasting model that addresses the nature of knowledge used by individuals in forecasting and how they work with this knowledge to produce viable forecasts. This model takes a cognitive approach to forecasting, as does the creative process, and considers forecasting a cognitive skill that requires individuals to evaluate the idea and monitor the environment simultaneously.

## Forecasting Model

Mumford and colleagues' (2015) framework of forecasting argues that individuals use their mental models to forecast effectively. For forecasting, mental models refer to an individual's own understanding of how future outcomes may unfold, which is derived from past experience. It also includes how they would apply their experiences and analysis to predict outcomes (Strange & Mumford, 2002; 2005). The case-based knowledge from mental models is also derived from experience and informs on the general causes, outcomes, restrictions, and

contingencies of a particular domain or the creative solution. When case-based knowledge and the creative environment are compatible, the individual can determine which attributes of their experience will be applied to the current situation more easily from this knowledge base (Mumford et al., 2015). In forecasting, these attributes are applied to predicted future outcomes, so the attributes that will be important later are more challenging to determine (Mumford et al., 2017).

More specifically, the framework presented by Mumford (2015) suggests that these key attributes (i.e., causes, outcomes, restrictions, contingencies, processes, actors, affect, systems, processes.), along with situational cues of past cases, serve as markers for potentially relevant forecasts. The model begins when individuals scan the environment of the creative idea to identify relevant situational cues. This environmental scan activates the person's mental model, upon which they identify key causes and outcomes of the situation. Prior to identifying the key causes and outcomes, the individual has already developed a vision for the idea, which highlights the attributes that will make the idea successful and ignore the ones that adversely affect it (Strange & Mumford, 2005). Key causes and outcomes are influenced by this person's vision which affects how the individual identifies the most challenging causes they may face in a new situation.

Once the key causes and outcomes of the current situation have been identified, the appropriate cases are activated and then organized into case prototypes and case exceptions. Mumford (2015) conceptualizes this as a library system or knowledge base where case prototypes from previous experiences abstract to provide information about the current situation. These case prototypes are selected depending on the situational contingencies identified when monitoring the situation. The critical characteristics identified from past cases and the situational

contingencies then give rise to forecasting attributes. Here individuals predict potential outcomes, consider difficulties, and anticipate errors in their creative idea (Doerner & Shaub, 1994; Mumford et al., 2002). Upon forecasting outcomes, individuals will develop an action plan that is, in principle, more likely to bring about successful implementation because they have considered outcomes that are likely to occur and accounted for them prior to implementation.

**Forecasting Extensiveness and Accuracy**

Prior to forecasting, individuals monitor the current situation to identify these key situational contingencies and limitations to attribute to past cases. The key situational attributes that are most heavily considered when forecasting outcomes are resources and time frame (Shipman et al., 2010). The availability of resources and the amount of time it takes to implement the idea can help to explain further why the outcomes occurred. Time frame and resources are consequently considered causal operatives that are linked to specific outcomes of past cases (Shipman et al., 2010).

Given that forecasting is cognitively demanding, individuals will examine fewer cases when simulating future outcomes (Doerner & Shaub, 1994) and use resources and time frames to choose these cases based on similar causal operatives. The types of experiences used to shape case examples and the beliefs surrounding key causal forces will contribute to how resources are identified. If the estimation of resources or time frame is inaccurate, it will affect the quality of the forecasts because the past case activated is no longer aligned with the situational contingencies (Dailey & Mumford, 2006). Shipman and colleagues (2010) tested this idea empirically and found that predicted outcomes focused on resources and time frame contributed to more extensive forecasts. When implementing the idea, certain outcomes are expected that are contingent on the available resources and the ability to accomplish the tasks in a timely manner.

When an individual has not accounted for these factors through forecasting, the implementation becomes more challenging because resources need to be reallocated quickly for the idea to be successful.

Prior work has illustrated the difficulty of defining and conceptualizing accuracy (Silva & Gendolla, 2001). In considering the extensiveness of one's forecasts, it should also be determined if their judgments about future outcomes are accurate. Evaluation accuracy, or error in evaluation, as it is referred to in Martin et al. (2019), is the gap between an individual's evaluation of the creative solution and the actual performance of the creative idea. When forecasting a myriad of outcomes of a creative solution, the most accurate forecasts will be the ones that are most likely to occur or impact the idea. However, considering individuals will forecast outcomes that consider a plethora of situational contingencies and restrictions, the adeptness to identify viable outcomes seems to be critical for forecasting accurately (Silva, 2008).

## Outcome Valence

Potential outcomes can be organized into strengths and weaknesses, both of which can be beneficial to consider prior to implementation (Mulhearn et al., 2020). Positive outcomes are helpful in creating a vision of the creative idea suggesting to the individual that the idea will be successful. When individuals believe it will be successful, they perceive future steps as less threatening, making them more motivated to continue working on the idea to fruition (Blair & Mumford, 2007; McIntosh et al., 2021; Mulhearn et al., 2020). A viable vision may also provide important cues on the causal operatives that continuously change throughout the creative process. Specifically, visions often include a wider time frame and consider the causes as more dynamic from the start to the end of the idea. When causes are articulated in this way, the

individual may produce forecasts that consider the causal operative that impacts more of the implementation process and outcomes that occur after implementation. This would lead to a greater portion of the time frame considered and more extensive forecasts.

Placing too much emphasis on the potential positive outcomes can result in a failure to see the attributes that adversely affect the idea (McIntosh et al., 2021). Looking at the weakness or negative outcomes, individuals take into consideration what is likely to cause the idea to fail (Mumford et al., 2000; Vessey et al., 2011). Individuals are actively seeking causal operatives that will prevent implementation because they are oriented around the contingencies of the idea by forecasting negative outcomes (Mumford et al., 2002). These contingencies can be directly linked to a potentially negative outcome to which the individual can assess how impactful it will be when implementing the idea. Moreover, contingencies are oriented negatively and may be easier to identify and place to a specific outcome than when forecasting negative outcomes.

Forecasting has been shown to have positive effects with respect to idea evaluation quality and creative performance but has not been addressed in the context of implementation planning. The theory of the creative process states that implementation planning is the bridge between idea evaluation and implementation and could provide information on how to integrate the two stages more effectively (Lovelace & Hunter, 2013). In the following study, I will identify the causal operatives that are considered in positive and negative forecasting from the lens of Mumford's (2015) forecasting model and theory of the creative process. I hypothesize that negative forecasts will be more extensive and accurate than positive forecasts. However, forecasting positive and negative outcomes together will be most effective at producing the most extensive forecasts. The nature of positive and negative forecasts is expected to differ in their timeframe, resource allocation, outcomes, and creativity (see Table 4 for the list of hypotheses

and variables). I will then examine how forecasting valence changes the characteristics of participants' final implementation plans with respect to resources and time frame variables. These implementation plans were also assessed for their creativity on the dimensions of quality, originality, and elegance. I hypothesize that positive and negative forecasting will lead to more extensive implementation plans compared to negative or positive forecasting, respectively. Lastly, I hypothesize that a combination of positive and negative forecasting will lead to implementation plans that are most creative, followed by negative only and then positive only forecasting. The hypotheses are summarized below.

*Hypothesis 1: Negative forecasting will generate more a) extensive and b) accurate forecasts compared to positive forecasting, but generating positive and negative outcomes will result in the most extensive and accurate forecasts.*

*Hypothesis 2: Negative forecasts will generate more extensive implementation plans compared to positive forecasting, but generating positive and negative outcomes will result in the most extensive plans.*

*Hypothesis 3: A combination of forecasting positive and negative outcomes will produce creative plans that are more creative than only forecasting positive or negative outcomes followed by negative then positive forecasts.*

## Methods

### Participants

The sample included 146 participants recruited from the psychology department subject pool at a large southwestern university. A power analysis was conducted to determine an acceptable sample size using a moderate effect size along with the addition of 30 participants due to the possibility of careless responses or missing data. Eight participants were taken out of the

dataset for failing two of the three attention checks. Students who took part in the study fulfilled a research requirement assigned for an undergraduate psychology course or received extra credit. In the context of the experimental task, the university subject pool provided an appropriate sample, such that university students are likely to be familiar with restaurants which can be used to aid in completing the experimental task.

Regarding the demographic information of the sample, 74% were female, 24% were male, and one participant preferred not to answer. The sample was racially diverse, with 30% of participants being Hispanic or Latino, 22% being Asian, 21% being Black, 14% being White, 11% identifying as two or more races, and 2% identifying as another race. The average age of the participants was 19 years old, and a median age of 18 years old. The age of participants ranged from 18 to 49 years old.

**General Procedure**

Participants completed all measures and the experimental task using Qualtrics in a controlled laboratory setting. Participants were randomly assigned to one of four conditions where they read two business cases adapted from Marta et al. (2005). The two low-fidelity business cases required the participant to consider a creative idea before it was implemented. This required the participant to plan for the outcomes and processes that would be necessary for the successful implementation of the creative idea. Prior to reading the two cases, participants were first asked to complete a series of timed covariates. Following a brief description of the study, they read two business cases, answered multiple-choice questions about the potential outcomes, and then forecasted outcomes depending on the condition they were assigned. A team of three research assistants qualitatively coded the forecasted outcomes dimensions. Participants were then asked to generate a final plan for implementing the idea considering their forecasted

outcomes. A second team of three research assistants coded the final implementation plans on the implementation planning variables and the creativity dimensions (see a full list of forecasting, implementation planning, and creativity variables that were qualitatively coded in Table 4). The multiple-choice questions and the open-ended response questions integrated within the experimental task were used to measure the extensiveness, accuracy, and creativity of the participants' forecasts and implementation plans. Participants had an unlimited amount of time to complete the experimental task and were able to move at their own pace. Once participants completed the experimental task, they completed a series of untimed covariate measures and a demographic information questionnaire. They were then debriefed on the purpose of the study.

## Manipulations

**Forecasting Valence**. For each business case, participants were randomly assigned to one of four conditions. Participants were asked to forecast either 1) positive outcomes, 2) negative outcomes, 3) both positive and negative outcomes, or 4) a prompt that is neutral/ambiguous and does not specify a specific orientation to forecast, which served as a control group. Accompanied by each forecasting manipulation, participants were provided with direction on what to consider for their forecasts. See Appendix A for the experimental design prompt used to convey this information to participants.

## Attention Check

After reading the two business cases, participants were asked which type of outcomes they predicted for both cases. They were given three multiple-choice questions. If the participant answered two or more correctly, they passed the attention check. A total of eight participants failed both attention checks and were removed from the study.

**Experimental Task**

The experimental task began by asking participants to assume the role of a business consultant at an outside consulting firm. The two business cases and their respective measures of planning were adapted from Marta et al., (2005) low-fidelity simulation task. Each business case included a brief history of the fictitious company as well as past events that led to the current state of the organization. The information provided was meant to aid in the participant's understanding of the situation and give them enough information to forecast outcomes of the creative solution. Importantly, the business cases did not provide information about potential outcomes or consequences of implementing the idea allowing participants to form their own judgments about the case.

