Industrial Marketing Management xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Industrial Marketing Management

journal homepage: www.elsevier.com/locate/indmarman

Research paper

Anticipated regret and escalation of commitment to failing, new product development projects in business markets

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ARTICLE INFO

Keywords:
Decision-making
Anticipated regret
New product development
Structural equation modeling
Escalation of commitment

ABSTRACT

Escalation of commitment, defined as the continuation in a failing course of action, is a persistent problem for decision makers in business markets, especially those involved in new product development (NPD). To address this issue, we use Anticipated Regret Theory to develop a model and then empirically test it to demonstrate how forward-looking emotions can lead decision makers to continue failing NPD projects in business-to-business (B2B) markets. We recognize that there are two countervailing types of anticipated regret (i.e., keep regret and drop regret) and test both in our model by adopting a mixed-methods empirical approach. In a quantitative study, a total of 280 subjects completed a NPD decision-making exercise in which various antecedents of persistence with a losing new, business-to-business NPD project were examined. The results suggest that anticipated drop regret plays a significant role in commitment to a failing course of action, whereas anticipated keep regret actually reduces commitment. In a second, qualitative study, twenty experienced NPD professionals operating in high-technology, B2B markets were interviewed either in-person or by telephone. The results suggest that anticipated drop regret is a more serious problem than anticipated keep regret, supporting the quantitative study.

1. Introduction

Business markets have been characterized by a rapid pace of technological and market change and widespread turbulence due to ever-changing customer needs and intense competition (Langerak and Commandeur, 1997; Liang, Sudhir, and Cherian, 2014). A key source of competitive advantage in such markets is new product development (NPD) which has been found to be crucial to the long-term success of business-to-business (B2B) firms (Nijssen and Frambach, 2000). In fact, empirical evidence reveals that higher performing B2B firms derive almost half of their sales and profits from new products they introduced within the last five years (Hutt and Speh 2013). However, NPD is expensive and time-consuming and also suffers from a high failure rate which can have a debilitating impact on organizations (Schmidt et al. 2009). Research shows that about 40% of all new products fail in the market causing significant losses to firms, and ony about one-in-five new products meet annual profit objectives (Cooper 2012).

Amidst several determinants of new product failure such as flawed products, incorrect market research, poor screening, and commercialization issues, a significant contributor to new product failure in business markets is escalation of commitment (Boulding et al. 1995; Liang, Sudhir, and Cherian, 2014; Schmidt and Calantone 1998). An escalation of commitment (hereafter escalation) situation has certain defining characteristics: (1) an initial investment of resources such as money, time, and effort into a course of action; (2) negative feedback about the future prospects of that course of action; (3) the possibility to withdraw or continue the chosen course with further investment of resources; (4) uncertainty about the consequences of these actions (Lehenkari 2012). Escalation is typically exhibited through the decision to ignore or distory negative information (Lee, Wong, and Ellick, 2015). Escalation can lead to substantial losses in resources, time, and opportunities and can be particularly disastrous for firms in B2B markets that require fast reactions and quick adaptability (Biyalogorsky et al. 2006).

The body of escalation research has grown significantly over the past four decades starting with the seminal work of Staw (1976). However, researchers believe that emotions need to be investigated further (Bazerman et al. 1998; Fineman 2000; Walsh 1995; Wong et al. 2006). Specifically, the role of anticipated emotions is still unclear, although decisions can be affected by those emotions that people expect to feel at a later point (Mellers, Ho, and Ritov, 1997) and "decision-makers actually look forward (prospectively) and look back (retrospectively)" (Moon 2001a, p.110) while making decisions.

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https://doi.org/10.1016/j.indmarman.2018.08.008
Received 20 January 2016; Received in revised form 13 August 2018; Accepted 15 August 2018

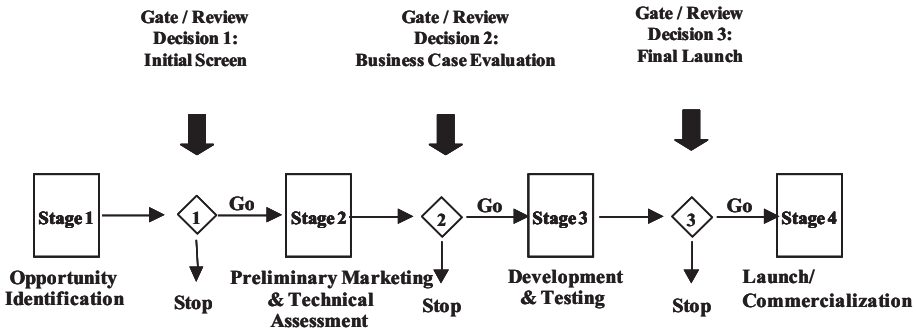

Fig. 1. Stage-Gate® new product development process.

Additionally, the presence of several variables impacting escalation (Sarangee et al. 2013) necessitates examining the potential inter-relationships among them. Most empirical research in this area has typically examined bi-variate and moderating relationships of various determinants of escalation. However, the mediating effects of other variables remain under-researched, so the manner in which these situations unfold remains murky (Biyalogorsky et al. 2006; Schultze and Schulz-Hardt, 2012).

To address these gaps, we test the relationship between anticipated regret and escalation since anticipation of regret in the future can potentially lead to biases in the *present* (Wong and Kwong 2007). First, we theoretically explain that anticipated regret has two distinct sub-components (i.e., anticipated keep regret and anticipated drop regret), whose significance might be underemphasized or unclear if their influence on escalation is not examined separately. Second, along the lines of Binder (1985) who defined commitment from both behavioral and cognitive perspectives, we conceptualize escalation as having a cognitive component (mental or attitudinal escalation) as well as a behavioral component (such as the actual act of funding a failing project). This demarcation is essential as we show a sequential occurrence of mental and behavioral escalation. Finally, since decision-makers often bias information, we explore the mediating role of perceived likelihood of success since it has been found to impact commitment (Moon 2001a; Schmidt and Calantone, 1998), and project continuation decisions (Arkes and Hutzel 2000; Onifade et al. 1997).

In summary, our study attempts to address the following research gaps:

1. What is the relationship between anticipated regret and its sub-dimensions on mental and behavioral commitment?
2. Does perceived likelihood of success play a mediating role in the process?

To answer our research questions, we adopted a mixed-methods empirical approach. First, we conducted a managerial decision-making exercise related to the introduction of a new high technology B2B product by a fictitious company which was completed by 280 participants composed of MBA and undergraduate students. In this quantitative study, we show a positive association between anticipated drop regret and escalation and conversely show the de-escalating influence of anticipated keep regret. Additionally, the results provide a more nuanced understanding of the path through which escalation occurs by establishing the mediating influence of perceived likelihood of success and explaining its association with mental and behavioral escalation. We followed this up with a qualitative study of 20 mid-to-senior level managers working in NPD in high technology, B2B markets. The results validated the findings of the quantitative study and showed the significant influence of anticipated drop regret.

