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Behavioral finance and perceived ethnic entrepreneurial investment success: The dual role of project management methodology

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Abstract

PURPOSE: *The study aims to investigate the effects of behavioral finance (BF) on ethnic entrepreneurship investment success (EEIS), with a particular focus on ethnic entrepreneurs operating in host-country contexts. It further hypothesizes that project management methodology (PM2) both moderates and mediates this relationship.* ***METHODOLOGY:*** *A quantitative research design was employed using survey data collected in 2024 from a sample of 183 ethnic entrepreneurs in the province of Quebec. The study is grounded in a descriptive-analytical approach and forms part of a broader empirical investigation examining behavioral and contextual determinants of entrepreneurial investment outcomes.* ***FINDINGS:*** *The results indicate that behavioral finance has a significant negative impact on ethnic entrepreneurs' decisions; however, the PM2 methodology both moderates and mediates this relationship. A detailed examination of behavioral finance factors revealed that heuristic effects and framing-dependent biases had significant impacts, whereas market conditions exhibited weaker associations. The findings also suggest that the convergence of heuristic effects, framing-dependent biases, and ethnic market conditions, when integrated with project management methodology, significantly enhances the decision-making processes of ethnic entrepreneurs.* ***IMPLICATIONS:*** *This study offers valuable insights for immigrant investors and ethnic entrepreneurs operating in host countries. The findings suggest that adopting the PM2 methodology can serve as both a moderator and a mediator of behavioral finance's influence on decision-making processes.* ***ORIGINALITY & VALUE:*** *Despite the growing prominence of behavioral finance in the financial sector, its impact on the decisions of non-financial investors, particularly entrepreneurs, remains insufficiently understood. This study is among the first to empirically examine the combined roles of behavioral finance and PM2 methodology in shaping ethnic entrepreneurship decisions.*

Keywords: *behavioral finance, ethnic entrepreneurship, immigrant entrepreneurship, cognitive biases, entrepreneurial investment, methodology, venture performance.*

INTRODUCTION

Entrepreneurship and small business ownership are key pathways through which immigrants pursue economic integration and financial advancement in host countries such as Canada and the United States (Kloosterman & Rath, 2001; Waldinger et al., 1990), a phenomenon commonly referred to as ethnic entrepreneurship (EE). Self-employment and business ownership are generally more prevalent among immigrants than native-born individuals. In Canada, 11.9% of immigrants

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aged 25–69 owned a private incorporated company or were primarily self-employed in 2016, compared with lower rates among second- and third-generation Canadians (Picot & Ostrovsky, 2021). These trends underscore the substantial economic contribution of immigrant entrepreneurs and highlight the importance of studying ethnic entrepreneurship to understand investment outcomes, decision-making processes, and policy implications in host countries.

However, a body of international research suggests that immigrant-owned businesses have shorter durations of survival than businesses owned by the native born (Fertala, 2005; Mueller, 2014; Vinogradov & Isaksen, 2008). Studies conducted in Sweden, Norway, Germany, and the United States confirm these results (Barth & Zalkat, 2020; Lofstrom & Wang, 2019; Vinogradov, et al., 2008), but there is little evidence to support this in Canada. According to Government of Canada (2018) recent immigrants (that is, those in Canada for less than 10 years) had higher exit rates from ownership and shorter durations of ownership than did the Canadian-born or longer-term immigrants (that is, those in Canada for 10 or more years). While, Statistics Canada study finds that, "on average, there was little difference in the duration of ownership between immigrant and Canadian-born owners of private incorporated companies" (Ostrovsky & Picot, 2018). Based on studies by Green et al. (2016), among recent immigrants, business-class immigrants had the highest exit rates and the shortest duration of ownership. Owners in real estate and leasing, food and accommodation, professional services and wholesale trade generally had the shortest duration of ownership.

