

The Role of AI Agents for De-Escalating Commitment in Digital Innovation Projects

Paper-a-Thon

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Abstract

The increasing complexity of managerial decision-making for digital innovation activities accelerates cognitive biases like escalation of commitment (EoC). Decision aids (e.g., AI agents) can assist managers in avoiding EoC scenarios. However, how AI-based decision aids affect EoC in this context remains a critical yet understudied topic. To address this gap, we develop a theoretical model and propose a randomized controlled post-test vignette experiment with a fictive decision-making simulation to study the de-escalating effect of an AI-based decision aid in the digital innovation context. Our model accounts for moderating (AI familiarity, personality traits) and mediating (decision aid reliance) factors. By entangling the de-escalating effect of AI agent decision aid in decision-making scenarios about digital innovation projects we contribute to the digital innovation, AI agent, and the EoC literature. The future implementation of the proposed research design lays the foundation for designing AI agent decision support systems that de-bias managerial decision-making.

Keywords: Escalation of commitment, digital innovation, ai agent, decision aid, artificial intelligence

Introduction

Organizational digital innovation activities (e.g., new product, service, or business model development) constitute the core of an organization's digital transformation (Gregory et al. 2019, Nambisan et al. 2017). However, this decision-making context functions as a breeding ground for escalation of commitment (EoC) bias – the irrational tendency for decision-makers to persist with failing courses of action and invest additional resources despite negative signs (Sleesman et al. 2018, Staw 1997, Weeth et al. 2019). Despite high awareness of EoC in business practice, it can still be observed frequently; survey results have shown that between 30 percent and 40 percent of all organizational technology projects exhibit some degree of EoC (Keil et al. 2000). Decisions to continue with a failing digital innovation project may lead to a significant waste of resources and transformation efforts, adversely affecting the entire organization (Sleesman et al. 2018, Weeth et al. 2019). It is therefore of great interest to find effective countermeasures to de-escalate commitment, especially in the context of decision-making for digital innovation projects. However, de-escalation strategies are not yet considerably addressed despite their significant role in unlocking the escalation entrapment (Ohlert and Weißenberger 2020). While prior IS literature has focused on theoretical underpinnings (e.g., Keil et al. 2000) and drivers to persist (e.g., Lee et al. 2019), there is a lack of transferring determinants into de-escalation strategies.

One type of aid that has the potential to debias managerial decision-making in digital innovation contexts is artificial intelligence (AI) agents (Collins et al. 2021). AI agents have made great advancements in recent years in the context of organizational decision-making (Jarrahi 2018). However, how AI agent decisions affect EoC in the context of digital innovation projects remains a critical yet understudied topic. Therefore, we pose the following research question:

Research Question: How does the intervention of AI agent-based decision aids influence the EoC tendency of managers in decision-making scenarios about digital innovation projects?

To answer the posed research question, we develop a theoretical framework that complements and extends existing de-escalation strategies in decision-making scenarios about digital innovation projects. Further, we derive a novel experimental design on the effects of AI agent advice on EoC.

Conceptual Background

Escalation of Commitment in Digital Innovation Projects

EoC is built upon the theory that individuals allocate additional resources to a previously chosen but failing course of action due to personal responsibility for having initiated the course of action (Staw, 1976). Investing additional resources in “runaway” projects frequently leads to a waste of valuable resources (Keil and Robey 1999). Prominent examples include the failed “Taurus” information technology project from the London Stock Exchange (Drummond 1996) and Sony’s continued participation in electronics after \$8.5 billion in losses over 10 years (Tabuchi 2014). The recent opening of the Berlin-Brandenburg Willy Brandt Airport after being \$4.5 billion over budget and 10 years behind schedule is another salient example of how EoC contributes to entrapping decision-makers to failing courses of action (Chazan 2020).