We structure the rest of the article as follows. First, we discuss NPD and the Stage-Gate® process. Second, we briefly review the escalation of commitment and anticipated regret literatures. We present our conceptual framework where we define key constructs and develop hypotheses. In the third section, the mixed-methods approach used is presented. For the quantitative study, we discuss the methodology, data sources, variable definitions, and empirical model results. For the qualitative study, a case study approach that centers on NPD professionals, we present the research design, method, and findings. Finally, we discuss implications, contributions, limitations, and avenues for further research.

2. Theoretical development and hypotheses

2.1. New product development

A popular method for NPD in most B2B firms is the Stage-Gate® process (Cooper 1990), which has been the focus of considerable academic attention (Iqbal and Sethi 2004; Sethi and Iqbal 2008). A typical Stage-Gate® design (represented in Fig. 1) breaks the entire NPD process into a set of distinct, identifiable and developmental stages that are separated by gates or review points.

About three-quarters of companies involved in NPD have implemented some robust idea to launch system such as Stage-Gate® (Barczak et al. 2009; Center" 2003). Many B2B companies such as Emerson Electric, ITT, Siemens, Corning Glass, BASF and 3 M have experienced considerable success and profitability from using Stage-Gate® (Cooper 2012). (Stage-Gate® is a registered trademark of Robert G. Cooper and the Product Development Institute, http://www.stage-gate.com). Therefore, it is critical to understand why escalation occurs within B2B firms utilizing this process. Our study aims to address this gap.

Importantly, a common criticism of the Stage-Gate® process is weakly handled or non-existent project evaluations due to problems with both decision-making managers as well as the governance process (Cooper 2012). For example, Go/Kill decisions often are based on sunk costs, opinions, speculations and political/personal agenda rather than solid financial decision making or facts (Cooper 2008). Therefore, in such situations, decision makers have been found to persist with losing NPD projects even in the face of consistently negative information (Boulding et al. 1997; Schmidt and Calantone, 1998). In reality, NPD involves significant competition, risk, and time pressures where decision makers often have to make critical review decisions often with inadequate or incomplete information (Sarangee et al. 2013). Such situations are ripe to arouse emotions that impair decision-making among managers (Ku 2008) and thereby form the basis of investigation in our study.

In each stage, a variety of marketing, technical, and financial activities are undertaken concurrently to solve problems and generate knowledge about new products that are being developed. Following each stage is a gate which serves as an evaluative checkpoint where decision-makers review information gathered in the preceding stage along different sets of pre-specified criteria. Then, they determine whether to continue the new product to the next stage by allocating

resources or terminate it prior to commercialization (Schmidt 2004). The reviewers at these gates are usually senior managers from different functional areas within the organization who have the power to make funding decisions. While gate reviews, if conducted appropriately, could serve as good mechanisms for risk assessment, resource allocation, and portfolio management, they also are ripe for politics (Sethi et al. 2012) and erroneous decision making (Schmidt et al. 2009). The very nature and characteristics of this staged investment and review process creates serious dilemmas in conducting reviews, due to which decision makers often experience myriads of emotions and suffer from various biases throughout the process such as escalation (Liang, Sudhir, and Cherian, 2014) and anticipated regret (Sarangee et al. 2013). We discuss these next.

2.2. Escalation of commitment

Escalation provides a useful lens for understanding macro- and micro-level problems in decision–making and has consistently manifested itself in multiple contexts such as sports events and human resource allocations (Staw and Hoang 1995), organizational decision-making (Drummond 1994), military involvement in war (Staw 1976), NPD (Schmidt and Calantone 2002), and financial investments (Ross and Staw 1986). This has spawned empirical investigations in diverse settings such as marketing, organizational behavior, psychology, human resources, entrepreneurship, accounting & information technology. Some recent articles have started examining the occurrence of escalation specifically in B2B markets. For example, researchers have investigated how culture is linked to escalatation (Liang, Sudhir, and Cherian, 2014). More work has drawn on escalation to better understand how sales people operating in B2B markets make decisions such as resource allocation as they pursue a new customer prospect and work on other customer opportunities across the sales cycle (Bonney, Christopher, and Wolter, 2014). Another article has proposed a new, objective escalation identification method using data envelopment analysis (DEA) since B2B managers are constantly faced with the decision to continue or abandon NPD projects (Donthu and Belgin, 2014). Our research continues this recent focus on escalation durig NPD projects within B2B markets, given the potential repercussions on managerial performance and firm profitability.

Several theories have also been used to explain escalation such as Self-Justification Theory (Staw 1976), Sunk Costs Theory (Arkes and Blumer 1985; Navarro 2009), Prospect Theory (Whyte 1986), Agency Theory (Harrison 1993), Approach Avoidance Theory (Rubin and Brockner 1975), Decision Dilemma Theory (Bowen 1987), Expectancy Theory (Levi 1981; Vroom 1964), and Self-Presentation Theory (Brockner 1992). This examination has led to the identification of several determinants that earlier work has categorized into project, psychological, social and organizational (Staw and Ross 1987; Staw and Ross 1989) and contextual variables (Ross and Staw 1993). Anticipated regret is a psychological determinant of escalation, the category provides the richest explanation. (For a meta-analytic review of escalation determinants, please see Sleesman, Donald, McNamara, and Miles, 2012). Some more recent work has substantially added to this literature by highlighting other important determinants of escalation such as competitive market conditions and reference to rivals (Hsieh and Chen, 2015) and goal difficulty (Lee, Wong, and Ellick, 2015). Also, in real-options contexts, it has been found that not only do firms not need to bring in a new decision maker, but also (counterintuitively) it is beneficial to retain the same decision maker in potential escalation situations (Boulding et al. 2017).

Scholars acknowledge that the role of emotions, especially those that are prospective and future-focused, remains ripe for further investigation (He and Mittal 2007; Wong and Kwong, 2007). This is important because the “bounded rationality” of individuals or the constraints of human beings dealing with complexity and cognitive limitations in their decision-making tasks (Simon 1972) might contribute to sub-optimality, and concomitant negative emotions. Along these lines, we invoke Behavioral Decision Theory that figures prominently in research on risky decision settings (Mullins and Walker 1996) such as NPD. This perspective emphasizes the conditional nature of optimality such that decisions and judgments are conditional on certain environmental assumptions and a specified time horizon (Einhorn et al. 1981). We believe that the idiosyncratic characteristics of B2B markets (mentioned previously). Hence, it is important to better understand these emotions and the nature of interplay between them.

In the extant literature, a few studies have examined the association between some emotions, such as regret (Ku 2008) and negative affect (Wong et al. 2006), and escalation. Regret, one of the most frequently experienced negative sentiment (Lehenkari 2012), has been defined as a backward-looking emotion resulting from an unfavorable evaluation of the outcome of a past decision (Contractor and Kumar 2013; Zeelenberg 1999). Thus, regret captures the counterfactual thinking that the outcome in the current situation could have been better if a different action had been taken (Zeelenberg and Pieters 2004). Additionally, a few exemplars of prospective factors of escalation exist. For example, escalation has been shown to increase when decision-makers perceive that the project will be completed sooner rather than later (Conlon and Garland 1993; Garland and Conlon 1998). Moreover, people take future return estimates and outcome expectancy into consideration when making escalation decisions (Tan and Frank, 1995; Wong 2005). Additionally, anticipated regret has been found to cause individuals to commit to a losing course of action (Wong and Kwong, 2007). However, Wong and Kwong (2007) focus on consumer decision-making situations; they also acknowledge the need for more realistic replications in more naturalistic settings.