Upon reading the business case, participants were asked to forecast outcomes that could occur if the creative solution were to be implemented. Prior to forecasting outcomes, participants were reminded of the implementability of the idea and given information to aid in forecasting outcomes. More specifically, participants were asked to consider the difficulty, length of time it will take to complete, the financial gain or loss, preparedness of the organization to implement the idea, the amount of demand for the creative idea placed on the organization, and coordination efforts that are important to consider when predicting potential outcomes. Using the information provided in the initial business case and their forecasted outcomes, participants generated a final plan for implementing the idea and did so for each business case. As participants generated the final plan, they were reminded to consider the resource considerations and the time frame requirements of the idea.

Immediately after generating a final plan for the idea, participants were asked to respond to two questions, both of which measured a critical aspect of planning skills. Each question

asked participants to discern between a set of causes relevant to each business case and determine which is most impactful prior to implementing the creative idea. The number of correct responses to each question was used to measure the aspects of planning skills relevant to forecasting.

## Covariates

### *Timed Covariates*

**Intelligence.** Intelligence has been shown to be a moderator of creative problem-solving (Kim, 2005; Mumford & Gustafson, 1988). To measure intelligence, participants completed the 30-item Employee Aptitude Survey (Ruch & Ruch, 1980). Participants were asked to read six sets of facts which were followed by a set of conclusions. Participants were then asked to rate the conclusions on whether they were "true," "false," or "uncertain," given the facts that were presented prior to reading the conclusion. Chronbach's alpha was used to assess the reliability for intelligence and was considered reliable ($\alpha$ = .78).

**Divergent Thinking.** Effective execution of idea appraisals and implementation planning is also based on divergent thinking ability (Lonergan et al., 2004; Osburn & Mumford, 2006; Mumford et al., 1997; Vincent et al., 2002). Divergent thinking was measured using the Consequence Test, which has sufficient validity and evidence of reliability established by Watts and colleagues (2019; $\alpha = 0.87$; Christensen et al., 1953). In this measure, participants were asked five questions and will be asked to generate as many responses as possible in two minutes. An example of such a question is "What would be the result if people no longer needed or wanted sleep?" participants will then be asked to generate as many ideas as to what could happen. In response to the questions, the number of ideas was summed to create a composite

divergent thinking score for each participant (Hocever, 1980). The reliability for the divergent thinking variable indicates the measure was reliable ($R_{wg}$ = .99)

### *Untimed Covariates*

**Need for Cognition.** Participants' need for cognition represents their motivation to think critically and deeply about an issue. Watts and colleagues (2017) demonstrated that the need for cognition reliably predicts quality, originality, and elegance in generating solutions to complex problems. Therefore, the need for cognition was measured using Cacioppo et al.'s (1984) 18-item measure. Participants were asked whether they agreed or disagreed with a set of statements using a 5-point Likert scale. An example of such a statement includes "I would prefer complex to simple problems" and "I really enjoy a task that involves coming up with new solutions to problems." The Cronbach's alpha for this measure provided evidence of its reliability for the need for cognition measure ($\alpha$ = .80).

**Big Five Personality.** Goldberg's (1999) 20-item International Personality Item Pool (mini-IPIP) was used to measure personality – openness, neuroticism, conscientiousness, agreeableness, and extraversion. The Big Five dimensions of personality were assessed because a number of these traits can predict creative performance (Feist, 2010). The mini-IPIP has shown to be psychometrically reliable with other Big Five measures and is a more practical measure of personality (Donnellan et al., 2006). The measure showed acceptable internal consistency coefficients for extraversion ($\alpha$ = .61), agreeableness ($\alpha$ = .68), conscientiousness ($\alpha$ = .69), and openness ($\alpha$ = .68). Neuroticism had an inadequate internal consistency coefficient of .36.

**Demographic Variables.** Each participant was asked to disclose several demographic characteristics that tend to be linked or have shown to be a significant moderator of creative problem-solving (e.g., Zhang & Bartol, 2010). Such variables included the participant's gender

and race. The participants' academic status, major, and GPA were also collected, along with the number of leadership roles the participant held prior to this study.

## Dependent Variables

### *Forecasting Accuracy*

The Marta et al., (2005) measure of planning skills was used to measure forecasting accuracy. This measure includes 15 cases, two of which were used in this study, each containing information regarding the critical aspects necessary for understanding the case. Each business case illustrates a scenario of a company in which forecasting is necessary. Upon reading the business case, participants were asked to respond correctly to questions that measured aspects of planning skills relevant to forecasting. More specifically, two questions were related to identifying the key causes and relevant restrictions. The questions were multiple choice, and participants had the option to choose three to four choices out of a larger list. The number of causes participants got correct versus incorrect was used to measure key causes and relevant restrictions. The total score of these questions was averaged for each participant. The measure has shown a reliability coefficient in the low 0.80s (see Table 5 for reliability statistic of each forecasting extensiveness, implementation planning, and creativity variable), suggesting it is appropriate to use in this instance. Similarly, evidence of construct validity through the correlation of relevant reference measures further demonstrates the appropriateness of the measure.

### *Forecasting Extensiveness*

The forecasting extensiveness measure was based on the forecasted outcomes of each business case developed by the participants. Prior to forecasting, the participants were reminded

to think of the "implementability of the plan and the outcomes associated with the idea" and be asked to describe the events that could occur if the idea were to be implemented. Judges were asked to rate the extensiveness of the participants' forecasts based on the 1) number of outcomes, 2) time frame considerations prior to implementation, 3) short-term and 4) long-term timeframe considerations, 5) forecasts focused on resources, 6) forecasts focused on implementation, 7) forecasts focused on outcomes, 8) the identification of resources over time, 9) environmental scanning, 10) social-focused forecasts, 11) forecasts that are problem or task-focused, 12) focus on controllable and 13) uncontrollable outcomes, 14) focus on current organizational strategy, 15) identification of situational/environmental change, 16) elaboration, 17) quality of forecasts, 18) specificity of outcomes, 19) and uniqueness of the forecasts. Three trained undergraduate judges were asked to rate the participant's forecast using a 5-point benchmark scale and were blind to the experimental conditions and the purpose of the study. The raters were asked to code the forecasted outcomes on the variables above and were not aware of the implementation plans of the participant. An inter-rater agreement statistic was used to establish reliability among undergraduate judges (LeBreton et al., 2005; Lindell & Brandt, 1999). See Table 4 and Table 5 for a full list of forecasting variables that were qualitatively coded and their reliability statistic. The reliability statistic (i.e., $R_{wg}$) for each variable was above 0.60, demonstrating consistency in the coder's judgments.

### *Implementation Planning*

Characteristics of the final implementation plans were qualitatively coded (See Appendix A). A separate group of undergraduate research assistants was asked to rate the extent to which the implementation 1) focused on resources, 2) identified events for monitoring progress, 3) developed backup plans, focused on 4) potential costs and 5) benefits, 6) anticipating

environmental constraints, 7) focus on human capital or 8) tasks and procedures, 9) consider goals, 10) competitors, and 11) obstacles. They were also asked to rate 12) the quality of the decision implementation, 13) the identification of interdependencies in action, and 14) the adaptability of the plan. A different team of raters qualitatively coded the implementation plans for extensiveness and creativity and were not aware of the experimental condition or the outcomes forecasted prior to the implementation plans. The $R_{wg}$ statistic for each variable was above 0.60, suggesting coders were consistent in their ratings (see Table 5).

### *Creative Performance*

After participants were asked to develop forecasts, they were then asked to write a final implementation plan for each business case using the initial idea and their forecasted outcomes. Participants were encouraged to consider the outcomes forecasted in developing a final plan. A group of three undergraduate research assistants was provided with a 5-point benchmark scale to rate the 1) quality, 2) originality, and 3) elegance of the participant's final implementation plan (Besemer & O'Quin, 1999; Christiaans, 2002). More specifically, quality (completeness, coherence, usefulness), originality (unexpectedness, elaborateness/descriptiveness), and elegance (flow, refinement, cleverness) represent attributes of the final creative plan and reflect a low, medium, or high indication of the final plan's attributes.

Prior to rating the forecasting extensiveness and creative performance of the participants, raters were asked to complete training to inform on the operational definitions, Likert-rating scales, and in some cases, markers of the variables. This was done to develop a shared understanding amongst raters on the variables to be rated. Upon completing the training, a measure (i.e., $R_{wg}$) from LeBreton et al., (2005) was used to assess interrater reliability. The

variables that did not meet an $R_{wg}$ of 0.60 were not considered in the analysis unless they were nearly 0.60 (i.e., $R_{wg}$ = .57).

## Analysis

A Pearson's *r* correlation was used to estimate the correlations between forecasting variables and creative performance variables. The relationships between forecasting accuracy and creativity variables were expected to be positive. Elegance was the only creativity variable that was significantly related to forecasting accuracy (*r* = .18). This positive relationship was only present in the second case; accuracy was not related to the quality, originality, or elegance of the participant's implementation plans in the first case. In both cases, the relationship between forecasting extensiveness and the dimensions of creativity was small to moderate. Significant correlations between the forecasting extensiveness variables and creativity ranged from .18 to .51 and were seen in both cases. A similar pattern emerged between creativity and implementation planning variables. These relationships were consistently positive throughout the implementation and creativity variables and ranged from .30 to .90. Refer to Table 6 and Table 7 for a complete list of Pearson's *r* correlations between forecasting extensiveness, accuracy, implementation planning, and creativity.

A one-way (forecasting valence: positive, negative, positive and negative, ambiguous) between-subjects, fixed-effect MANCOVA was conducted where the main effect of forecasting valence was evaluated at the .05 significance level. A partial eta-squared effect size was computed to determine the practical significance of any effects. Following the omnibus *F* test, a multiple comparisons procedure was conducted to test for group differences. More specifically, Tukey's HSD planned contrast determined mean group differences. Only the statistically

significant covariates of intelligence and agreeableness were retained for all analyses to ensure model comparability.

## Results

### Manipulation Check

To determine if the forecasting valence manipulation was effective, the number of negative outcomes and positive outcomes generated by participants were counted. A MANOVA was used to test group differences in forecasting valence for the number of negative and positive outcomes. There was a significant effect of feedback valence for the first scenario, $F(3, 141) = 12.93$, $p < .001$, $\eta_p^2 = .18$, and second scenario, $F(3, 141) = 12.25$, $p < .001$, $\eta_p^2 = .17$.