While escalation is a general phenomenon that can occur with any type of decision scenario, troubled digital innovation projects are particularly prone to incur much more resources than originally expected due to their explorative nature and ambiguous environment (Nambisan et al. 2017, Weeth et al. 2019). In the context of digital innovation, “projects that should have been abandoned during development often proceed through commercialization only to fail in the market at substantially higher costs than if they had been terminated earlier” (Schmidt and Calantone, 2002, p.103). EoC in decisions about digital innovation projects have the potential to adversely affect an organization’s efforts to remain competitive through digital transformation. Hence, given that today’s digitally disrupted environments force organizations into constant adaptation and renewal (Warner and Wäger 2019), lessening the impact of the forces behind escalation tendencies becomes of utmost managerial importance.

It is therefore not surprising that the explanation and possible prevention of the EoC phenomenon has become of lasting interest to both practitioners and IS researchers (Sleesman et al. 2018). According to the Self-Justification Theory (Staw 1976), decision-makers continue to commit resources to self-justify an earlier decision and minimize cognitive dissonance (Brockner 1992). Determinants reinforcing this escalating tendency include decision-specific factors like the type and amount of feedback information, individual factors like the motivation and personality traits of the decision-maker, and external factors like market complexity and environmental uncertainty (Sleesman et al. 2018).

Building on the understanding of what gives rise to EoC, previous research has identified factors and mechanisms that combat escalating tendencies. Triggers that can enhance de-escalation tendencies or reduce pre-existing forces for commitment include organizational tolerance for failure, re-defining the decision-making problem, regularly evaluating the project including displaying the sunk costs, and fostering the awareness of negative project feedback (Pan et al. 2004). Still, resisting escalating forces is a challenging task and known de-escalation strategies lack reconciliation and practical implementation (Ohlert and Weißenberger 2020). This has led to the introduction of decision aids as potential de-escalating triggers. Decision aids are tools embedded with information that help decision-makers to raise decision quality (Wheeler and Murthy 2011). Prior research indicates that decision aids have the potential to de-escalate commitment in the context of digital innovation depending on the characteristics of the decision-maker, decision aid features, and the degree to which the decision-maker relies on the decision aid (Ohlert

and Weißenberger 2020). Accounting for the rising diffusion of AI and its disruptive potential in managerial decision-making support, a promising type of decision aid for de-escalating commitment is AI agents (Collins et al. 2021).

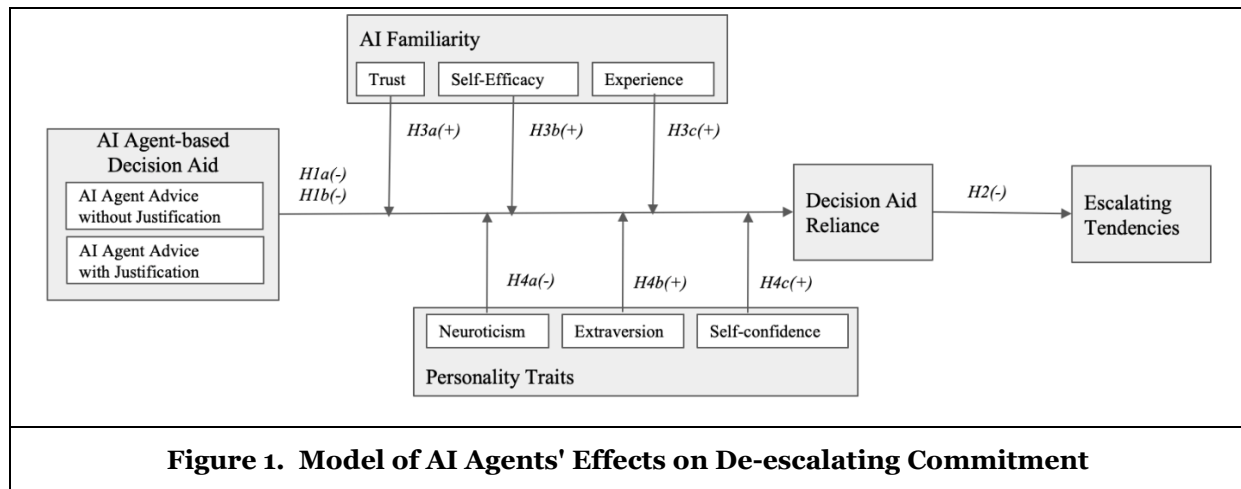
AI Agents

AI-based decision support can be provided by a variety of applied AI tools such as expert systems, artificial neural networks, fuzzy logic, and genetic algorithms (Wilson and Daugherty 2018). Rooted in the domain of expert (or knowledge-based) systems, AI agents employ reasoning to provide decision support in specifically defined areas of expertise (Davern et al. 2012). Research suggests that the use of an AI-based system may lead to higher accuracy and quality, fewer errors, and improved efficiency in managerial decision-making (Ben Mimoun et al. 2017). For reaching better decisions and to heighten creativity, introducing AI-based decisions into organizations becomes more effective when some level of transparency or interpretability of decisions can be achieved (Wilson & Daugherty, 2018).