Finally, extant escalation research has put more focus on bi-variate relationships of the various determinants of escalation. Also, researchers have established the moderating effects of various factors on escalation such as prior success versus failure experience (Bragger et al. 2003), efficacy of resource management and allocation (Henderson et al. 2007), framing of decision alternatives ((Davis and Bobko 1986; Schoorman et al. 1994) and personality characteristics such as the type of personality (Schaubroeck and Williams 1993), dispositional optimism (Aspinwall and Richter 1999) and conscientiousness (Moon 2001b). However, the mediating effects of relevant variables on escalation have been relatively under-examined by extant academic literature. A notable exception is a study (Schultze and Schulz-Hardt, 2012), which shows that the evaluation of the previously sought information is biased among participants who were responsible for initiating the course of action. This evaluation bias in favor of reinvestment partially mediates the responsibility effect on escalation. Hence, researchers acknowledge the need for more research about how information is processed in escalation (Schultze and Schulz-Hardt, 2012) and what the path to escalation entails (Biyalogorsky et al. 2006, p.119). We address this gap by testing the mediating effects of perceived likelihood of success; subsequently the role of anticipated regret is discussed.

2.2.1. Mental commitment and behavioral commitment

In most escalation research, academicians have not differentiated behavior and cognition and have typically measured commitment from a behavioral perspective only. For example, the dollar amount committed to a hypothetical project of interest which is showing failing signs has been treated as the sole dependent variable. Rather than grouping both types of commitment under the rubric of escalation, we address this gap by making a clear distinction between behavior and cognition. Our approach is similar to that of Binder (1985) who defined commitment from both behavioral and cognitive perspectives. Hence, we define *behavioral commitment* as the funding recommendation - to invest resources in and pursue a failing course of action. *Mental commitment* is the establishment of favorable “attitudes” in the minds of the decision maker towards the failing course of action. We believe that this distinction is important as it provides a comprehensive view of the path

to escalation (i.e., how it unravels in the mind of the decision maker).

2.2.2. Perceived likelihood of success

Perceived likelihood of success can be defined as the decision-makers' assessment or estimated probability that the future outcomes of a course of action will be favorable or successful (Arkes and Hutzel, 2000). Researchers have noted that before discussing escalation situations, perceptions of success must be first controlled (Heath 1995). Moon (2001a) found that perceived likelihood of success is highly correlated with commitment. It has also been found to be important in sequential decision-making processes such as NPD (Sarangee et al. 2013). Schmidt and Calantone (2002) also showed that perceptions of possible outcomes vary in NPD projects even when decision-makers have identical information with which to make their decisions. Another study found that the expectation of success is significantly associated with project continuation decisions (Onifade et al. 1997). Hence, the potential influence of these perceptions should be accounted for while analyzing managerial flaws and biases in decision-making scenarios.

2.3. Anticipated regret

Anticipated Regret Theory can provide insight as to how decision makers' expectations of future regret influence their current behavior. (Refer to Zeelenberg, Zeelenberg 1999 for a review). Thus, anticipated regret is felt (1) before a decision is made, (2) before the outcomes of both the chosen, and the forgone alternative(s) are known, and (3) when a person considers the possibility of post-decision (i.e., future) regret (Lemon et al. 2002, p.7). High levels of anticipated regret lead to hesitation and doubt (Janis and Mann 1977), and when people anticipate regret they choose courses of action that avoid or minimize it (Hetts et al. 2000; Simonson 1992). Zeelenberg, Beattie, Plight, and Vries (1996) show that even in situations where people show preference for a course of action, anticipating regret can influence this preference.

Extant research suggests that anticipated regret may be multi-dimensional. First, Lemon, White and Winer (2002) examined regret anticipated by consumers when deciding to keep or drop a given service such as a cable TV or a health club membership. Similarly, Wong and Kwong (2007) looked at the impact of net anticipated regret about withdrawal (or anticipated regret about withdrawal minus anticipated regret about persistence) on behavioral escalation or the actual act of betting against negative information. Along these lines, we believe that people typically experience two distinct, countervailing types of anticipated regret which can potentially influence their perceptions, attitudes, intentions and decisions. Hence, anticipated regret can be interpreted as a higher-order construct composed of two important sub-dimensions: *anticipated keep regret* and *anticipated drop regret*. Accordingly, we posit that the true consequences of anticipated regret on managerial decision-making cannot be fully understood unless both its dimensions are examined separately rather than combining them into a single measure. This discussion forms the basis of our conceptual framework where we define keep and drop regret and examine their roles in the occurrence of escalation in NPD.

Accordingly, we provide the following definitions of anticipated keep and drop regret.

Anticipated Keep Regret is the regret that a decision-maker *anticipates* to feel in the future (time period = $T_1 \ldots n$) as a result of deciding to *continue* the troubled NPD project in the present (time period = T_0) and later learning it should have been stopped earlier.

Anticipated Drop Regret is the regret that a decision-maker *anticipates* to feel in the future (time period = $T_1 \ldots n$) due to *terminating* the troubled NPD project at the current time (time period = T_0), prior to completion, and later realizing that it should have been continued.

Next, we investigate the independent effects of anticipated keep and drop regret on the mental commitment and project funding and also explore the mediating influence of perceived likelihood of success.

2.4. The path to escalation

We hypothesize that anticipated keep regret is negatively associated with perceived likelihood of success, mental commitment, and behavioral commitment. If decision-makers anticipate regret in the future, they might lower their assessment about the probability of success of a project. This reduction in the forecast may significantly decrease the attitudes or mental commitment of the decision maker towards the troubled project. Thus, the decision maker will be expected to minimize regret by deciding to stop the NPD project. This assertion can also be supported by the tenets of Prospect Theory which posits that people are risk averse for gain and opportunities, since they tend to prefer the sure gain than the equivalent risky bet (Kahneman and Tversky 1979). When anticipated keep regret leads to lower perceptions of success, which is followed by lower mental commitment, then terminating the troubled project is deemed as a gain which can lead to project termination.