For the first scenario (Chili's Restaurant), forecasting valence had a significant effect on producing negative outcomes $F(3, 142) = 17.30$, $p < .001$, $\eta_p^2 = .27$. When participants were asked to forecast negative outcomes ($M = 2.45$, $SE = .21$), they generated more negative outcomes than the ambiguous ($M = 1.72$, $SE = .20$, $p = .05$), positive ($M = .38$, $SE = .21$, $p < .001$), and the both conditions ($M = 1.45$, $SE = .20$, $p = .003$). There was also a significant effect on forecasting positive outcomes $F(3, 142) = 37.65$, $p < .001$, $\eta_p^2 = .44$. Pairwise comparisons showed that participants who were asked to forecast only positive outcomes ($M = 2.89$, $SE = .17$) generated more positive outcomes than the ambiguous ($M = 1.68$, $SE = .17$, $p < .001$), negative ($M = .50$, $SE = .17$, $p < .001$), and the combination of both ($M = 2.41$, $SE = .17$, $p < .001$) conditions. These findings supported the manipulation's efficacy for scenario one.

For the second scenario (Morningstar Bakery), there was a significant difference between conditions when generating negative outcomes, $F(3, 142) = 16.64$, $p < .001$, $\eta_p^2 = .26$. Pairwise comparisons suggest that negative forecasting generated more negative outcomes ($M = 2.45$, $SE = .21$) than the ambiguous ($M = 1.68$, $SE = .20$, $p = .038$), positive ($M = .41$, $SE = .21$, $p < .001$),

and both ($M$ = 1.45, $SE$ = .20, $p$ = .003) conditions. There was also a significant difference in producing positive forecasts, $F(3, 142) = 34.87$, $p < .001$, $\eta_p^2 = .42$. Pairwise comparisons showed the positive-only condition ($M$ = 2.88, $SE$ = .18) produced more positive outcomes than the ambiguous condition ($M$ = 1.68, $SE$ = .17, $p < .001$) and negative condition ($M$ = .53, $SE$ = .17, $p < .001$), but not the both condition ($M$ = 2.41, $SE$ = .17, $p$ = .23). The comparisons suggest the forecasting valence manipulation was also efficacious for scenario two.

## Case 1: Chili's Restaurant

### *Forecasting Extensiveness*

The covariates that were retained in the model that had a significant positive effect on forecasting extensiveness were intelligence, $F(1, 140) = 1.42$, $p$ = .178, $\eta_p^2 = .11$, and agreeableness, $F(1, 140) = 1.68$, $p$ = .085, $\eta_p^2 = .12$. There was a marginally significant relationship between forecasting valence and forecasting extensiveness, $F(3, 140) = 1.42$, $p$ = .065, $\eta_p^2 = .11$. The univariate analysis for the number of outcomes, $F(3, 140) = 3.01$, $p$ = .023, $\eta_p^2$ =.06, and a focus on outcomes, $F(3, 140) = 3.27$, $p$ = .023, $\eta_p^2$ =.07, were significant.

Pairwise comparisons for the number of outcomes found that generating both positive and negative outcomes ($M$ = 3.88, $SE$ = .23) produced more outcomes than generating only negative forecasts ($M$ = 2.95, $SE$ = .24, $p$ = .025). For forecasts focused on outcomes, those generating both positive and negative outcomes ($M$ = 3.33, $SE$ = .11) were more focused on outcomes than those generating only negative forecasts ($M$ = 2.88, $SE$ = .11, $p$ = .021). Findings from this scenario suggest that forecasting positive and negative outcomes together generated more forecasts, and these forecasts were more focused on outcomes than negative forecasting.

These findings partially support Hypothesis 1a, which states that forecasting positive and negative outcomes together would generate more extensive forecasts than negative forecasting.

### *Forecasting Accuracy*

The covariates that were retained had a positive effect on accuracy were intelligence, $F(1, 140) = 9.38$, $p = .002$, $\eta_p^2 = .06$, and agreeableness, $F(1, 140) = 1.30$, $p = .256$, $\eta_p^2 < .001$. There were no significant differences in forecasting valence for the accuracy of forecasting, $F(3, 140) = 0.40$, $p = .750$, $\eta_p^2 < .001$. Thus, Hypothesis 1b was not supported.

### *Implementation Planning*

The covariates retained had a significant and positive effect on implementation planning were intelligence, $F(1, 140) = 2.24$, $p = .028$, $\eta_p^2 = .12$, and agreeableness, $F(1, 140) = 3.94$, $p < .001$, $\eta_p^2 = .19$. There was not a significant main effect of forecasting valence on implementation planning, $F(3, 140) = 1.24$, $p = .206$, $\eta_p^2 = .07$. However, there was a marginally significant univariate effect for assessing environmental constraints $F(3, 140) = 2.15$, $p = .097$, $\eta_p^2 = .04$. Based on the pairwise comparisons, those who generated only negative forecasts ($M = 2.06$, $SE = .11$) were significantly more focused on environmental constraints than those who forecasted both positive and negative outcomes ($M = 1.67$, $SE = .11$, $p = .056$). Addressing implementation planning, negative forecasts were more focused on environmental constraints than forecasting both outcomes. These findings do not support Hypothesis 2 and were the opposite of what was expected.

### *Creativity*

The covariates that were retained had a significant and positive effect on creative performance. These were intelligence, $F(1, 140) = 3.30$, $p = .022$, $\eta_p^2 = .07$, and agreeableness, $F(1, 140) = 5.66$, $p = .001$, $\eta_p^2 = .11$. There was no significant difference of forecasting valence on creativity, $F(3, 140) = 0.93$, $p = .501$, $\eta_p^2 = .02$. There was no significant difference in forecasting valence and the quality, $F(3, 140) = 0.14$, $p = .938$, $\eta_p^2 < .001$. There were also no significant effects of forecasting valence on originality, $F(3, 140) = 0.32$, $p = .810$, $\eta_p^2 < .001$. There were no significant differences in forecasting valence with respect to elegance, $F(3, 140) = 0.27$, $p = .845$, $\eta_p^2 < .001$. Based on these findings, Hypothesis 3 was not supported.

## Case 2: Morningstar Bakery

### *Forecasting Extensiveness*

Intelligence, $F(1, 140) = 1.52$, $p = .133$, $\eta_p^2 = .11$, and agreeableness, $F(1, 140) = 1.43$, $p = .167$, $\eta_p^2 = .11$, had a positive effect on forecasting extensiveness. Forecasting valence had a significant main effect on forecasting extensiveness, $F(3, 140) = 1.77$, $p = .006$, $\eta_p^2 = .13$. A significant univariate relationship was found for the number of outcomes $F(3, 140) = 2.70$, $p = .048$, $\eta_p^2 = .05$, a focus on implementation $F(3, 140) = 2.64$, $p = .052$, $\eta_p^2 = .05$, and a focus on outcomes $F(3, 140) = 5.06$, $p = .002$, $\eta_p^2 = .10$.

For the number of outcomes produced, those who generated positive and negative outcomes ($M = 3.84$, $SE = .23$) produced more outcomes than those who only generated negative outcomes ($M = 2.95$, $SE = .24$, $p = .038$). Similarly, those who generated positive and negative outcomes ($M = 3.29$, $SE = .11$) were more focused on implementation than those who only generated negative forecasts ($M = 2.88$, $SE = .11$, $p = .046$). For a focus on outcomes, those who

forecasted negative outcomes ($M$ = 2.51, $SE$ = .14) generated forecasts that were more focused on outcomes than those who generated positive forecasts ($M$ = 1.86, $SE$ = .14, $p$ = .006). Similarly, those who were in the ambiguous condition ($M$ = 2.52, $SE$ = .13) produced forecasts that were more focused on outcomes than the positive condition ($p$ = .004). This suggests that positively oriented forecasts do not focus on outcomes more than other forecasting strategies, which supports Hypothesis 1. Forecasting positive and negative outcomes also resulted in more outcomes that were focused on implementation showing support for Hypothesis 1.

***Forecasting Accuracy***

Intelligence, $F(1, 140) = 9.67$, $p < .001$, $\eta_p^2 = .09$, was positively related to forecasting accuracy. There was no significant main effect of valence for forecasting accuracy, $F(3, 140) = 1.25$, $p = .293$, $\eta_p^2 = .03$. Therefore, Hypothesis 1b was not supported for the second case.

***Implementation Planning***

Intelligence, $F(1, 140) = 5.13$, $p = .001$, $\eta_p^2 = .11$, was positively related to implementation planning. There was a significant main effect on implementation planning $F(3, 140) = 1.98$, $p = .004$, $\eta_p^2 = .10$. The univariate analyses suggest significant differences in considering competitors $F(3, 140) = 4.53$, $p = .005$, $\eta_p^2 = .09$ and obstacles $F(3, 140) = 3.07$, $p = .030$, $\eta_p^2 = .06$. The multiple comparisons show negative-only forecasts ($M$ = 1.95, $SE$ = .08) were more focused on competitors than positive-only forecasts ($M$ = 1.49, $SE$ = .09, $p < .001$). Those in the positive-only forecasts group were also significantly less focused on competitors than the ambiguous forecasting condition ($M$ = 1.84, $SE$ = .08, $p$ = .020). The negative-only forecasting group ($M$ = 2.16, $SE$ = .07) was also more focused on obstacles than the positive-only forecasting group ($M$ = 1.85, $SE$ = .08, $p$ = .022). Those who forecasted both positive and negative outcomes

($M$ = 2.12, $SE$ = .07) were also more focused on obstacles than the positive-only group ($p$ = .050). These findings suggest that negative forecasts were more focused on competitors and obstacles than positive forecasting showing support for Hypothesis 2. Also showing support for Hypothesis 2, findings show that positive forecasting was significantly less focused on obstacles than the positive/negative condition.

### *Creativity*

Intelligence, $F(1, 140) = 8.83$, $p < .001$, $\eta_p^2 = .16$, was positively related to creativity. There was not a significant main effect for forecasting valence on creativity, $F(3, 140) = 0.52$, $p = .860$, $\eta_p^2 = .03$. For the dimension of quality, there was no significant effect of forecasting valence, $F(3, 140) = 0.52$, $p = .670$, $\eta_p^2 = .01$. There was also no significant main effect of forecasting valence on originality, $F(3, 140) = 0.19$, $p = .903$, $\eta_p^2 < .001$, or elegance, $F(3, 140) = 0.72$, $p = .540$, $\eta_p^2 = .02$. These findings do not support Hypothesis 3.

## Summary of Hypotheses

Based on findings from both cases, Hypothesis 1a was partially supported, where positive and negative forecasts together were significantly more extensive than negative forecasts for the number of outcomes, forecasts focused on outcomes, and forecasts focused on implementation. There was also support for Hypothesis 1a for the finding that negative forecasting was more focused on outcomes than positive and ambiguous forecasting. Hypothesis 1b predicted that positive and negative forecasting would generate more accurate forecasts. This was not supported. In fact, forecasting accuracy was unrelated to forecasting valence.

Hypothesis 2 predicted that positive and negative forecasting together would generate more extensive final plans. This was partially supported. Positive forecasting was less effective

at considering competitors and obstacles than other forecasting orientations. In support of Hypothesis 2, positive and negative forecasting together were more focused on obstacles than forecasting only positive outcomes.

For Hypothesis 3, it was predicted that positive and negative forecasts would have the most creative implementation plans. Based on the findings, Hypothesis 3 was not supported. This was also shown through the univariate relationships, where there were no significant differences in the quality, originality, or elegance of creative solutions based on forecasting valence.