Although ethnic businesses may face higher risks of failure, scholars have proposed several explanations for immigrants' relatively high rates of entrepreneurial entry. Immigrants often pursue business ownership as a strategy to overcome barriers in the labor market, including discrimination, credential recognition issues, or limited employment opportunities (Salehi, 2026). In particular, immigrant entrepreneurs are motivated by a combination of opportunity- and necessity-driven factors (Kloosterman et al., 2001; Dana, 1995), with some seeking to capitalize on unique market niches and others engaging in entrepreneurship out of economic necessity. These motivations shape the type, scale, and risk profile of the ventures they undertake, influencing both strategic decisions and long-term outcomes. These conditions may shape both their decision-making processes and the outcomes of their ventures.

Entrepreneurial investment outcomes are inherently the result of prior investment decisions, which are influenced by a combination of cognitive, emotional, and contextual factors. Behavioral finance (BF) provides a theoretical framework to understand these influences, emphasizing how heuristics, biases, and framing effects systematically shape decision-making under uncertainty (Guzavicius et al., 2014; Belsky & Gilovich, 2010). While this study does not directly observe investment decisions themselves, it is grounded in the theoretical premise that these decisions are the mechanisms through which behavioral factors manifest. Consequently, the outcomes of these decisions, captured here as perceived ethnic entrepreneurial investment success (EEIS), serve as a valid and meaningful reflection of the effectiveness and quality of the underlying investment choices.

Perceived ethnic entrepreneurial investment success is conceptualized as a multidimensional construct, comprising performance, adaptation, satisfaction, social effects, and sustainability. Each dimension captures a distinct facet of venture outcomes, providing a holistic perspective that integrates financial, strategic, social, and long-term considerations. In this framework, behavioral finance factors drive investment decisions, while perceived investment success serves as the observable outcome through which the effects of these latent decisions can be empirically studied.

Although behavioral finance is well-established in financial markets, its application to entrepreneurial contexts, particularly ethnic entrepreneurship, remains limited. This study extends the relevance of behavioral finance by examining how cognitive and emotional biases, heuristics, and decision-making anomalies manifest in the outcomes of investment projects of ethnic entrepreneurs. Traditional theories of the "fully rational agent" assume that decisions are based solely on complete information and mathematically optimal calculations (Prosad et al., 2015). In reality, entrepreneurs operate in complex, uncertain, and dynamic environments where market conditions shift, information is incomplete, and patterns of overreaction or underreaction are common. Such conditions provide strong evidence that investment outcomes are shaped by more than purely rational calculation. By framing perceived ethnic entrepreneurial investment success as the observable reflection of underlying investment decisions, this research captures how behavioral and contextual factors influence venture outcomes. Understanding these effects is critical not only for extending behavioral finance beyond traditional financial settings but also for identifying strategies, such as effective project management methodologies, that enhance the effectiveness, adaptability, and sustainability of ethnic entrepreneurial ventures.

Building on this background, the present study addresses the following research questions: 1) How do behavioral finance factors influence the investment success of ethnic entrepreneurs? And 2) in what ways does the PM2 project management methodology moderate and mediate the relationship between behavioral finance and ethnic entrepreneurial decision-making outcomes?

To answer these questions, the study surveys 183 ethnic entrepreneurs in Quebec, Canada, and empirically examines the effects of heuristics, framing biases, and market conditions on perceived investment success. The remainder of the paper is structured as follows: Section 2 presents the theoretical background and literature review; Section 3 develops the research model and hypotheses; Section 4 describes the methodology; Section 5 reports the results and findings; Section 6 provides a discussion, including interpretations, theoretical contributions, practical implications, limitations, and directions for future research; and Section 7 concludes the study.

THEORETICAL FOUNDATIONS

Ethnic entrepreneurship

The literature on entrepreneurship uses several related terms to describe entrepreneurial activities undertaken by individuals with a shared cultural or migration background. Among these, ethnic entrepreneurship is the most frequently used concept. Ethnic entrepreneurship can be defined as the process by which "an individual identifies, assesses, and exploits opportunities through a business he or she starts, acquires, or inherits, and that maintains close relationships with the ethnic community to which the individual belongs" (Allali, 2010). This definition emphasizes both the entrepreneurial activity itself and the embeddedness of the venture within an ethnic or cultural community. More broadly, ethnic entrepreneurship encompasses business activities undertaken by individuals whose group membership is tied to a common cultural heritage or origin and who are recognized by out-group members as possessing such shared traits (Honig et al., 2010).