On the contrary, anticipated drop regret is expected to be positively associated with the perceived likelihood of success, mental commitment and funding. When decision-makers anticipate regret in the future due to the possibility of a troubled NPD project being terminated now, they will be expected to reduce regret and cognitive dissonance (Arkes and Hutzel, 2000; Festinger 1957) by increasing their perceptions of the likelihood of success of the project. Subsequently, due to their positive beliefs of better success prospects, decision makers will be more likely to increase their mental commitment by developing favorable attitudes towards their chosen course of action. This might promote the tendency to delay or avoid decisions since anticipated regret promotes decision aversion (Beattie et al. 1994), to gather more information and reach a better decision or to avoid the negative consequences and the responsibilities for the consequences (Zeelenberg 1999, p.103). Hence, to minimize regret, decision makers might delay termination of the dubious product with the hope of achieving better outcomes later "or turning the situation around." Similarly, as per Prospect Theory, people are risk seeking for losses, since they tend to prefer the risky bet to the equivalent sure loss (Kahneman et al. 1979; Mullins et al. 1996). Anticipated drop regret leads to higher perceptions of success and the formation of more favorable attitudes towards the failing project. Terminating the project now is considered a sure loss thereby leading to the manager persisting with the project. Accordingly, we suggest that:

H1. : Anticipated keep regret is negatively associated with a decision-maker's (a) perception of likelihood of success (b) mental commitment, and (c) behavioral commitment.

H2. : Anticipated drop regret is positively associated with a decision-maker's (a) perception of likelihood of success (b) mental commitment, and (c) behavioral commitment.

The next aspect of our conceptualization involves the relationship between perceptions of success, mental commitment, and behavioral commitment. The association between beliefs, attitudes and behaviors has been captured by the Theory of Reasoned Action which posits that perceptions, beliefs and evaluations influence attitudes and intentions, which in turn determine actual behavior (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975). The Theory of Planned Behavior, which is an extension of this theory, further validates this relationship by suggesting that a decision maker's intention to perform a given behavior strongly determines actual engagement in that behavior (Ajzen 1991). These theories strongly indicate that whenever an individual has to make a decision about a potentially flawed NPD project, there is a sequential occurrence of perceptions of success, mental or attitudinal commitment and finally actual behavior at that point of time.

Existing research on escalation has demonstrated a favorability bias where decision makers exhibit a tendency to ignore post-decision failure data and enhance their perceptions about the possible final outcome of a failing endeavor (Contractor and Kumar, 2013). Indeed, past research shows that individuals can and do bias information to fit

previously held beliefs and preferences (Boulding et al. 1997; Lovallo and Kahneman 2003; Schmidt and Calantone, 2002) and to manage impressions to others (Caldwell and O'Reilly 1982). The information distortion literature also demonstrates that new information can be distorted when there is a pre-existing preference or even in the absence of any initial preference (Russo et al. 2008; Russo et al. 1996). Finally, the effects of prior beliefs have been demonstrated in the motivated reasoning literature which provides evidence that decision makers are more likely to arrive at conclusions that they want to arrive at (Kunda 1990).

The above discussion suggests that decision-makers are not likely to develop positive attitudes and pursue a failing NPD project without first developing strong beliefs about the likelihood of its success in the future. Thus, when negative feedback is received, they must be ignored or biased and interpreted as positive or at least neutral to continue the project (Heath 1995). This heightened perception of success should lead to the formation of positive mental attitudes of the decision maker towards the course of action and also impact the behavioral act of actually funding the failing new product. Since behavior has been found to be determined by attitudes and the intention to behave, mental commitment should also lead directly to behavioral commitment.

H3. : A decision-maker's perception of likelihood of success of a failing project is positively associated with her/his (a) mental commitment and (b) behavioral commitment.

H4. : A decision-maker's mental commitment to a failing project is positively associated with behavioral commitment.

3. Mixed-methods approach

Our empirical methodology directly tests these hypotheses by adopting a mixed-methods approach which Cresswell and Plano (2007, p.5) define as follows:

> A research design with philosophical assumptions as well as methods of inquiry. As a methodology, it philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on the collecting, analyzing, and mixing both quantitative and qualitative data in a single study or a series of studies. Its central premise is that the use of quantitative and qualitative approaches provides a better understanding of research problems than either approach alone.

Mixed-methods research has been gaining prominence over the past couple decades. See Cresswell and Plano (2007) who identify four perspectives of mixed-methods research. This article can be classified as the Practice Perspective which involves using both quantitative and qualitative data to conduct “traditional” research designs. Additionally, Cameron et al. (2015) provide reasons for the growing prominence of mixed-methods research and claim in provides for “greater insights” into “complex phenomena” (p. 90).

To more fully understand anticipated regret and escalation to failing NPD projects in B2B markets, two studies were conducted. In the quantitative study, individuals completed a managerial decision-making exercise in NPD using a large sample of 280 undergraduate and graduate students to better understand the role of moderators and the path to escalation. In the qualitative study, 20 interviews were conducted with mid- to senior-level NPD managers operating in high technology markets. Cumulatively, these two studies address our research questions and are discussed in more detail next.

3.1. Quantitative study

The context of our empirical examination is NPD since it has been found to be especially susceptible to escalation (Liang, Sudhir, and Cherian, 2014) and also generate anticipated regret in the minds of decision makers (Sarangee et al. 2013). Therefore, we investigated our research questions and first tested our conceptual model by conducting a NPD decision-making exercise. We obtained responses from a sample of 280 participants from two major state universities. Several courses over a period of a few months were required to yield this sample size. The participants included included graduate (MBA) and undergraduate students enrolled in junior- and senior -level courses at both universities. About 40% of the final sample was MBA students. This sample was deemed appropriate since, in the escalation literature, there is a general finding that increased work experience/expertise does not attenuate sticking with a failing new product. For example, Keil et al. (2000), Schmidt et al. (2001), and Schmidt and Calantone (2002) all show that work experience is not a significant correlate (or covariate) of escalation of commitment. Along these lines, our analyses also showed no significant differences across the two universities or across the graduate and undergraduate students ($p > .1$). Consequently, we pooled the data and report results for the total sample. As a check, the correlations between the number of years of work experience and years of NPD experience with the variables in our model were not statistically significant ($p > .05$).

The exercise required the participants to assume the role of a review team member for a fictitious B2B corporation that was involved in the development of a new sensor for automobiles and truck airbag applications. We kept in mind Staw's (1997) criticism of laboratory based escalation research where he explicitly stated that most studies used only a one or two sentence description of an escalation situation rather than a complete scenario as the context for decision making. Consequently, this use of abbreviated scenarios would most likely produce weakened escalation effects. The exercise was highly realistic since it used a detailed scenario where the information and tasks closely paralleled those in actual NPD projects.

The scenarios was structured as follows. First, all instructions and other information were printed in booklet form. Second, the exercise describes the Stage-Gate® NPD process and provides details about the fictitious company and its new product under consideration. Third, the participants were presented with detailed financial performance and other information pertinent to make project review decisions. Participants were instructed that as per corporate policy, a new product was required to achieve a minimum market share of 30%, minimum annual sales of $30 million as well as positive profitability in order to proceed through the process. Also, as shown in Appendix A, the quantitative performance feedback information that was provided to respondents showed that the NPD project was showing initial signs of failing; it was not meeting the mandated minimum hurdle rates (e.g., forecasted market share was 26%, sales of $24.5 million but profits were positive at $2.2 million). Fourth, on the basis of all the above information, the subjects were asked to make project funding recommendations and to answer other questions about the likelihood of success, mental commitment, and anticipated drop and keep regret.