## Discussion

### Limitations

Before discussing the larger implications of the present effort, certain limitations should be considered. The experimental task was designed as a low-fidelity simulation task meant for an undergraduate sample. Participants spent approximately 20 minutes completing the experimental task and engaging with the business case in a laboratory setting. It was developed to be an undergraduate task that those at a university would find engaging and can also perform (Strange & Mumford, 2005). It should be recognized that the findings may not be readily generalizable to expert individuals. Similarly, while the business cases presented to the participants represented a creative idea in an organizational context, it is not necessarily generalizable to larger, more complex creative problems that individuals or teams face in an organizational setting.

Another limitation is the nature of the dependent variables for implementation planning. The implementation planning variable was concerned with the characteristics of forecasting to different orientations and attributes of an implementation plan that were impacted by the manipulation. The chosen dependent variables align with the objectives of the current study, but they do not consider implementation. The dependent variables can only speak to individuals

planning for implementation, not implementation, which is distinguished in the creative process. During implementation, individuals are required to find solutions for restrictions and contingencies in a different manner than in the implementation planning phase (Osburn & Mumford, 2006). A part of forecasting and implementation planning is predicting and accounting for these restrictions that will affect the implementation process so it does not impede implementation. Thus, the scope of the study is to assess an individual's ability to plan, not to find solutions for implementing a creative problem, by addressing creativity during the implementation planning phase of the creative process.

**Theoretical Contribution**

Bearing these limitations in mind, the results of this study have some noteworthy implications for the nature of forecasting and implementation planning. First, forecasting positive and negative outcomes together was more focused on outcomes that would occur after implementation than negative outcomes. Forecasting negative outcomes allows the individual to consider future creative restrictions that are expected as the idea progresses toward the implementation of the idea and once the creative solution has been implemented. As they identify key causes and outcomes when forecasting, they identify what is likely going to affect the creative idea adversely. In other words, past cases that are activated are focused on information about the operatives that caused the idea not to succeed.

Case prototypes are then organized based on the situational contingencies, resources, and time frame where the causal operatives heavily influence the outcome of the idea. The case exceptions will be activated with case prototypes to some extent, but provide the individual with cases where the resources and time frame resulted in an outcome different from what is typical (Mumford et al., 2015). For negative outcomes, this means that case exceptions represent

outcomes where the resources and time frame were not influential but were thought to be prior to the case. Between the case prototypes and case exceptions that are generated by considering negative outcomes, the individual can understand the relationship between the causes and outcomes to forecast to a greater extent.

The forecasting attributes (e.g., potential outcomes or difficulties, anticipating error of the current idea) that the individual chooses are based on the cases where the resources and time frame caused issues with the success of the creative idea. At this point in forecasting, the individual is interdependently monitoring the situation and evaluating the idea, ascertaining that all the contingencies of the idea have been considered. Their forecasting attributes can be built upon by their initial analysis of the situation that is negatively oriented around resources and time frame. As the individual learns more information about the negative causal operatives, the realism of the negative outcomes becomes more available, and they must consider the success of implementation. This would help to explain, in part, why negative forecasting would elicit a greater focus on outcomes after implementation, along with a heavy focus on implementation planning.

Positive outcomes help individuals to see the broader vision of the creative idea. Vision is inherently orientated after implementation and often showcases how the idea became successful. The next stage of the creative process after implementation is monitoring the idea to ensure it remains successful and operational. Forecasting the positive outcomes likely results in more monitoring behaviors that focus on the overall vision of the idea. This would orient the individual to focus on outcomes that occur after the implementation of the idea, along with the considerations of implementation. The vision of the idea often takes precedence at the beginning stages of the forecasting model because the individual is scanning their environment and

identifying situational cues that create a vision of the idea. While forecasting negative outcomes with positive outcomes, the restrictions of the idea are taken into consideration in relation to a vision that includes outcomes after the idea has been implemented and during the implementation phase of the idea.

Second, an interesting finding was found regarding environmental constraints where negative forecasts produced implementation plans that were more focused on the environmental conditions affecting implementation than positive-negative forecasting. This finding is consistent with the findings from Hypothesis 1 because it suggests negative outcomes take into consideration the causal operatives that adversely impact the idea. The resources and time frame are built around the environmental conditions of the idea (Mumford et al., 2000), whether it is an innovative or organizational problem. In other words, how the resources are allocated, and the number of resources required depends on the environment and how difficult the creative idea is to be innovative. Considering the environmental constraints in implementation planning would be easier to achieve than other causal operatives because the situational contingencies are considered heavily throughout the forecasting process. By just forecasting negative outcomes, individuals were able to reassess the situational contingencies that had already been considered when they formed their mental models and scanned the environment. In forecasting the restrictions later in the forecasting process, the analysis of environmental constraints is likely to lead to a new combination of outcomes that are more related to the most recent situation. This may help to explain why negative forecasting led to implementation plans that were more focused on environmental constraints than forecasting positive and negative outcomes together.

Overall, the notion that positive forecasting is more focused on vision and negative forecasting is focused on causal operatives is further explained by finding positive forecasting as

less effective for considering obstacles and competitors. Positive and negative forecasting resulted in the implementation plans that were more focused on obstacles. This effect was diminished when individuals predicted positive outcomes when it came to obstacles and competitors. Both findings would suggest that negative forecasting is necessary for positive forecasting to be effective but not necessarily needed when predicting negative outcomes when considering obstacles in the implementation plan.

Third, there was not a significant relationship between forecasting valence and creativity, showing no support for Hypothesis 3. Several forecasting extensiveness variables were significantly correlated with quality, originality, and elegance, suggesting possible mediation between forecasting valence and creative performance. Future analysis should examine the mediating effect of forecasting the extensiveness and accuracy of creative performance. This would help to determine where in the later stage of the creative process, forecasting improves creativity. This would also explain why there was no effect of the forecasting valence manipulation on creative performance. If it were shown that forecasting extensiveness mediated forecasting valence and creative performance, it would show empirical support for Mumford and colleagues (2015) forecasting framework.

Along similar lines, future research should also examine other forecasting strategies in tandem with forecasting valence. More specifically, how forecasting valence interacts with certain findings from Shipman et al. (2010) and Byrne et al. (2010). Specifically, considering deliberation versus implementation with forecasting positive or negative outcomes may help to further refine how forecasting affects the later stages of the creative process. These factors would address the inherent planning component of forecasting while considering the individual's affect during implementation. Deliberation of implementing the idea may be viewed as less threatening

to individuals and may insinuate that the idea is not at the stage of implementation. This would motivate the individual to continue planning for the implementation of the idea and would reduce the heightened pressure of achieving innovation.

Another interesting venture would be to address the difference in forecasting processes or outcomes to see how these strategies interact with forecasting valence. The processes refer to the actions that are required to overcome the causal operative, whereas outcomes reflect a result of these processes. Since positive forecasting considers vision more heavily, it would be expected that forecasting outcomes would generate extensive forecasts. On the other hand, negative forecasts would be more effective in combination with the processes necessary to overcome the restriction considering negative forecasting is more focused on implementation. In considering whether processes or outcomes are forecasted, we can delineate when it is most appropriate to engage in specific forecasting strategies that increase the likelihood of a successful creative idea.

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## Appendix A

**Table 1**

*Chili's Restaurant: Forecasting Accuracy Measures*

1. What were the key factors in Chili's success during economic uncertainty? (Choose 4)
    a. Improved look
    b. Location
    c. Price of oil
    d. Emphasis on food rather than alcohol
    e. Tax laws
    f. Varied menu
    g. Increased efficiency
    h. Employment rates
2. What are the future implications of the following remodeling decisions: New kitchen layout, new customer areas, brick exterior? (Choose 4)
    a. Concerns about changing building codes
    b. Change in efficiency
    c. Change in table turnover
    d. Increased maintenance
    e. Change in appeal
    f. Employee satisfaction
    g. Reduced maintenance
3. Chili's executives feel that the dessert menu is too limited. What factors must they consider when deciding to increase the variety of desserts offered? (Choose 3)
    a. Amount of food served for dinner
    b. Price
    c. Available cooking appliances
    d. The latest diet trends
    e. Aesthetic appeal of time
    f. Type of customer

**Table 2**

*Morningstar Bakery: Forecasting Accuracy Measures*

1. What lead to the success of the Morningstar Bakery? (Choose best 3)
    a. Consistent product
    b. Great advertising
    c. Cheap prices
    d. High quality product
    e. Open communication
    f. The couple's relationship
    g. Proper target market
    h. Organizational structure
    i. Loyal customers
    j. Excellent customer service
    k. Satisfied employees
    l. Hard work and dedication
2. What are some of the future implications of not filling special requests from customers? (Choose best 4)
    a. Lower quality product
    b. Dissatisfied employees
    c. Increased efficiency
    d. Decreased productivity
    e. Lower efficiency
    f. Increased profit
    g. Loss of customers
    h. Smaller target market
    i. Fewer customers at vending carts
    j. Decrease customer satisfaction
    k. More consistent product
3. What are some of the factors that the Pollards must take into account when deciding whether or not to open up the vending carts throughout the city? (Choose best 4)
    a. Number of bakeries in the area
    b. Operating hours
    c. Interest rates
    d. Tax laws
    e. Local weather
    f. Previous attempts by other companies
    g. Company policies
    h. Target market
    i. Profit capabilities
    j. Company culture
    k. Type of pastries sold
    l. Potential advertising space

**Table 3**

*New Western Candy Company: Forecasting Accuracy Measures*

1. What are some of the key reasons for New Western Candy Company's success? (Choose best 4)
    a. High quality product
    b. Excellent customer service
    c. Intrinsically motivated employees
    d. Consistent product
    e. Loyal customers
    f. Great advertising
    g. Cheap prices
    h. Great location
    i. Well documented financial reports
    j. Precise candy-making technique
    k. Correct target market
2. What are some of the future implications to expanding the company to different parts of the state or country? (Choose best 3)
    a. Must hire more workers
    b. Decrease in quality
    c. More candy produced than sold
    d. Earthquakes are more devastating
    e. Too many employees
    f. Loss sense of family
    g. Less control over workers
    h. Decreased productivity
    i. Cannot be as meticulous with finances
    j. Decrease efficiency
3. Who were the owners of the New Western Candy Company? (Choose best 3)
    a. Mrs. Jones
    b. Mrs. Frank
    c. Mr. Samuels
    d. Mrs. Robinson
    e. Mr. Smith
    f. Ms. Barker
    g. Bob Bradley
    h. Mr. Thomas
    i. Mr. Picke