Related terms such as immigrant entrepreneurship and migrant entrepreneurship are often used interchangeably with ethnic entrepreneurship but reflect important conceptual distinctions. The term immigrant entrepreneur typically refers to foreign-born individuals who have immigrated within recent decades and subsequently established businesses in their host countries (Brzozowski, Cucculelli, & Surdej, 2017). While this definition captures first-generation immigrant business owners, it excludes members of ethnic minority groups who may have resided in the host country for multiple generations but continue to operate businesses shaped by ethnic identity and community ties. Similarly, migrant entrepreneurship refers to individuals who move to another country for a minimum period, commonly defined as at least twelve months, and engage in entrepreneurial activity in the host country (Salehi, 2026; Sinkovics & Reuber, 2021). The primary distinction between immigrant and migrant entrepreneurship lies in the degree of permanence in the host country, rather than in the nature of entrepreneurial activity itself.

In this study, the term ethnic entrepreneurship is adopted because it provides the most inclusive and theoretically appropriate framework for capturing entrepreneurial investment activities shaped by cultural background, migration experience, and ethnic embeddedness. This broader conceptualization is particularly suitable for examining investment behavior and outcomes, as it acknowledges the enduring influence of ethnic identity, social networks, and contextual constraints on entrepreneurial decision-making and venture performance. Empirical evidence indicates that immigrant entrepreneurs constitute a substantial and economically significant segment of small business owners in North America; for example, in Canada, 11.9% of immigrants aged 25–69 owned a private incorporated company or were primarily self-employed in 2016 (Picot & Ostrovsky, 2021). This prevalence underscores the relevance of studying this population, as their investment decisions and venture strategies provide meaningful insights into ethnic entrepreneurship and the application of behavioral finance principles.

Behavioral finance

Behavioral finance provides a theoretical framework for understanding how cognitive and emotional factors systematically shape investment decisions under conditions of uncertainty (Barberis & Thaler, 2003; Shefrin, 2002). While traditional finance assumes fully rational actors, entrepreneurs operate in complex environments characterized by incomplete information, market volatility, and high ambiguity, making decision outcomes inherently influenced by heuristics, biases, and contextual cues. Despite its extensive application in financial markets, the relevance of behavioral finance for ethnic entrepreneurial investment outcomes remains underexplored. This study draws on the behavioral finance micro (BFMI) perspective, emphasizing individual-level cognitive and emotional biases that indirectly manifest in observable venture outcomes, here conceptualized as perceived ethnic entrepreneurial investment success (Taylor, 2024; Noah & Lingga, 2020; Hamidon, & Kehelwalatenna, 2019).

Recent research highlights that entrepreneurs are particularly susceptible to biases in evaluating opportunities and allocating resources under uncertainty. Overconfidence, loss aversion, and representativeness heuristics can lead to suboptimal investment decisions, affecting both venture performance and sustainability (Shepherd et al., 2015; Baron & Shane, 2007). For ethnic entrepreneurs, these effects may be compounded by contextual factors, such as limited access to financial networks, institutional barriers, and the necessity-driven motivations underlying venture creation (Kloosterman & Rath, 2001; Picot & Ostrovsky, 2021). Studies indicate that the influence of behavioral biases extends beyond immediate financial decisions to strategic choices and long-term project outcomes, reinforcing the importance of a behavioral lens in entrepreneurship research (McMullen & Shepherd, 2006; Zhao & Seibert, 2006).

Despite these insights, the current behavioral finance literature exhibits several limitations. Most empirical work remains anchored in stock markets or institutional investor behavior, with relatively few studies addressing the entrepreneurial context, particularly for ethnic entrepreneurs (Hamidon & Kehelwalatenna, 2020). Existing research often treats behavioral mechanisms in isolation, neglecting the interaction between cognitive biases and the contextual environment, including informational asymmetries, market trends, and social influences, which can amplify or mitigate the effects of individual-level heuristics (Shiller, 2003; Bikhchandani & Sharma, 2000). Furthermore, prior studies rarely link behavioral factors to observable outcomes, such as venture performance or perceived investment success, limiting their practical and theoretical utility for understanding ethnic entrepreneurial decision-making.