This hypothetical scenario was generated after we consulted with eight actual NPD practitioners who mentioned that risky decision-making situations typically involved ambiguity, such as balancing project underperformance with some minimal positive indications from the product. According to them, if the project was underperforming along all pre-specified and agreed upon criteria, it would be most certainly be terminated. Hence, based on their feedback, we deliberately designed an ambiguous scenario that mimics reality, where the new product was not meeting minimum criteria in market share and sales but was projected to have a little profitability.

We believe the participants took the exercise seriously. They were given extra credit in their respective business courses for their successful completion of the exercise. On average, they spent about 25–30 min, to complete the exercise. A review of the completed booklets showed calculations and various notes made by most participants. Furthermore, they were asked to justify their answers for multiple

questions using open-ended responses which required them to be engaged in the exercise and carefully think about their answers and rationale.

3.1.1. Variable measures

The empirical testing of our hypotheses revolved around the following constructs – anticipated keep and drop regret, perceived likelihood of success, mental commitment, and behavioral commitment. We used existing and previously validated measures in this study with some modifications. The scale to measure perceived likelihood of success was adopted from Schmidt & Calantone (2002) and showed good reliability. We adapted scale items from Lemon, White and Winer (2002) for anticipated regret. Some items were modified, and some new ones developed to measure keep regret and drop regret. Commitment was measured from both mental and behavioral perspectives (Binder 1985). Self-reported mental commitment to a failing NPD project (commit) and behavioral commitment (funding recommendation) for project continuation were measured using already validated scales (Schmidt and Calantone, 2002). Table 1 shows the constructs, measures, and descriptive statistics, and Appendix B shows the variance/covariance matrix.

3.1.2. Estimation procedure

Several tests were performed to ensure that the measurement items were reliable and valid. Initially, we conducted exploratory factor analyses. The rotated factor loadings showed the measurement items cleanly loaded on their respective constructs. However, as shown by Gerbing and Anderson (1988), confirmatory factor analysis is the optimal method to test the unidimensionality of scales. Consequently, we conducted a second-order CFA using EQS software for the regret variables. Using raw data and analyzing the covariance matrix using maximum likelihood estimation, the theoretical model fit the data extremely well (e.g., $\chi^2 = 4.21$, d.f., 4 d.f., $p = .38$, Benter-Bonett Normed Fit Index [BBNFI] = 0.983, Benter-Bonett Non-Normed Fit Index [BBNNFI] = 0.998, Comparative Fit Index [CFI] = 0.999, Goodness of Fit Index [GFI] = 0.994, Adjusted Goodness of Fit Index [AGFI] = 0.978, and Root Mean-Square Error of Approximation [RMSEA] = 0.014, 90% confidence interval = 0.000–0.092). All of the paths are significantly greater than zero ($p < .001$), and the results of the LeGrangian Multiplier (LM) and Wald tests indicated that no paths needed to be dropped or added, respectively ($p < .05$). The results confirm that anticipated regret is indeed a higher-order construct comprised of the two lower-level sub-constructs (i.e., anticipated keep and anticipated drop regret).

The research hypotheses were tested by simultaneously testing the measurement and structural models using structural equation modeling (SEM) approach in EQS software after we conducted another CFA with all multi-item constructs simultaneously. SEM offers several important advantages including the ability: (1) to test relationships using covariances rather correlations; (2) to model simultaneous relationships and interrelationships rather than analyzing each hierarchical set of relationships individually; (3) to parcel the measurement error from the structural relationships thereby potentially providing more accurate estimates; and (4) the ability to specifically test the total effects (i.e., direct + indirect effects) thereby offering the potential to more completely understand mediating effects. Rather than testing and reporting direct effects (i.e., from one variable to another) as is typically done, we focused on the total effects and use them to evaluate the hypotheses. Such an approach has the following advantage:

> The value of causal path modeling lies in its ability to disentangle the relationships among a set of variables and to depict both direct and indirect effects between the variables. This enables the calculation and comparison of total effects of cause variables on effect variables, by taking into account direct and indirect effects. Hence, it provides us with a detailed description of the mechanisms that underlie a particular phenomenon (Bozionelos 2003, p.5, emphasis added).

Again, raw data were used, and the covariance matrix was analyzed using the maximum likelihood estimation procedure. Based on intermediate results, paths should be added from anticipated keep regret to funding and from drop regret to commitment. These paths were added to the final model, and it was re-estimated. The results indicate that the data-implied covariance matrix fits the theoretical covariance matrix well. The model converged in 10 iterations with no error messages.[1]

As a final step and also to conduct a robustness check, a bootstrap simulation was conducted with 100 replications. All replications converged successfully.

3.1.3. Quantitative study results

The results of the bootstrap simulation model show a good fit based on the average results for the 100 replications: Chi-square statistic (31.92, < 1.10/d.f.) (e.g., BBNFI = 0.968, BBNNFI = 0.995, CFI = 0.995, GFI = 0.978, AGFI = 0.958, and RMSEA = 0.018, 90% confidence interval = 0.002–0.050) (Bagozzi and Yi 1988; Bollen 1989; Browne and Cudeck 1992; Hu and Bentler 1999; Sharma et al. 2005). The results of the measurement model appear in Table 1, and selected results of the structural model appear in Table 2. The measurement model shows good convergent and discriminant validity. All measurement items loaded on their respective constructs, and all were significantly greater than zero ($p < .001$). The results also show that there is no need to modify the measurement model. The structural model results confirm that all our research hypotheses are supported.

The results suggest that decision-makers simultaneously anticipate experiencing regret if they continue the project and later decide that this was a mistake (i.e., anticipated keep regret) and if they discontinue the project and subsequently decide they should have continued it (i.e., anticipated drop regret). To our knowledge, little previous research has deliberately tested for these countervailing sub-dimensions of anticipated regret.

These findings are even more meaningful since the higher-order construct, anticipated regret, is not related to perceptions or the likelihood of success or mental commitment ($p > .05$). However, anticipated regret is negatively associated with project continuation (-0.21, $p < .05$). This implies that although anticipated regret is associated with the final escalation recommendation, it does not provide a comprehensive understanding.

The first set of hypotheses (H1a,b,c and H2a,b,c) centers on the associations between anticipated keep regret and the three endogenous variables. Support was found for all three hypotheses; anticipated keep regret was negatively and significantly related to perceived likelihood of success, mental commitment and behavioral commitment. ($p < .05$; H1a, b, c). Significant results were also found for anticipated drop regret which was found to be positively related to a decision-maker's perceived likelihood of success, his/her mental commitment to the project, and behavioral commitment ($p < .01$; H2a, b, c).

Interestingly, it appears that anticipating regret does not lead decision-makers to bias forecasts and become mentally committed to dubious projects. No significant effects were found from anticipated regret, the higher-order construct, and perceived likelihood of success, or mental commitment. Instead, it is the interplay of anticipated drop and keep regret the lead to escalation of commitment.