**Table 4**

*Forecasting and Implementation Planning Operational Definitions*

| *Variables* | *Definition* | *Hypothesis* |
|---|---|---|
| Forecasting | | |
| Number of outcomes | The number of forecasted outcomes generated by the participant (i.e., count) | Pos/Neg |
| Number of positive outcomes | The number of positive forecasted outcomes generated by the participant (i.e., count) | Pos |
| Number of negative outcomes | The number of forecasted negative outcomes generated by the participant (i.e., count) | Neg |
| Timeframe considerations prior to implementation | The degree to which the forecasts focus on consequences during implementation<br>Are the participants forecasting outcomes that could occur while the idea is being implemented?<br>Described the key challenges for the idea, while focusing on the consequences occurring during implementation if these issues or challenges are unaddressed | Neg |
| Short-term timeframe considerations | The degree to which the forecast focused on the short-term consequences.<br>Short-term consequences are outcomes taking place within 6 months of the implementation of an idea.<br>Described the key challenges for the idea while focusing on the short-term consequences if these issues or challenges are unaddressed | Neg |
| Long-term timeframe considerations | The degree to which the forecast focused on the long-term consequences.<br>With long-term meaning, consequences take place after 6 months of implementation of an idea.<br>Described the key challenges for the idea while focusing on the long-term consequences if these issues or challenges are unaddressed | Pos |
| Forecasts focused on resources | The extent to which the forecasted outcomes involve resources<br>The allocation of resources that exploit potential gains<br>The allocation of resources preventing losses from impacting successful implementation | Neg |
| Identification of changes in resources over time | Forecasts that considered resources in relation to time | Neg |
| Forecasts focused on implementation | The extent to which the forecasted outcomes focus on factors that occur while the plan is being implemented | Neg |
| Forecasts focused on outcomes | The extent to which the forecasted outcomes focus on factors that occur after implementation | Pos |
| Environmental scanning | The extent to which the participant identified important external information and situational cues regarding events occurring in the environment | Neg |
| Forecasts that are social focused | Forecasted outcomes involving a human element<br>Focus on employee efforts for successful implementation<br>Mention of strategy involving employee's contribution to successful implementation<br>Mention of leadership contributing to idea implementation | Pos |
| Forecasts that are problem or task-focused | Forecasted outcomes involving the proper execution of tasks required for implementation | Neg |

| | | |
|---|---|---|
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| Considerations of organizational goals | The extent to which the participant forecasted outcomes in relation to the overall goals (e.g., financial gains, market share, implementation success) of the idea<br>Discussion of how the current strategy is effective or ineffective. | Pos/Neg |
| Focus on controllable outcomes | The extent to which the forecasted outcomes focused on practical issues and/or outcomes | Neg |
| Focus on uncontrollable outcomes | The extent to which the forecasted outcomes cannot be used to refine the implementation plan | Pos |
| Focus on current organizational strategy | Consideration of the current strategy of the organization | Neg |
| Identification of situational/environmental change | The level at which participants considered the situation or environment as a dynamic process | Neg |
| Elaboration | The extent to which participants elaborated on, or refined, forecasted outcomes | Pos/Neg |
| Quality of forecasts | The degree to which the forecasted outcomes displayed detail, relevance to the scenario, considered critical aspects of the scenario, and were realistic.<br>Completeness—Is the forecasted outcome comprehensive?<br>Coherence—Is the forecasted outcome coherent? Is it well thought out and logical?<br>Usefulness—Is the forecasted outcome of ideas actually feasible and appropriate for addressing the problem? | Pos/Neg |
| Specificity of outcomes forecasted | The extent to which the forecasted outcomes focus on specific concerns with the idea | Pos/Neg |
| Uniqueness of forecasts | The extent to which the forecasted outcomes are original and nove<br>Unexpectedness—Are the forecasted outcomes novel, imaginative, unpredictable, or innovative?<br>Elaborative/Descriptive—Are forecasted outcomes described richly enough to help the reader visualize solutions for addressing the problem? | Pos/Neg |
| Implementation | | |
| Preparation of resources | The resources needed for controlling actions at various levels of interaction with the work environment | Neg |
| Identifying events for monitoring progress | The extent to which participant identifies factors that require monitoring<br>Does the participant discuss the need to evaluate/monitor progress?<br>Does the participant consider specific key events/markers that might be used to evaluate the progress of actions taken? | Pos |
| Developing backup plans | The development of alternative solutions in relation to potential issues that could occur with the foci implementation plan | Neg |
| Implementation plan focused on potential costs | The consideration of the potential costs of implementation failure<br>Consideration of the potential loss of resources of time that could negatively impact the organization | Neg |
| Implementation plan focused on benefits | The consideration of the potential benefit of successful implementation<br>Consideration of the potential financial gains if the plan were to be successfully implemented | Pos |
| Anticipating environmental constraints | The extent to which the participant identifies the market demand and/or technology that impact the creative idea | Neg |
| Implementation plan involving human capital | Consideration of the coordination efforts required by the organization and its employees for effective implementation | Pos |
| Implementation plan addressing tasks and procedure | The extent to which the implementation plan takes into account the steps to achieve successful implementation | Neg |

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| | | |
|---|---|---|
| Considering goals | Consideration of the overarching goals (e.g., successful implementation, organizational goals) of the idea | Pos |
| Considering competitors | Consideration of other organizations in relation to the successful implementation of the idea | Neg |
| Considering obstacles | The extent to which the participant understands the obstacles (things outside the participant's control).<br>Explains logically why obstacles are or are not likely to occur.<br>Demonstrates that obstacles have been carefully considered and whether they could impact ideas. | Neg |
| Quality of decision implementation | The competence with which the steps are taken to execute the strategic decision | Pos/Neg |
| Identification of interdependencies in action | Definition:<br>Does the participant discuss actions and their possible impact on other actions within the plan?<br>Does the participant discuss the necessity of one action for another to be effective?<br>Does the participant discuss how actions may need to be modified depending on the outcomes of other actions? | Pos/Neg |
| Adaptability of plan | The extent to which the final plan can be refined and modified to improve the implementation plan | Pos/Neg |
| Quality | The overall quality of the participant's final advertising plan.<br>Completeness—Is the plan comprehensive?<br>Coherence—Is the plan coherent? Is it well thought out and logical?<br>Usefulness—Is the plan of ideas actually feasible and appropriate for addressing the problem | Pos/Neg |
| Originality | The extent to which the participant's implementation plan is original and novel.<br>Unexpectedness—Is the plan novel, imaginative, unpredictable, or innovative?<br>Elaborative/Descriptive—Is the plan described richly enough to help the reader visualize solutions for addressing the problem? | Pos/Neg |
| Elegance | The extent to which the final plan is articulately arranged in a succinct way.<br>Flow— Do all parts of the plan fit together smoothly? Does it flow seamlessly?<br>Refinement—Is the plan easy to follow and well-refined? Is the plan focused well so that it uses The minimal number of elements necessary to operate?<br>Cleverness—Is the plan well-designed and cleverly put together? | Pos/Neg |

*Business Case Proposals*

**Chili's Restaurant**

Chili's restaurant, founded by two brothers, opened in 1975 in Dallas. The restaurant was created to exploit a new niche between fast food and mid-scale restaurants. The appeal of Chili's was twofold: fast, full-service and quality hamburgers. By 1986 there were 80 Chili's restaurants in 12 mostly southwestern states. Up to this point in time, the restaurant industry was healthy and Chili's was performing well. However, industry analysts predicted 1986 to be a year of change in the restaurant business. Consumers had less to spend and competition was increasing. Oil prices had plummeted and energy companies were laying off workers. Tax reform in 1986 eliminated write-offs for business related dining. Employment and expendable income had decreased in addition to increased debts and lower savings rates. Furthermore, the cost of eating out was increasing relative to the cost of eating at home. In addition to economic trends, the restaurant industry became more competitive. Convenience stores, deli counters, and supermarkets were beginning to capture some of the market. Additionally, consumer awareness and governmental regulations concerning alcohol sales and consumption were expected to decrease overall alcohol revenue. Chili's top executives needed to make plans to combat the expected decline.

A market analysis indicated that design modifications to the buildings would increase appeal while reducing maintenance costs. A remodeling program included new signs, improved lighting, custom awnings, a new kitchen layout, reconfigured customer areas, and brick exterior. The menu was diversified to attract a broad customer group, including a children's menu. The introduction of several new items increased the number of non-burger items offered. Full bar service was available and included premium wines available by the glass or bottle. Most of the alcohol sales came from customers waiting for tables.

**Morningstar Bakery**

Morningstar Bakery is a relatively new commercial bakery started 18 months ago by Joe and Jane Pollard. They mainly sell cheesecake, coffee cake, other cakes, muffins, and miscellaneous snacks like cupcakes and lemon bars. Morningstar worked its way into the commercial baking business by gradually selling their baked goods to the local bakeries. Almost all of the local bakeries initially approached became regular customers.

The Pollard's make sure that their baked goods are always consistent and of the highest quality. Some of the steps that the Pollard's take to make sure that their product is of the highest quality are using butter not margarine in the products, limiting or eliminating preservatives, and hand-mixing rather than using a commercial mixer. The couple also takes pride in keeping their bakery clean and tidy. In addition, Joe and Jane Pollard make sure that their customers' needs are met by making products that the Morningstar Bakery does not currently bake. However, the couple has come to the realization that this was not the most profitable decision. During the first year of business the company did not pull in a profit, as a consequence the couple decided not to fulfill special orders until the Morningstar Bakery became more established

After the second year in business however, the company did pull in a large profit so Joe and Jane Pollard decided to expand their business and open up vending carts throughout the city. This would allow the Pollard's to sell their products to a broader market and potentially add another 20,000-40,000 new customers since their vending carts would be placed within the downtown area of Oklahoma City.