Prior literature has also observed that AI-enabled decision-making can reduce the effects of cognitive biases. For instance, Black and van Esch (2020) showed how firms can overcome biases in recruiting decisions with the aid of AI's ability to process information and make decisions at speeds and accuracy levels that exceed human capability. Another prominent example is given in the field of medicine where advances in AI have “spawned computer-aided intelligent diagnosis systems that accomplish tasks that were previously regarded as uniquely human” (Jussupow et al. 2021, p. 713). To observe the effect of AI agents as decision-aids for de-escalating commitment, we developed a framework shown in the next section.

A Framework for Exploring the Role of AI Agents for De-Escalating Commitment in Digital Innovation Projects

Figure 1 shows our framework for explaining the role of AI agents for de-escalating commitment in decision-making scenarios about digital innovation projects. The AI agent de-escalation effects are manifested in the indirect negative relationship between the AI agent-based decision aid and escalation tendencies of the decision-maker. This relationship is mediated by decision aid reliance and moderated by AI familiarity and the decision-makers' personality traits.



a continuation recommendation and to calculate respective confidence levels. Lastly, the framework is built on the assumption that there exists a general concern about trust in AI recommendations fueled by the high stance of intuition and authority reliance in managerial decision-making (Dietvorst et al. 2014). The potential of AI agent-based decision aids to de-escalate commitment in the context of digital innovation further depends on the characteristics of the decision-maker, decision aid features, and the degree to which the decision-maker relies on the decision aid. Hence, we assume the de-escalating effects of AI agent-based decision aids to be sensitive to context and user characteristics. Drawing on this set of assumptions, we explain our framework in the following sections.

AI Agent-based Decision Aid

Applied to the context of digital innovation projects, AI-based decision aids that track project performance, monitor market conditions, and assess previous decision patterns could provide decision-makers with (dis)continuation recommendations based on predictions of future project success. Considering that project monitoring and third-party assessment (which could come in the form of an AI agent) are known de-escalation mechanisms in innovation projects, a prescriptive decision recommendation by an AI agent to not continue with a troubled digital innovation project is likely to reduce escalating tendencies. In line with this claim is existing research on the effect predictions of additional project-specific information on escalating tendency: AI agent-based advice on a project continuation decision reduces ambiguity, which can reinforce the poor aspects of the decision and de-escalate the decision-makers' commitment (Bowen 1987). This can be illustrated by the so-called “deaf effect” within the information avoidance literature where people make use of different tactics to avoid unpleasant information, such as paying no attention to it or filtering out negative aspects (Golman et al. 2017). The use of an AI agent-based decision aid makes it difficult for the decision-maker to avoid the unpleasant feedback information and the decision aid, fostering de-escalation. Therefore, we hypothesize the following:

H1a: Receiving a decision recommendation by an AI agent to not continue with a troubled digital innovation project will reduce escalating tendencies of the decision maker.

As user interactions with AI agents can trigger contradictory behavioral responses (Rzepka and Berger 2018), it is crucial to integrate learnings on technology acceptance and trust from human-computer-interaction research. Often the adoption of AI systems assisting in decision-making is limited by a lack of trust of humans into an AI's prediction. Prior research has argued that people tend to have less trust towards AI by default, which is known as “algorithmic aversion” (Dietvorst et al. 2014). Trust in the AI system's recommendation, however, correlates with the level of transparency the AI system provides. Hence, under certain circumstances, algorithmic aversion can be diminished when an AI agent justifies its prescriptive advice by providing explanations, for instance in the form of input factors considered and confidence levels. This argument is further supported by the growing research field of explainable AI (XAI), which advocates the use of explanations that provide insight into the rationale an AI uses to draw a conclusion (Rai 2019). Rai (2019) suggests that opening up the black-box associated with AI can enhance the degree of explainability, which in turn affects trust and use intention. Therefore, we propose the following:

H1b: An AI agent that gives no justification for its recommendation to not continue with a troubled digital innovation project will have weaker influence on the escalating tendencies than an AI agent that provides justification in the form of input factors and a confidence level.