The next group of hypotheses (H3a,b and H4) centers on the total effects of a decision-maker's perceived likelihood of success on her/his mental commitment and the project funding decision. The results show support for both H3a and H3b ($p < .001$). Since mental commitment and behavioral commitment are strongly linked to a decision-maker's

[1] It is imperative that the software converge to a unique solution prior to interpreting the results (Bentler and Wu 1995).

Table 1
Quantitative study measurement items, descriptive statistics and measurement model results.

	Min.	Max.	Mean	Std. Path[a]	
Anticipated Regret[b] (α = 0.73)					
Anticipated Keep Regret	1	7	4.6	. 55[c]	
The regret you anticipate that you might feel if you authorized the funds and found out later that you should not have. (V1)					
The regret you anticipate that you might feel in future that you gave too many opportunities for your product to do well later by not stopping the funding now. (V2)	1	7	3.8	0.70	
Anticipated Drop Regret					
The regret you anticipate that you might feel if you did not authorize the funds and found out later that you should have. (V3)	1	7	4.2	0.65	
The regret you anticipate that you might feel in future that you did not give sufficient opportunities for your product to do well later by stopping the funding now. (V4)	1	7	4.5	0.61	
The regret you anticipate that you might feel that you delayed the new product and a competitor came up with a similar product earlier than you did because of the delay. (V5)	1	7	4.4	.68[c]	
Perceived Likelihood of Success (α = 0.83)					
I believe that this new product will be a success. (V6)	1	7	5.0	.91[c]	
I believe that this new product will be a failure. (R)[e] (V7)	1	7	5.4	0.79	
Mental Commitment[d] (α = 0.69)					
I will stick with this new product no matter what problems are encountered. (V8)	1	7	3.0	0.52	
I am committed to this new product. (V9)	1	7	4.7	.87[c]	
Behavioral Commitment					
How likely is it that you would recommend authorizing the funds required to complete the next stage of the new product development project?[f] (V10)	0	10	6.1	2.41	–

[a] Standardized path coefficient from measurement model in SEM. All freely estimated path coefficients in measurement model are significantly different than zero at $p < .05$ or better.
[b] Adapted from Lemon, White and Winer (2002). Items measured on 1-to-7 scales anchored by "not at all" and "a lot."
[c] Measurement item whose unstandardized coefficient is fixed to 1 for scaling.
[d] Schmidt and Calantone (2002). Items measured on 1-to-7 scales anchored by "strongly agree" and "strongly disagree."
[e] R indicates reversed-scaled item.
[f] Adapted from Schmidt and Calantone (2002) study. Item measured on an 11-point scale (i.e., 0 to 100% chance) anchored by "definitely would not authorize" and "definitely would authorize" with "even chance" at 50%.

Table 2
Study 1 results – standardized total (direct + indirect) effects.

Antecedent Variable	Dependent variable(s)	Std. coefficient	z-value	Hypothesis	Supported
Anticipated Regret	Ant. Keep Regret	1.00			
Anticipated Regret	Ant. Drop Regret	0.69			
Anticipated Regret	Likelihood of Success	−0.07	−0.67		
Ant. Keep Regret		−0.45**	−2.55	H1a	Yes
Ant. Drop Regret		0.55**	3.23	H2a	Yes
Anticipated Regret	Mental Commitment	−0.07	0.73		
Ant. Keep Regret		−0.38**	−2.55	H1b	Yes
Ant. Drop Regret		0.66***	4.21	H2b	Yes
Likelihood of Success		0.85***	12.93	H3a	Yes
Anticipated Regret	Behavioral Commitment	−0.21*	−2.09		
Ant. Keep Regret		−0.56***	−4.06	H1c	Yes
Ant. Drop Regret		0.50***	4.20	H2c	Yes
Likelihood of Success		0.65***	11.30	H3b	Yes
Mental Commitment		0.36***	14.00	H4	Yes

Measurement model and error estimates are not reported for brevity but are available from the authors upon request.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

perception of success of the failing NPD project, one potential path for making better project continuation decisions is facilitating more accurate project evaluation so as to reduce reliance on perceptions. Finally, mental commitment was found to be significantly related to the final project funding decision (H4; $p < .001$). This result suggests that there is a temporal difference between the occurrence of mental and behavioral escalation.

To confirm the robustness of our results, the direct effects are also shown in Table 3. They contain the standardized results for the structural model as well as the measurement model.

3.2. Qualitative study

The quantitative study addressed the research hypotheses we presented previously, but like any single study, it has certain limitations such as an artificial scenario and the use of students to complete the exercise. Consequently, to validate our findings, we designed and conducted a second study that we discuss next.

3.2.1. Sample and data collection

For this study, we selected individuals who have significant, relevant experience in NPD in high-technology B2B industries such as software, hardware, medical devices, electronics, networking etc. Using a convenience sample, we interviewed 20 mid-to-high-level managers working in 18 Silicon Valley-based organizations. They held positions such as Senior Product Manager, Global Product Manager, Director of Product Marketing and Sales, Director of Product Management and Vice President. After securing their agreement to participate in our study, one of the authors called each participant to conduct a telephone interview ($N = 12$) or met with the respondent to conduct a personal

Table 3
Quantitative results –standardized direct effects.

Antecedent Variable	Dependent Variable(s)	Std. coefficient	Error
Structural Model			
Anticipated Regret	Keep Regret	1.00	0.00
Anticipated Regret	Drop Regret	0.69	0.72
Anticipated Keep Regret	Likelihood of Success	−0.45	0.91
Anticipated Drop Regret		0.55	
Anticipated Drop Regret	Mental Commitment	0.19	0.41
Likelihood of Success		0.85	
Anticipated Keep Regret	Behavioral Commitment	−0.27	0.61
Mental Commitment		0.76	
Measurement Model			
Anticipated Keep Regret	V1	0.55	0.84
	V2	0.70	0.72
Anticipated Drop Regret	V3	0.65	0.76
	V4	0.61	0.79
	V5	0.68	0.74
Likelihood of Success	V6	0.91	0.42
	V7	0.79	0.62
Mental Commitment	V8	0.52	0.85
	V9	0.87	0.50

All paths are significant at $p < .001$.

interview ($N = 8$). The interviews followed the process outlined by Yin (1994) and each interview lasted between 20 and 30 min. We used the same questions from the quantitative study to form the scales for anticipated drop and keep regret. In addition, open-ended questions were used to better understand anticipated regret as well as anticipated drop and keep regret. The closed-ended questions were entered into SPSS for statistical analyses. The answers to the open-ended questions were transcribed and later content analyzed by two authors. Agreement was nearly perfect as the responses were clear. The interview protocol appears in Appendix C.

3.2.2. Qualitative study results

The results for the qualitative study appear in Table 4, and they corroborate the findings from the quantitative study and enhance our understanding of anticipated regret and escalation of commitment during NPD. The respondents in this sample had between 4 and 35 years of NPD experience ($\bar{\mu} = 14.3$; s.d., 7.9). New products were reported to be very important to the organizations in this sample (mean 1.65) (1 = extremely important; 2 = very important).