**Table 5**

*Rwg Statistics*

| Forecasting Extensiveness | | Implementation Planning | |
|---|---|---|---|
| | *Rwg* | | *Rwg* |
| Number of outcomes | .69 | Developing backup plans | .81 |
| Number of positive outcomes | .84 | Anticipating environmental constraints | .66 |
| Number of negative outcomes | .85 | Implementation plan involving human capital | .67 |
| Short-term timeframe considerations | .63 | Considering competitors | .76 |
| Forecasts focused on resources | .60 | Considering obstacles | .56 |
| Forecasts focused on implementation | .63 | Quality of decision implementation | .68 |
| Forecasts focused on outcomes | .68 | Identification of interdependencies in action | .65 |
| Forecasts that are problem or task-focused | .59 | Quality | .61 |
| Considerations of organizational goals | .62 | Originality | .55 |
| Focus on current organizational strategy | .62 | Elegance | .63 |
| Elaboration | .67 | | |
| Quality of forecasts | .68 | | |

## Appendix B

**Table 6**

*Correlations for Case 1*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Extraversion | 2.66 | 0.73 | | | | | | | | | | |
| 2. Agreeableness | 3.84 | 0.68 | .23** | | | | | | | | | |
| 3. Conscientiousness | 3.42 | 0.82 | .04 | .02 | | | | | | | | |
| 4. Neuroticism | 3.07 | 0.66 | .07 | .14 | -.12 | | | | | | | |
| 5. Openness | 3.74 | 0.67 | .16 | .39** | -.03 | .03 | | | | | | |
| 6. Divergent Thinking | 4.49 | 1.80 | .08 | .02 | .01 | .05 | .11 | | | | | |
| 7. Need for Cognition | 3.08 | 0.40 | .04 | .28** | .03 | .14 | .47** | .13 | | | | |
| 8. Intelligence | 20.87 | 6.40 | -.07 | .00 | -.11 | .04 | .16* | .19* | .15 | | | |
| 9. Accuracy | 5.69 | 1.34 | -.10 | .09 | -.02 | -.03 | .07 | .02 | .07 | .26** | | |
| 10. Number of outcomes | 3.37 | 1.42 | -.09 | .08 | -.06 | .08 | .22** | .15 | .10 | .13 | .18* | |
| 11. Number of positive outcomes | 1.87 | 1.35 | .01 | .03 | .17* | .05 | .13 | .08 | .13 | .10 | .10 | .48** |
| 12. Number of negative outcomes | 1.51 | 1.42 | -.08 | .05 | -.21* | .05 | .09 | .08 | -.04 | .03 | .10 | .54** |
| 13. Short-term timeframe considerations | 2.28 | 0.61 | -.05 | .10 | -.11 | .06 | .21** | .02 | .16 | .15 | .05 | .36** |
| 14. Long-term timeframe considerations | 2.91 | 0.70 | -.12 | .17* | -.14 | .10 | .21* | .15 | .19* | .16* | .14 | .47** |
| 15. Forecasts focused on resources | 2.62 | 0.85 | -.20* | .03 | -.18* | -.06 | .17* | .07 | .16 | .19* | .17* | .49** |
| 16. Forecasts focused on implementation | 2.44 | 0.95 | -.12 | .05 | -.10 | -.09 | .23** | .04 | .20* | .25** | .14 | .32** |
| 17. Forecasts focused on outcomes | 3.13 | 0.67 | -.23** | .08 | -.20* | .09 | .08 | .06 | .01 | .12 | .06 | .55** |
| 18. Forecasts that are problem or task-focused | 2.51 | 0.83 | -.21* | -.01 | -.17* | -.06 | .24** | -.02 | .16* | .19* | .08 | .38** |
| 19. Considerations of organizational goals | 2.62 | 0.74 | -.19* | -.07 | -.13 | .03 | .15 | .09 | .05 | .27** | .13 | .43** |
| 20. Focus on controllable outcomes | 2.81 | 0.75 | -.18* | .06 | -.01 | -.09 | .21* | .07 | .10 | .18* | .12 | .44** |
| 21. Focus on current organizational strategy | 2.55 | 0.75 | -.10 | .05 | -.19* | -.12 | .18* | .11 | .02 | .15 | .12 | .44** |
| 22. Elaboration | 2.75 | 0.90 | -.19* | -.04 | -.16 | -.01 | .26** | .13 | .15 | .27** | .13 | .54** |
| 23. Quality of forecasts | 2.90 | 0.91 | -.21* | -.00 | -.14 | -.01 | .29** | .09 | .16* | .27** | .14 | .52** |
| 24. Specificity of outcomes forecasted | 2.67 | 0.89 | -.25** | -.03 | -.13 | -.08 | .21* | -.01 | .12 | .12 | .07 | .39** |
| 25. Preparation of resources | 2.61 | 0.87 | -.02 | .23** | -.16 | .08 | .31** | .16* | .30** | .16 | .12 | .25** |
| 26. Identifying events for monitoring progress | 2.51 | 0.99 | -.06 | .26** | -.13 | .16* | .25** | .14 | .23** | .24** | .15 | .28** |
| 27. Developing backup plans | 1.37 | 0.44 | -.04 | .25** | -.19* | .10 | .25** | .10 | .26** | .25** | .11 | .17* |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28. Implementation plan focused on potential costs | 2.13 | 0.80 | -.16* | .21* | -.16 | .04 | .26** | .05 | .27** | .19* | .14 | .23** |
| 29. Implementation plan focused on benefits | 2.36 | 0.70 | .05 | .24** | -.10 | .03 | .20* | .12 | .18* | .10 | .10 | .15 |
| 30. Anticipating environmental constraints | 1.82 | 0.66 | -.11 | .09 | -.07 | -.01 | .16 | .09 | .23** | .07 | .07 | .13 |
| 31. Implementation plan involving human capital | 1.82 | 0.97 | .02 | .16 | -.05 | -.05 | .13 | .11 | .16 | .09 | .07 | .16 |
| 32. Implementation plan addressing tasks and procedure | 2.78 | 0.92 | -.11 | .27** | -.11 | .01 | .30** | .15 | .28** | .20* | .06 | .26** |
| 33. Considering goals | 2.82 | 0.81 | .05 | .24** | -.15 | .12 | .23** | .15 | .20* | .12 | .04 | .20* |
| 34. Considering competitors | 1.29 | 0.48 | -.05 | .03 | -.15 | .05 | .16 | .05 | .11 | .07 | .01 | .11 |
| 35. Considering obstacles | 1.72 | 0.60 | -.04 | .08 | -.14 | .10 | .12 | .09 | .11 | .12 | .06 | .12 |
| 36. Quality of decision implementation | 2.79 | 0.82 | -.09 | .29** | -.19* | .04 | .28** | .11 | .26** | .20* | .10 | .22** |
| 37. Identification of interdependencies in action | 2.61 | 0.85 | -.14 | .14 | -.21* | .05 | .18* | .21** | .28** | .26** | .10 | .28** |
| 38. Adaptability of plan | 2.52 | 0.82 | -.05 | .25** | -.09 | .06 | .29** | .12 | .26** | .23** | .12 | .26** |
| 39. Quality | 2.76 | 0.96 | -.06 | .31** | -.15 | .07 | .29** | .15 | .28** | .24** | .11 | .31** |
| 40. Originality | 2.52 | 0.89 | -.12 | .25** | -.16 | .03 | .23** | .16 | .29** | .22** | .09 | .26** |
| 41. Elegance | 2.52 | 0.96 | -.09 | .26** | -.19* | .06 | .30** | .11 | .26** | .21** | .07 | .24** |

Note. *M* and *SD* are used to represent mean and standard deviation, respectively.
* indicates $p < .05$. ** indicates $p < .01$.

**Table 6**

*Correlations for Case 1 Cont.*

| Variable | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. Number of negative outcomes | -.47** | | | | | | | | | | | |
| 13. Short-term timeframe considerations | .09 | .30** | | | | | | | | | | |
| 14. Long-term timeframe considerations | .25** | .25** | .22** | | | | | | | | | |
| 15. Forecasts focused on resources | .09 | .40** | .41** | .50** | | | | | | | | |
| 16. Forecasts focused on implementation | -.01 | .34** | .43** | .40** | .69** | | | | | | | |
| 17. Forecasts focused on outcomes | .32** | .25** | .35** | .51** | .41** | .11 | | | | | | |
| 18. Forecasts that are problem or task-focused | -.06 | .43** | .44** | .37** | .71** | .71** | .28** | | | | | |
| 19. Considerations of organizational goals | .17* | .28** | .34** | .47** | .58** | .61** | .34** | .56** | | | | |
| 20. Focus on controllable outcomes | .32** | .12 | .30** | .42** | .61** | .51** | .39** | .56** | .40** | | | |
| 21. Focus on current organizational strategy | .08 | .38** | .29** | .54** | .65** | .61** | .37** | .55** | .56** | .55** | | |
| 22. Elaboration | .22** | .34** | .40** | .58** | .74** | .73** | .40** | .62** | .64** | .64** | .73** | |
| 23. Quality of forecasts | .19* | .35** | .44** | .57** | .77** | .74** | .45** | .69** | .69** | .64** | .72** | .92** |
| 24. Specificity of outcomes forecasted | .07 | .31** | .32** | .53** | .68** | .62** | .34** | .62** | .51** | .62** | .60** | .78** |
| 25. Preparation of resources | .07 | .20* | .14 | .35** | .37** | .45** | .11 | .39** | .36** | .29** | .36** | .48** |
| 26. Identifying events for monitoring progress | -.00 | .29** | .17* | .17* | .33** | .37** | .17* | .33** | .26** | .25** | .23** | .37** |
| 27. Developing backup plans | -.02 | .21** | .23** | .20* | .28** | .40** | .13 | .33** | .25** | .18* | .23** | .29** |
| 28. Implementation plan focused on potential costs | -.10 | .34** | .22** | .22** | .36** | .46** | .14 | .45** | .30** | .32** | .29** | .40** |
| 29. Implementation plan focused on benefits | .11 | .04 | .18* | .18* | .18* | .27** | .17* | .25** | .25** | .26** | .16 | .24** |
| 30. Anticipating environmental constraints | -.11 | .23** | .22** | .08 | .17* | .28** | .14 | .32** | .25** | .04 | .10 | .25** |
| 31. Implementation plan involving human capital | .07 | .11 | .07 | .21* | .27** | .34** | .06 | .26** | .21* | .20* | .26** | .30** |
| 32. Implementation plan addressing tasks and procedure | .06 | .20* | .27** | .30** | .43** | .46** | .25** | .43** | .38** | .38** | .35** | .50** |
| 33. Considering goals | .11 | .10 | .11 | .18* | .25** | .29** | .14 | .23** | .23** | .23** | .21* | .32** |
| 34. Considering competitors | .02 | .09 | .12 | .18* | .13 | .22** | .02 | .23** | .22** | .06 | .22** | .16* |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35. Considering obstacles | -.13 | .26** | .21* | .07 | .12 | .30** | .08 | .34** | .23** | .13 | .19* | .26** |
| 36. Quality of decision implementation | .00 | .22** | .18* | .29** | .35** | .42** | .20* | .41** | .28** | .34** | .32** | .45** |
| 37. Identification of interdependencies in action | .05 | .25** | .16* | .37** | .38** | .41** | .22** | .35** | .35** | .37** | .40** | .51** |
| 38. Adaptability of plan | .05 | .21* | .16 | .23** | .29** | .36** | .14 | .34** | .23** | .30** | .25** | .39** |
| 39. Quality | .09 | .23** | .25** | .36** | .40** | .43** | .30** | .39** | .36** | .36** | .35** | .51** |
| 40. Originality | .02 | .25** | .25** | .31** | .40** | .45** | .28** | .43** | .40** | .26** | .33** | .46** |
| 41. Elegance | .07 | .19* | .15 | .28** | .32** | .38** | .22** | .32** | .32** | .30** | .29** | .45** |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 6**