Decision Aid Reliance

The arguments relating to the power of XAI in increasing decision-makers' trust in an AI-based system also indicate that the de-escalating effect of AI agent-based decision aid is an indirect one. Decision-makers will not use an AI agent that they do not trust (Ribeiro et al. 2016). If a decision-maker underuses or avoids a decision aid, then it provides little to no value. Hence, the reliance of the user on the decision aid (i.e., the extent an innovation manager considers the AI agent's recommendation to discontinue the troubled digital innovation project) is likely to mediate the effect of the decision aid on escalation tendency.

H2: Decision aid reliance mediates the effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision maker.

AI Familiarity

In their review on user interaction with AI-enabled information systems, Rzepka and Berger (2018) identified user characteristics as a crucial moderating factor when looking at the effects of AI-enabled systems. Based on user characteristics, AI-enabled decision-making is highly influenced by a manager's AI trust, self-efficacy and experience (Araujo et al. 2020). If innovation managers who are confronted with the decision of whether to continue a troubled digital innovation project have a high general familiarity with AI, they are more likely to listen to the provided recommendation from the AI agent. Hence, these user-specific elements of AI-familiarity are expected to moderate the de-escalating effect of AI agent advice. Therefore, we hypothesize:

H3a: Greater trust in AI will increase the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision maker.

H3b: Greater AI self-efficacy will increase the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision maker.

H3c: Greater experience with AI will increase the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision maker.

Personality Traits

Recent literature has found that certain personality traits will moderate the effects of AI-enabled decision-making on de-escalation of commitment (Böckle et al. 2021). For example, users with high levels of self-confidence tend to discount negative information, believing they can overcome any obstructive aspects of a situation (Judge et al. 1998). It is therefore reasonable to predict that decision-makers with high levels of self-confidence tend to disregard both, the decision aid and negative project information, leading to higher escalating tendencies. Therefore, we hypothesize:

H4a: Greater self-confidence will decrease the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision-maker.

Building on personality research, neuroticism - defined by anxiety, hostility, depression, and personal insecurity - appears to be linked to de-escalation behavior (Moon et al. 2001). As neuroticism is characterized by sensitivity to negative events resulting in the experience of negative emotions, it is plausible that decision-makers with higher levels of neuroticism change their course of action when faced with negative project feedback. This view is consistent with the so-called "sadder but wiser effect" from the depressive realism perspective (Staw, 1997). This view predicts a negative relationship between negative trait affect as part of neuroticism and escalating tendency because those individuals tend to avoid overestimating their control over an event, which makes a realistic (un-biased) decision more likely. As those arguments can equally be applied to the effect of neuroticism on a decision-maker's interaction with an AI agent-based recommendation to disinvest in a troubled project, we hypothesize the following:

H4b: Greater neuroticism will increase the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision-maker.

Another personality trait that has been linked to both, escalating tendencies and decision-aid reliance is extraversion - the tendency to be outgoing, assertive, active, and excitement seeking. Extraverted individuals place greater importance on their performance (Judge et al. 1998). Drawing from self-justification theory we hypothesize that extraverted decision-makers experience higher cognitive dissonance when faced with recurring negative project feedback and are consequently more likely to persist with their initially taken action. Previous research supports this argument showing that extraversion potentially engenders escalating tendency of decision-makers (Brender-Ilan and Shertzer 2021). However, when looking at findings from trust in AI research, a moderating role of extraversion is supported: Extraverts have a higher propensity to consider the project continuation recommendation because they might transfer their willingness to trust other humans to AI systems (Hoff and Bashir 2015). This means, that even though their initial escalation tendency might be higher compared to introverts, the de-escalating effect of the decision aid has a stronger impact. Therefore, we hypothesize:

H4c: Greater extraversion will increase the negative effect of the AI agent's recommendation to not continue with a troubled digital innovation project on escalating tendencies of the decision-maker.