After qualifying respondents and discussing their NPD experiences, the interviews moved onto discuss the respondents' anticipated regret during NPD. On the question that asked, “Would you agree that decision makers try to imagine how their NPD project continuation/termination decisions look in the future once they have more information?” slightly more than half of the respondents answered affirmatively (11/20). Actual NPD professionals sometimes consider how their decisions will look to them in the future. A Director of Marketing and Sales from a very well-known consumer electronics maker said “Yes, we internally project the future, and that influences continuation or termination decisions.” The VP of a software company claimed, “We definitely look into the future”.

Table 4
Qualitative results.

	N	Minimum	Maximum	Mean	Std. Dev.
NPD exp. - years	18	4	35	14.28	7.865
Imp of NPs	20	1	3	1.65	0.587
Anticipated Regret	20	1	2	1.35	0.489
Keep_Regret	20	1	2	1.60	0.503
Drop_Regret	19	1	2	1.11	0.315
Drop1	20	1	5	3.15	1.089
Drop2	19	2	5	4.21	0.918
Keep1	20	1	5	2.10	0.788
Drop3	20	1	5	3.25	1.070
Keep2	20	1	2	1.85	0.366
DropΣ	19	1.67	4.67	3.53	0.780
KeepΣ	20	1.00	3.50	1.98	0.472

Please refer to Appendix C for a description of each of these variables.
Drop1, Drop2 and Drop3 are the measures of Drop Regret.
Keep 1 and Keep 2 are the measures of Keep Regret.

A similar open-ended question was asked with respect to anticipated keep regret, and 55% answered “yes” to anticipating they will feel regret for continuing a NPD project that they later realized should have been stopped. A General Manager and Director of Products with 10 years of NPD experience stated that in his organization, decision makers do sometimes anticipate regretting allowing a project to continue but qualified it because “It happens rarely because we do not think about failure.” Similarly, a VP answered “Yes, a fair amount of this (anticipated keep regret) happens… The bias is not to cancel in order to avoid the regret, even if you should cancel.”

The answers on the open-ended question concerning anticipated drop regret suggests that happens much more often - 85% (17/20) answered affirmatively that they anticipate feeling drop regret – and this is a more serious problem than anticipated keep regret. A Global Product Manager stated “Yes, this is very prevalent, especially with the engineers. The magnitude of this was higher than the other regret. “Happened almost daily.” Another respondent answered “Yes, this happens. Instead of killing a product, they continued to add features since the stock market was going through the roof. Hence, they wanted to avoid regret. They felt necessary to go to market.” One Product Manager claimed “Yes, because they feel they have an opportunity. Stopping means a lost opportunity where competitors might leverage.” Other responses add considerable support to anticipated drop regret being a more insidious problem than anticipated keep regret: “Yes, this absolutely happens”; “Yeah, absolutely! It obviously happens”; “Yes, this happens relatively often”; “This is much more prominent”; “yes, this happens very frequently”.

Finally, we asked the same anticipated regret questions used in the quantitative study, and the summated items averaged 3.5 and 2.0 for anticipated drop and keep regret, respectively. Again, this indicates that NPD professionals tend to feel greater levels of anticipated drop regret than keep regret (as the former averages close to “often” on our scale whereas the latter response averages about a “seldom” on our scale). This is also a clear indication of the fact that anticipated drop regret is a much more problematic emotion for decision makers which organizations need to monitor and alleviate or eliminate.

4. Discussion, conclusion, and future research

Little research has empirically examined the nature of linkage between anticipated regret and escalation; even less has examined anticipated keep and drop regret. This has prevented a comprehensive understanding of the path to escalation.

This current study addresses these gaps by adopting a mixed-method empirical approach. In the quantitative study, the respondents completed the decision-making exercise in a controlled environment. To increase confidence in the findings, the qualitative study utilized interviewed seasoned professionals who had substantial experience in NPD. The findings of both studies suggest that anticipated regret plays a significant role in escalation during NPD. More importantly, the results confirm that decision makers actually experience two different and countervailing types of anticipated regret – keep regret and drop regret, which are associated with escalation in different ways. Anticipated drop regret is significantly and positively linked to decision-makers' (a) perceptions of project success (b) their mental commitment and (c) their recommendation to fund the failing project. In contrast, anticipated keep regret has negative associations with the same variables. Importantly, our findings suggest that these two sub-dimensions have associations that differ in directionality and magnitude. This is novel and interesting and makes a substantial addition to extant research that

suggests that anticipated regret is the net difference between these dimensions (Wong et al. 2007). It indicates that decision makers have to be cognizant of the simultaneous presence and differential influence of both these forces. Thus, while anticipated drop regret needs to be carefully monitored because of its deleterious impact on decision makers, increasing keep anticipated regret can potentially lessen a decision-maker's level of commitment for a failing product. Hence, keep regret should be utilized as a de-escalation mechanism in business markets, which is a major theoretical contribution to the burgeoning de-escalation literature (Sarangee et al. 2013). Future research should examine the best processes and mechanisms to evoke anticipated drop regret among managers involved in failing NPD projects.

Our results shed light on the role of anticipated regret in escalation of commitment during NPD. Specifically, when regret associated with terminating a dubious new product now is anticipated in the future, the perceptions of the likelihood of success of the project are considerably enhanced in the mind of the decision-maker. This thereby leads to the development of favorable mental attitudes towards that endeavor and the decision maker ultimately ends up pursuing the flawed course of action by funding it. This finding highlights the importance of perceptions (rather than reality) in the decision-making process. An interesting line of examination could look at what factors induce decision makers to enhance their perceptions of success of dubious projects. Further research can also investigate various tools and mechanisms that can enable decision-makers to make more accurate assessments of the future success prospects of new projects. One possibility is to have another individual or a group to rate the likelihood of success of dubious projects and provide this assessment to the ultimate decision-maker. In the organizational context, firms can use outside consultants to manage this project assessment process. In addition, companies should identify appropriate “success' metrics and develop the right process to gather data and evaluate prospects of different new products. The process of how escalation works might also be studied further. While the present studies found no association between professional experience and anticipated regret or escalation, some research has found expertise can lead to different decision processes. (See Read et al. 2009). Such a path is ripe for additional research.

Methodologically, our study makes contributions to the existing escalation research. We used a structural equation modeling approach to analyze the data which offers several advantages. Our model explains much of the variance of mental and behavioral commitment to a failing project. Specifically, 85% of the variance is explained with respect to decision-makers' mental commitment while 70% of their behavioral commitment (project funding recommendation) is explained. Our study thus builds up on the study by Wong and Kwong (2007) in which anticipated regret accounted for 27% of the variance in continuing a losing course of action. This implies that including the two sub-dimensions of anticipated regret, adding perceived likelihood of success as a mediator and delineating mental commitment and funding more thoroughly accounts for escalation. Moreover, Wong and Kwong (2007) conceptualized anticipated regret as the net difference between keep and drop regret whereas we suggest that they exert effects that operate in opposite directions. Our empirical approach thereby mitigates some commonly acknowledged substantive and methodological problems (Edwards 1995; Edwards and Parry 1993) of the difference score analysis approach adopted by Wong & Kwong (2007) such as loss of explanatory & predictive power (Klein et al. 2009), reliability, discriminant validity, spurious correlations and variance restriction (Peter et al. 1993).