*Correlations for Case 1 Cont.*

| Variable | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24. Specificity of outcomes forecasted | .80** | | | | | | | | | | | |
| 25. Preparation of resources | .44** | .41** | | | | | | | | | | |
| 26. Identifying events for monitoring progress | .39** | .27** | .63** | | | | | | | | | |
| 27. Developing backup plans | .34** | .30** | .54** | .65** | | | | | | | | |
| 28. Implementation plan focused on potential costs | .41** | .34** | .65** | .67** | .64** | | | | | | | |
| 29. Implementation plan focused on benefits | .26** | .21* | .55** | .50** | .31** | .42** | | | | | | |
| 30. Anticipating environmental constraints | .25** | .22** | .42** | .50** | .41** | .51** | .41** | | | | | |
| 31. Implementation plan involving human capital | .27** | .23** | .65** | .53** | .39** | .40** | .43** | .25** | | | | |
| 32. Implementation plan addressing tasks and procedure | .49** | .42** | .76** | .74** | .53** | .61** | .60** | .60** | .59** | | | |
| 33. Considering goals | .30** | .20* | .63** | .53** | .33** | .41** | .68** | .37** | .43** | .65** | | |
| 34. Considering competitors | .14 | .15 | .31** | .33** | .25** | .26** | .29** | .22** | .25** | .32** | .30** | |
| 35. Considering obstacles | .27** | .21* | .51** | .53** | .56** | .68** | .47** | .60** | .28** | .57** | .35** | .31** |
| 36. Quality of decision implementation | .44** | .38** | .75** | .75** | .50** | .66** | .63** | .58** | .57** | .87** | .69** | .33** |
| 37. Identification of interdependencies in action | .47** | .40** | .71** | .70** | .54** | .64** | .49** | .43** | .54** | .77** | .59** | .34** |
| 38. Adaptability of plan | .41** | .30** | .68** | .83** | .58** | .65** | .51** | .50** | .54** | .77** | .60** | .30** |
| 39. Quality | .49** | .42** | .79** | .74** | .52** | .61** | .66** | .54** | .59** | .90** | .69** | .32** |
| 40. Originality | .45** | .37** | .76** | .76** | .58** | .66** | .60** | .66** | .60** | .88** | .59** | .30** |
| 41. Elegance | .43** | .35** | .76** | .72** | .48** | .61** | .65** | .51** | .58** | .87** | .68** | .33** |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 6**
*Correlations for Case 1 Cont.*

| Variable | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|
| 36. Quality of decision implementation | .59** | | | | | |
| 37. Identification of interdependencies in action | .50** | .77** | | | | |
| 38. Adaptability of plan | .49** | .78** | .73** | | | |
| 39. Quality | .56** | .90** | .79** | .77** | | |
| 40. Originality | .58** | .84** | .75** | .76** | .87** | |
| 41. Elegance | .53** | .89** | .78** | .76** | .92** | .86** |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 7**

*Correlations for Case 2*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Extraversion | 2.66 | 0.73 | | | | | | | | | | |
| 2. Agreeableness | 3.84 | 0.68 | .23** | | | | | | | | | |
| 3. Conscientiousness | 3.42 | 0.82 | .04 | .02 | | | | | | | | |
| 4. Neuroticism | 3.07 | 0.66 | .07 | .14 | -.12 | | | | | | | |
| 5. Openness | 3.74 | 0.67 | .16 | .39** | -.03 | .03 | | | | | | |
| 6. Divergent Thinking | 4.49 | 1.80 | .08 | .02 | .01 | .05 | .11 | | | | | |
| 7. Need for Cognition | 3.08 | 0.40 | .04 | .28** | .03 | .14 | .47** | .13 | | | | |
| 8. Intelligence | 20.87 | 6.40 | -.07 | .00 | -.11 | .04 | .16* | .19* | .15 | | | |
| 9. Accuracy | 2.46 | 1.28 | .03 | .02 | -.16* | -.01 | .08 | -.11 | .11 | .25** | | |
| 10. Number of outcomes | 3.35 | 1.43 | -.07 | .08 | -.05 | .08 | .23** | .14 | .10 | .14 | -.05 | |
| 11. Number of positive outcomes | 1.87 | 1.35 | -.00 | .03 | .17* | .03 | .13 | .07 | .13 | .10 | -.07 | .49** |
| 12. Number of negative outcomes | 1.50 | 1.42 | -.08 | .04 | -.20* | .05 | .10 | .07 | -.03 | .04 | .02 | .54** |
| 13. Short-term timeframe considerations | 2.29 | 0.61 | -.09 | .10 | -.09 | .03 | .20* | .03 | .15 | .11 | .10 | .38** |
| 14. Long-term timeframe considerations | 2.87 | 0.73 | -.09 | .18* | -.15 | .11 | .21* | .15 | .21* | .17* | .14 | .47** |
| 15. Forecasts focused on resources | 2.60 | 0.85 | -.21* | .04 | -.19* | -.05 | .19* | .07 | .19* | .22** | .11 | .47** |
| 16. Forecasts focused on implementation | 3.11 | 0.67 | -.20* | .06 | -.17* | .09 | .09 | .05 | .01 | .10 | .07 | .55** |
| 17. Forecasts focused on outcomes | 2.26 | 0.85 | -.17* | -.02 | -.25** | -.04 | .11 | -.02 | .09 | .08 | .14 | .18* |
| 18. Forecasts that are problem or task-focused | 2.47 | 0.83 | -.19* | .00 | -.17* | -.04 | .26** | .01 | .17* | .19* | .08 | .42** |
| 19. Considerations of organizational goals | 2.61 | 0.75 | -.17* | -.05 | -.15 | .03 | .17* | .09 | .06 | .27** | .09 | .44** |
| 20. Focus on controllable outcomes | 2.78 | 0.75 | -.16 | .07 | -.00 | -.07 | .23** | .06 | .12 | .19* | .06 | .45** |
| 21. Focus on current organizational strategy | 2.53 | 0.77 | -.08 | .05 | -.19* | -.09 | .15 | .13 | .01 | .12 | .01 | .43** |
| 22. Elaboration | 2.71 | 0.93 | -.17* | -.03 | -.16 | .02 | .25** | .13 | .15 | .26** | .09 | .55** |
| 23. Quality of forecasts | 2.86 | 0.93 | -.20* | .01 | -.13 | .01 | .29** | .09 | .19* | .28** | .08 | .54** |
| 24. Specificity of outcomes forecasted | 2.64 | 0.90 | -.25** | -.03 | -.15 | -.06 | .21* | -.02 | .11 | .09 | .05 | .39** |
| 25. Preparation of resources | 2.96 | 0.70 | -.02 | .22** | -.12 | -.01 | .16 | .20* | .14 | .25** | .04 | .31** |
| 26. Identifying events for monitoring progress | 2.79 | 0.80 | -.04 | .11 | -.09 | -.06 | .16 | .17* | .18* | .29** | .05 | .26** |
| 27. Developing backup plans | 1.57 | 0.42 | .09 | .14 | -.02 | -.03 | .09 | -.01 | -.02 | .07 | .00 | .04 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28. Implementation plan focused on potential costs | 2.36 | 0.58 | .07 | .13 | -.04 | .02 | .08 | -.05 | .03 | .05 | .02 | .20* |
| 29. Implementation plan focused on benefits | 2.73 | 0.54 | .00 | .15 | -.09 | -.13 | .16 | .02 | .12 | .12 | .03 | .21** |
| 30. Anticipating environmental constraints | 2.08 | 0.55 | -.03 | .14 | -.13 | .05 | .17* | .14 | .13 | .27** | .10 | .28** |
| 31. Implementation plan involving human capital | 1.92 | 0.76 | -.09 | .11 | -.05 | -.07 | .09 | .03 | .01 | .21* | -.09 | .25** |
| 32. Implementation plan addressing tasks and procedure | 3.02 | 0.79 | -.03 | .17* | -.09 | -.06 | .22** | .14 | .22** | .38** | .11 | .27** |
| 33. Considering goals | 3.09 | 0.61 | -.07 | .10 | -.02 | -.15 | .19* | .06 | .19* | .20* | .10 | .23** |
| 34. Considering competitors | 1.76 | 0.54 | .06 | .03 | -.14 | .03 | -.03 | .17* | -.03 | .24** | .10 | .14 |
| 35. Considering obstacles | 2.05 | 0.46 | -.03 | .09 | -.13 | .01 | .01 | .04 | -.04 | .12 | .04 | .15 |
| 36. Quality of decision implementation | 2.92 | 0.78 | -.01 | .24** | -.13 | -.01 | .25** | .13 | .23** | .36** | .10 | .32** |
| 37. Identification of interdependencies in action | 2.67 | 0.76 | .05 | .15 | -.18* | -.07 | .16 | .05 | .12 | .23** | .08 | .21** |
| 38. Adaptability of plan | 2.58 | 0.58 | -.08 | .11 | -.03 | -.05 | .20* | .06 | .17* | .24** | .10 | .28** |
| 39. Quality | 3.00 | 0.88 | -.05 | .18* | -.13 | -.06 | .20* | .15 | .20* | .39** | .13 | .30** |
| 40. Originality | 2.74 | 0.81 | -.03 | .16 | -.12 | -.02 | .26** | .14 | .20* | .32** | .04 | .30** |
| 41. Elegance | 2.73 | 0.91 | -.09 | .16 | -.15 | -.01 | .22** | .09 | .19* | .36** | .10 | .30** |

Note. M and SD are used to represent mean and standard deviation, respectively.
* indicates $p < .05$. ** indicates $p < .01$.