Although behavioral finance has been widely applied in financial markets, its application to ethnic entrepreneurial investment remains limited. Existing research often focuses on individual investors rather than entrepreneurs and rarely links cognitive and emotional biases to observable outcomes such as perceived investment success. Integrating contextual factors, including informational environments and decision-making frameworks, can help clarify how these biases shape entrepreneurial investment outcomes. These considerations provide a natural bridge to project management methodologies, which may influence the effectiveness of entrepreneurial decision-making under uncertainty.

Project management methodologies provide structured frameworks for planning, executing, monitoring, and controlling projects to achieve predefined objectives within constraints of time, cost, and scope. PM^2 is a standardized project management methodology designed to enhance transparency, governance, and consistency in project implementation, particularly in complex and uncertain environments (Kourounakis & Maraslis, 2018). It incorporates defined roles, formal planning processes, risk management practices, and performance monitoring tools that support systematic decision-making across the project life cycle.

PM2 is composed of three integrated components: Agile Management, Portfolio Management, and Program Management (European Commission, 2021). Agile emphasizes adaptive planning, iterative execution, and responsiveness to change, which is especially useful in uncertain and dynamic entrepreneurial environments (European Commission, Directorate-General for Digital Services, 2021). Portfolio Management provides guidance for selecting, prioritizing, and monitoring multiple projects to ensure strategic alignment and optimal resource allocation (European Commission, Directorate-General for Digital Services, & Council of the European Union, General Secretariat, 2022). Program Management focuses on coordinating interrelated projects to achieve overarching objectives, facilitating stakeholder engagement, and ensuring that project outcomes collectively deliver intended benefits (European Commission, Directorate-General for Digital Services, & Council of the European Union, 2021).

In entrepreneurial investment contexts, PM2 can be conceptualized as both a decision-structuring and decision-enabling mechanism. By introducing formal procedures, evaluation criteria, and control checkpoints, PM2 reduces ambiguity and reliance on intuition-driven judgments, while simultaneously enabling entrepreneurs to translate strategic intentions into organized investment actions (European Commission, Directorate-General for Digital Services. 2023; Fonrouge et al., 2019). This dual role is particularly relevant in settings characterized by uncertainty, limited resources, and high cognitive demands, such as ethnic entrepreneurial ventures.

From a behavioral finance perspective, PM2 can be understood as interacting with cognitive and emotional factors rather than operating independently of them. As a mediating mechanism, PM2 explains how behavioral finance factors may influence the way investment decisions are structured, planned, and executed. Behavioral tendencies such as overconfidence, herding effects, and loss aversion (Abideen et al., 2023) may affect the extent to which entrepreneurs adopt, apply, and adhere to formal project management practices, which may subsequently shape investment outcomes. In this sense, PM2 represents an intermediate mechanism through which behavioral influences are translated into observable investment decisions and outcomes.

At the same time, PM2 also serves a moderating role by shaping the strength and direction of the relationship between behavioral finance factors and investment outcomes. By providing structure, feedback, and governance, PM2 can

attenuate the negative effects of certain behavioral biases or enhance the positive effects of disciplined decision-making. Thus, PM2 influences not only whether behavioral tendencies affect outcomes, but also how strongly they do so.

Accordingly, in this study, PM2 is theorized as both a mediator and a moderator in the relationship between behavioral finance factors and perceived ethnic entrepreneurial investment success. This dual conceptualization allows for a nuanced examination of how structured project management practices both channel and condition the effects of cognitive and emotional influences on entrepreneurial investment outcomes.

CONCEPTUAL MODEL AND HYPOTHESES

Conceptual model overview

Entrepreneurial investment success does not emerge in isolation; it is the cumulative outcome of a series of investment-related decisions made under conditions of uncertainty. In the context of ethnic entrepreneurship, these decisions are often shaped by limited information, unfamiliar institutional environments, cultural distance, and heightened personal and financial risk (McMullen & Shepherd, 2006). Behavioral finance offers a robust theoretical lens for understanding how such conditions influence decision-making by emphasizing the role of cognitive heuristics, emotional biases, and contextual factors in shaping judgment and choice (Barberis & Thaler, 2003).