This study has some limitations which provide avenues for future research. First, cross-sectional data was used thereby preventing the establishment of causal relationships. Causation may only be determined through controlled experiments, although we used previous research and theoretical reasoning to construct the model. Second, future research should continue refining anticipated drop and keep regret scales. Third, the focus in this article was more on internal validity. Testing the proposed model in an actual project decision-making scenario can lead to higher external validity. The qualitative study somewhat lessons this concern; however, the focus was more on the NPD program rather than a specific project. Additionally, the questions were perceptual and retrospective. Following actual NPD projects over the development process would yield richer insights and stronger conclusions. Next, researchers can also focus on the specific conditions and factors under which decision makers will be more likely to focus on drop regret versus keep regret. Certainly situational, contextual and project-based factors can be expected to play an important role. Additionally, enduring personality traits (e.g., self-confidence, optimism and goal persistence) are likely to be associated with individuals experiencing anticipated regret.

Future efforts could look at separating personal traits from situational factors. For example, recent research suggests that men and women have different risk-taking preferences depending on the decision situation (He et al. 2008), and a meta-analysis shows that men generally take more risks than women (Byrnes et al. 1999). Research also shows that teams seem less likely to continue failing projects compared to individuals (Schmidt et al. 2001). The dynamics of anticipated regret in teams and across gender might be a fruitful future research opportunity. Future research should also examine multiple, sequential decisions over a project's life to generalize our findings. Additionally, the applicability of our model to other decision-making contexts and settings such as consumer decision-making, human resources, R&D and information technology-based projects should be tested. Furthermore, research can look into differences in NPD processes between larger firms and smaller, entrepreneurial firms and how escalation occurs in these contexts. Finally, the bulk of escalation research has focused on Go/Kill decision with very little examination of the “Hold” decision. We believe that academicians would be well served to examine the dynamics of this important scenario in the review process.

Acknowledgments

Please direct comments or questions to Jeffrey B. Schmidt. This paper benefited substantially from comments made by Richard Bagozzi, Donald E. Conlon, Joseph Cooper, Raj Echambadi and Madhu Viswanathan who read earlier drafts of this article. The authors wish to acknowledge Tony Roath and Robert Kreuzbauer for their assistance with data collection and Atanas “Nasko” Chobanov for his help with data coding. Finally, the authors acknowledge research seminar participants at Clarkson University and the University of Houston for their suggestions and comments which significantly improved this manuscript.

Appendix A. Performance feedback

After a brief overview of the new product development process and decision-making exercise, participants were provided the following information. (We asked respondents to review information after the preliminary marketing and technical assessment stage and prior to the development and testing stage). Subsequently, they answered questions.

Please read the following scenarios carefully and answer the following questions carefully.

Scenario

So far, **$500,000** has been spent on developing the new sensor. The projected performance information is presented below.

Projected annual sales: ..... **$24.5 million**

Projected annual profits: ..... **$2.2 million**
Projected market share: **26%**

At a recent press conference, the company President announced the new sensor that you are developing. The sensor created great interest among *Wall Street* analysts, automobile manufacturers, and stockholders causing the company's stock to increase by more than $2.00 per share. In addition, because of this project, you have been quoted in *Business Week* and the *Wall Street Journal* and have been interviewed for several trade journals including *Ward's Auto World* and *Automotive Industries*.

As a Review Team Member, you are to make a recommendation to top management whether this new product development project should proceed to the next stage at a cost of $3.18 million.

Appendix B. Variance - Covariance Matrix

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
V1	2.7189									
V2	0.947	2.613								
V3	0.696	1.1350	3.186							
V4	0.540	0.7735	1.116	2.451						
V5	0.515	1.2030	1.499	1.323	3.803					
V6	−0.346	0.1447	0.380	0.246	0.493	1.504				
V7	−0.358	0.0280	0.066	0.033	0.202	1.059	1.474			
V8	−0.175	0.2706	0.582	0.212	0.552	0.724	0.454	2.380		
V9	−0.180	0.2104	0.405	0.426	0.676	1.222	0.996	1.130	1.956	
V10	−1.104	−0.2758	0.403	0.344	0.579	1.863	1.838	1.248	2.126	5.782

Appendix C

PERSONAL INTERVIEW WRITE-Up
Date:
Interviewee:
Company:
Title
Address:
Phone number:
Email:

Today, I would like to discuss new product development in your organization with you. There are no right or wrong answers to the questions I will ask; I simply want your insights and perceptions since you have experience in developing and launching new products. The purpose of this interview is to help to me formulate our research in the new product development area. Our discussion is completely confidential. No one outside of our research team will have access to any of these records, and you or your organization will never be identified in this research.

INTERVIEW QUESTIONS

1. How many years of professional work experience do you have in the area of new product development? (NPD exp. – years)
2. How important are new products to your organization? (Imp of NPs)

Extremely important	Very Important	Somewhat Important	Indifferent	Not Very Important	Not At All Important

3. Over the past 3–5 years, what type of new product development record does your organization have with respect to success? (NPD Record over past 3–5 years)
4. Approximately how many review points or “gates” (e.g., go/no-go) does a typical new product development project go through before it is launched in the market? (Typical number of gates)
5. When making new product development project continuation/termination decisions, do you consider that you might feel regret if you decide to allow the project to continue and later realize that you should have stopped it? (Keep_Regret)
6. When making new product development project continuation/termination decisions, do you consider that you might feel regret if you decide to stop the project prior to completion and later realize that you should have allowed it to continue? (Drop_Regret)
7. Would you agree that decision makers try to imagine how their new product development project continuation/termination decisions look in the future once they have more information? (Anticipated Regret)

Please answer the following questions using this scale: Never. Seldom. Sometimes. Often. Always.
When making new product development project continuation/termination decisions:

1 The regret you anticipate that you might feel if you did not authorize the funds and found out later that you should have. (Drop1)

Never	Seldom	Sometimes	Often	Always

2 The regret you anticipate that you might feel that you delayed the new product and a competitor came up with a similar product earlier than you did because of the delay. (Drop2)

Never	Seldom	Sometimes	Often	Always

3 The regret you anticipate that you might feel in future that you gave too many opportunities for your product to do well later by not stopping the funding now. (Keep1)

Never	Seldom	Sometimes	Often	Always

4 The regret you anticipate that you might feel in future that you did not give sufficient opportunities for your product to do well later by stopping the funding now. (Drop3)

Never	Seldom	Sometimes	Often	Always

5 The regret you anticipate that you might feel if you authorized the funds and found out later that you should not have. (Keep2)

Never	Seldom	Sometimes	Often	Always

Thank you for participation!!

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