**Table 7**
*Correlations for Case 2 Cont.*

| Variable | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. Number of negative outcomes | -.46** | | | | | | | | | | | |
| 13. Short-term timeframe considerations | .09 | .33** | | | | | | | | | | |
| 14. Long-term timeframe considerations | .29** | .22** | .20* | | | | | | | | | |
| 15. Forecasts focused on resources | .13 | .36** | .39** | .53** | | | | | | | | |
| 16. Forecasts focused on implementation | .35** | .27** | .39** | .48** | .42** | | | | | | | |
| 17. Forecasts focused on outcomes | -.29** | .47** | .20* | .24** | .48** | .15 | | | | | | |
| 18. Forecasts that are problem or task-focused | -.01 | .44** | .43** | .36** | .71** | .30** | .52** | | | | | |
| 19. Considerations of organizational goals | .17* | .30** | .34** | .45** | .65** | .35** | .49** | .61** | | | | |
| 20. Focus on controllable outcomes | .36** | .11 | .29** | .41** | .60** | .36** | .12 | .60** | .49** | | | |
| 21. Focus on current organizational strategy | .10 | .36** | .32** | .55** | .59** | .36** | .45** | .56** | .57** | .55** | | |
| 22. Elaboration | .25** | .32** | .37** | .59** | .69** | .42** | .43** | .64** | .62** | .61** | .72** | |
| 23. Quality of forecasts | .24** | .33** | .40** | .57** | .75** | .47** | .53** | .70** | .70** | .62** | .70** | .91** |
| 24. Specificity of outcomes forecasted | .09 | .31** | .31** | .53** | .65** | .37** | .41** | .66** | .54** | .59** | .61** | .77** |
| 25. Preparation of resources | .14 | .19* | .26** | .23** | .23** | .31** | .19* | .21* | .19* | .20* | .17* | .29** |
| 26. Identifying events for monitoring progress | .10 | .18* | .24** | .22** | .32** | .23** | .24** | .34** | .25** | .22** | .23** | .32** |
| 27. Developing backup plans | -.03 | .09 | .07 | .03 | .16 | .08 | .28** | .21* | .15 | .06 | .19* | .19* |
| 28. Implementation plan focused on potential costs | .08 | .15 | .06 | .05 | .17* | .16* | .18* | .13 | .11 | .05 | .15 | .19* |
| 29. Implementation plan focused on benefits | .18* | .05 | .21* | .18* | .15 | .20* | .11 | .22** | .19* | .26** | .15 | .26** |
| 30. Anticipating environmental constraints | .13 | .15 | .07 | .24** | .20* | .18* | .17* | .17* | .20* | .09 | .15 | .26** |
| 31. Implementation plan involving human capital | .08 | .17* | .12 | .14 | .18* | .22** | .16 | .14 | .18* | .25** | .21* | .25** |
| 32. Implementation plan addressing tasks and procedure | .12 | .16 | .22** | .30** | .32** | .23** | .23** | .31** | .30** | .29** | .23** | .40** |
| 33. Considering goals | .18* | .06 | .26** | .20* | .17* | .16 | .17* | .22** | .27** | .24** | .14 | .29** |
| 34. Considering competitors | -.24** | .37** | .16 | .08 | .06 | .09 | .09 | .04 | .01 | -.08 | .04 | .07 |
| 35. Considering obstacles | -.09 | .25** | .09 | .11 | .19* | .12 | .29** | .21* | .22** | .10 | .23** | .25** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36. Quality of decision implementation | .16* | .18* | .26** | .29** | .29** | .26** | .20* | .29** | .29** | .25** | .27** | .40** |
| 37. Identification of interdependencies in action | .09 | .15 | .21** | .20* | .28** | .21* | .22** | .28** | .26** | .26** | .27** | .36** |
| 38. Adaptability of plan | .07 | .24** | .24** | .23** | .33** | .25** | .26** | .34** | .27** | .20* | .26** | .36** |
| 39. Quality | .15 | .18* | .26** | .25** | .29** | .26** | .21* | .26** | .28** | .25** | .20* | .34** |
| 40. Originality | .13 | .20* | .25** | .26** | .26** | .24** | .12 | .26** | .24** | .24** | .19* | .35** |
| 41. Elegance | .18* | .14 | .28** | .25** | .28** | .25** | .18* | .28** | .28** | .22** | .20* | .35** |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 7**

*Correlations for Case 2 Cont.*

| Variable | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24. Specificity of outcomes forecasted | .77** | | | | | | | | | | | |
| 25. Preparation of resources | .30** | .22** | | | | | | | | | | |
| 26. Identifying events for monitoring progress | .33** | .23** | .66** | | | | | | | | | |
| 27. Developing backup plans | .25** | .15 | .45** | .62** | | | | | | | | |
| 28. Implementation plan focused on potential costs | .21* | .10 | .53** | .50** | .55** | | | | | | | |
| 29. Implementation plan focused on benefits | .22** | .15 | .55** | .47** | .39** | .32** | | | | | | |
| 30. Anticipating environmental constraints | .26** | .20* | .46** | .53** | .52** | .38** | .41** | | | | | |
| 31. Implementation plan involving human capital | .25** | .19* | .63** | .42** | .27** | .32** | .29** | .23** | | | | |
| 32. Implementation plan addressing tasks and procedure | .42** | .30** | .77** | .80** | .56** | .50** | .53** | .56** | .57** | | | |
| 33. Considering goals | .26** | .17* | .60** | .55** | .36** | .28** | .70** | .40** | .32** | .67** | | |
| 34. Considering competitors | .05 | -.05 | .18* | .28** | .18* | .02 | .05 | .32** | .06 | .25** | .13 | |
| 35. Considering obstacles | .25** | .22** | .41** | .45** | .62** | .57** | .31** | .52** | .30** | .51** | .25** | .17* |
| 36. Quality of decision implementation | .38** | .27** | .72** | .76** | .58** | .53** | .59** | .63** | .47** | .88** | .70** | .25** |
| 37. Identification of interdependencies in action | .35** | .23** | .68** | .75** | .64** | .56** | .62** | .48** | .45** | .80** | .63** | .27** |
| 38. Adaptability of plan | .40** | .29** | .61** | .79** | .58** | .49** | .47** | .53** | .36** | .77** | .58** | .30** |
| 39. Quality | .37** | .24** | .76** | .78** | .54** | .55** | .57** | .58** | .50** | .89** | .69** | .24** |
| 40. Originality | .35** | .24** | .67** | .74** | .52** | .51** | .59** | .60** | .43** | .84** | .65** | .23** |
| 41. Elegance | .35** | .25** | .70** | .77** | .53** | .48** | .56** | .53** | .48** | .85** | .67** | .21* |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 7**

*Correlations for Case 2 Cont.*

| Variable | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|
| 36. Quality of decision implementation | .51** | | | | | |
| 37. Identification of interdependencies in action | .58** | .78** | | | | |
| 38. Adaptability of plan | .50** | .77** | .74** | | | |
| 39. Quality | .48** | .92** | .77** | .74** | | |
| 40. Originality | .50** | .89** | .75** | .74** | .89** | |
| 41. Elegance | .44** | .91** | .77** | .73** | .92** | .87** |

Note. * indicates $p < .05$. ** indicates $p < .01$.

**Table 8**

*MANCOVA Results for Forecasting Extensiveness*

| | *df* | *F* | *p* | *Partial η2* |
|---|---|---|---|---|
| **Case 1** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 1.41 | .178 | .11 |
| Agreeableness | 1,140 | 1.68 | .085 | .12 |
| Forecasting Valence | 3,140 | 1.42 | .065 | .11 |
| **Case 2** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 1.52 | .133 | .11 |
| Agreeableness | 1,140 | 1.43 | .167 | .11 |
| Forecasting Valence | 3,140 | 1.77 | .006** | .13 |

* indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

**Table 9**

*MANCOVA Results for Accuracy*

| | *df* | *F* | *p* | *Partial η2* |
|---|---|---|---|---|
| **Case 1** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 9.38 | .002** | .06 |
| Agreeableness | 1,140 | 1.30 | .256 | .00 |
| Forecasting Valence | 3,140 | .40 | .750 | .00 |
| **Case 2** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 9.67 | .002** | .06 |
| Agreeableness | 1,140 | .18 | .672 | .00 |
| Forecasting Valence | 3,140 | 1.25 | .293 | .03 |

*indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

**Table 10**

*MANCOVA Results for Implementation Planning*

| | *df* | *F* | *p* | *Partial η2* |
|---|---|---|---|---|
| **Case 1** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 2.24 | .028* | .12 |
| Agreeableness | 1,140 | 3.94 | .001*** | .19 |
| Forecasting Valence | 3,140 | 1.24 | .206 | .07 |
| **Case 2** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 5.13 | .001*** | .11 |
| Agreeableness | 1,140 | 1.37 | .218 | .11 |
| Forecasting Valence | 3,140 | 1.98 | .004** | .13 |

* indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

**Table 11**

*MANCOVA Results for Creativity*

| | *df* | *F* | *p* | *Partial η2* |
|---|---|---|---|---|
| **Case 1** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 3.30 | .022* | .07 |
| Agreeableness | 1,140 | 5.66 | .001*** | .11 |
| Forecasting Valence | 3,140 | 0.93 | .501 | .02 |
| **Case 2** | | | | |
| *Covariates* | | | | |
| Intelligence | 1,140 | 8.82 | .001*** | .16 |
| Agreeableness | 1,140 | 1.68 | .174 | .04 |
| Forecasting Valence | 3,140 | 0.52 | .860 | .01 |

* indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

**Table 12**

*Forecasting Extensiveness Univariate Effects of Forecasting Valence*

| | Case 1 | | | Case 2 | | | |
|---|---|---|---|---|---|---|---|
| | *F* | *p* | *Partial η2* | *F* | *p* | *Partial η2* | *MC* |
| Number of outcomes | 3.01 | .032* | 0.06 | 2.70 | .048* | 0.05 | Pos-Neg > Neg |
| Organizational goals | 0.71 | .547 | 0.02 | 0.59 | .624 | 0.01 | |
| Organizational strategy | 1.00 | .396 | 0.02 | 1.16 | .329 | 0.02 | |
| Focus on outcomes | 3.27 | .023* | 0.07 | 5.06 | .002** | 0.10 | Pos-Neg > Neg<br>Pos < Ambig<br>Pos < Neg |
| Forecasting quality | 0.53 | .661 | 0.01 | 0.62 | .606 | 0.01 | |
| Focus on resources | 0.79 | .499 | 0.02 | 1.04 | .375 | 0.02 | |
| Focus on short-term time frame | 0.11 | .952 | 0.00 | 0.44 | .724 | 0.00 | |
| Task-focused forecasts | 1.03 | .381 | 0.02 | 1.43 | .237 | 0.03 | |
| Implementation-focused forecasts | 2.48 | .064 | 0.05 | 2.64 | .052* | 0.05 | Pos-Neg > Neg |
| Focus on long-term time frame | 0.73 | .534 | 0.02 | 0.91 | .437 | 0.02 | |
| Elaboration | 0.62 | .602 | 0.01 | 0.48 | .699 | 0.01 | |

* indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

*MC* = Multiple comparisons

**Table 13**

*Implementation Planning Univariate Effects of Forecasting Valence*

| | Case 1 | | | Case 2 | | | |
|---|---|---|---|---|---|---|---|
| | *F* | *p* | *Partial η2* | *F* | *p* | *Partial η2* | *MC* |
| Developing back-up plans | 2.00 | .116 | 0.02 | 1.05 | .373 | 0.02 | |
| Anticipating environmental constraints | 2.15 | .097 | 0.03 | 1.47 | .224 | 0.03 | |
| Focus on human capital | 0.40 | .750 | 0.03 | 1.48 | .222 | 0.03 | |
| Focus on tasks | 0.27 | .851 | 0.00 | 0.38 | .766 | 0.00 | |
| Considering competitors | 0.93 | .430 | 0.09 | 4.53 | .005** | 0.09 | Pos < Ambig<br>Pos < Neg |
| Considering obstacles | 1.95 | .125 | 0.06 | 3.07 | .030* | 0.06 | Pos < Neg<br>Pos-Neg > Pos |
| Quality of decision implement | 0.52 | .672 | 0.00 | 0.34 | .793 | 0.00 | |
| Identification of interdependence in action | 0.37 | .774 | 0.00 | 0.23 | .872 | 0.00 | |

* indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

*MC* = Multiple comparisons

**Table 14**

*Creativity Univariate Effects of Forecasting Valence*

| | *F* | *p* |
|---|---|---|
| Case 1 | | |
| Quality | 0.14 | .938 |
| Originality | 0.32 | .810 |
| Elegance | 0.27 | .845 |
| Case 2 | | |
| Quality | 0.52 | .670 |
| Originality | 0.19 | .903 |
| Elegance | 0.72 | .540 |

* indicates $p < .05$. ** indicates $p < .01$.
*** indicates $p < .001$.