Proposed Research Design

In this study, we theorize how the intervention of AI agent decision aid influences decision-makers escalating tendencies. To test our proposed framework including the mediating and moderating factors highlighted in the prior section, we implement an online experiment with one non-treatment and two treatment groups. The design follows a randomized controlled post-test vignette experiment with a fictive decision-making scenario. The decision task used to provoke the bias describes a troubled digital innovation project adapted from the “blank radar plane” case originally presented by Arkes and Blumer (1985) and commonly used to study escalation of commitment. Participants are asked to justify their decision in an open text field after each decision round. We expect this measure will keep participants engaged in the simulation. Further, we will make use of content analysis on the justifications given as an additional qualitative measure of decision-aid reliance to improve validity and counteract social desirability bias.

The manipulation consists of an introduction of the decision aids (no advice, AI agent advice without justification, and AI agent advice with justification in the form of a list of input factors considered and a confidence level). For this study, our AI agent will be faked (i.e., provide the same recommendations for each subject). We measure EoC with the number of decision rounds that the participant decides to persist with the failing course of actions, the amount of additional money invested in the project, and a subjective post-decision indication of decision confidence. We operationalize AI familiarity via trust, AI self-efficacy, and AI knowledge using existing scales (Araujo et al. 2020). Further, personality traits are measured via neuroticism, extraversion (Bayram and Aydemir 2017), and self-confidence (Akin 2007). Decision aid reliance is measured after the case simulation and captures the extent to which a decision-maker considered the decision on a 7-point Likert scale. In line with prior research, we control for age, gender, and years of experience in the simulated decision context as demographic variables with confounding potential. Further, we included individual risk aversion and perceived project completion as they have been shown to influence escalating tendency in prior studies (Keil et al. 2000).

Expected Contributions

By entangling the de-escalating effect of AI agent decision aid in decision-making scenarios about digital innovation projects we contribute to the digital innovation, AI agent, and the EoC literature. We expect our study to provide evidence for the de-escalating effect of AI agent decision aid in managerial decision-making in digital innovation scenarios. Prior AI agent literature focuses on factors that influence trust in the AI systems (Araujo et al. 2020). To extend this body of literature, we expect to demonstrate how AI agent advice can affect EoC scenarios in decision-making tasks. We further enrich the implementation guidance by including details on the situational context and individual factors of the decision-maker. This approach allows us to get a detailed understanding of the factors that underpin EoC.

Looking at the current research body on EoC, we add to the underrepresented stream of de-escalation strategies by developing and testing a theoretical model on the de-escalating power of AI agent decision aids. We encourage future researchers to test our model in other contexts (e.g., other cognitive biases like framing and environment perception) and other decision scenarios.

We expect that our study can provide empirical evidence as to when and how AI agent advice can de-escalate commitment. This has great implications from a practitioners’ perspective, as our study can guide AI agent implementations. The AI agent decision support system can be tailored based on a manager’s behavioral tendencies, personality, and familiarity with prior AI systems. Organizations need to know which kind of decision aids to use, especially in determining whether decision aid use is effective in reducing EoC.

Limitations and Future Research Directions

There are several initial limitations in the proposed research design. First, for developing the theoretical model we assume that managers have sole decision rights to escalate commitment. However, in some organizational contexts, this may be a group decision. Second, we are proposing to use mainly college students as test subjects. While we note that this will not harm the external validity of our approach, there may still be a difference between established managers and college students.

Potential future directions assuming the success of this project include the extension of decision-aid types as treatment variables. One can, for instance, vary the extent and the way of displaying the recommendation justification to further specify the ideal configurations. Another promising area to extend this study is the addition of qualitative analysis based on the open text fields after each decision round. Creating a mixed methods approach this extension would allow for a more nuanced understanding of the perception and effects of AI agents in the decision-making process. We believe that following these research directions and addressing the limitations offer significant potential in the investigation of AI agents and EoC scenarios.

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