In this study, investment decisions are conceptualized as a latent, unobserved process through which behavioral finance factors exert their influence. While the decision-making process itself is not directly measured, it is treated as the underlying mechanism linking behavioral influences on observable outcomes, consistent with current behavioral finance literature (Taylor, 2024; Hamidon & Kehelwalatenna, 2019). This conceptualization is consistent with behavioral finance theory, which posits that biases and heuristics affect how individuals evaluate information, assess risk, and select courses of action, with the consequences of these decisions becoming evident only after implementation. Accordingly, the dependent construct in this research is perceived ethnic entrepreneurial investment success, which captures entrepreneurs' ex post evaluations of the outcomes of their investment activities. These perceived outcomes are understood as reflections of the effectiveness and quality of prior investment decisions, rather than as direct measures of the decision-making process itself. By focusing on outcomes, this study aligns with the view that the impacts of cognitive and emotional biases are most meaningfully observed in how entrepreneurs assess venture performance, adaptability, satisfaction, social impact, and long-term viability.

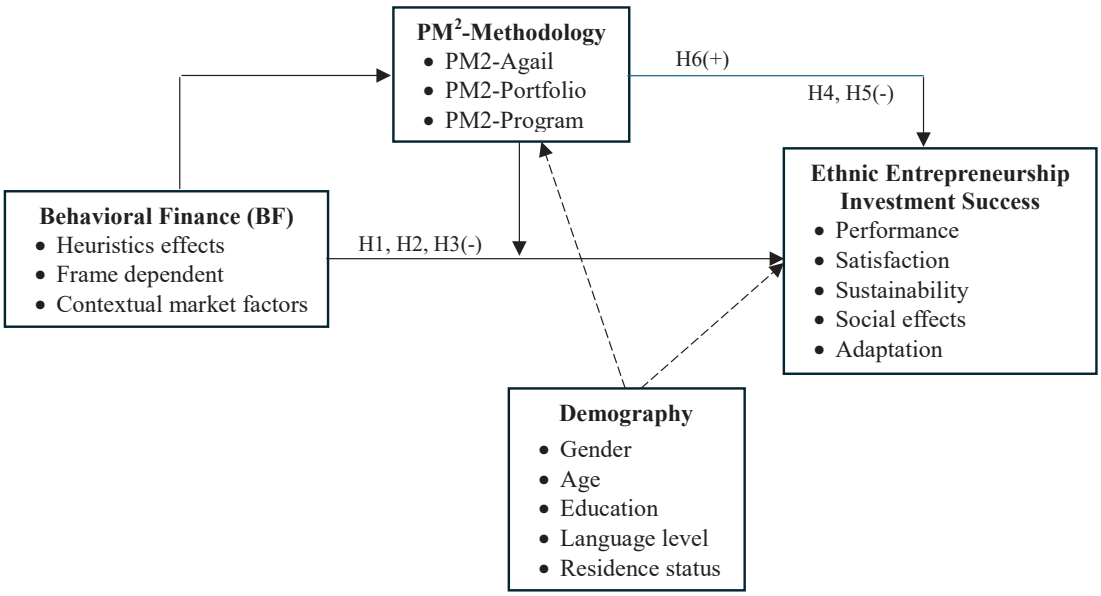

Figure 1. The proposed research model

Figure 1 illustrates the proposed conceptual model. Behavioral finance factors, comprising heuristics effects, frame-dependent biases, and contextual market condition, are theorized to influence investment decisions at the cognitive and evaluative level. These latent decisions, in turn, shape perceived investment success. Project management methodology (PM2) is incorporated as a critical contextual mechanism within this framework. On the one hand, PM2 provides structure, formalization, and discipline that can channel behavioral influences into more systematic decision processes. On the other hand, it can condition the strength and direction of behavioral effects by either mitigating or amplifying the consequences of biases under different project environments.

By explicitly distinguishing between latent investment decision processes and observable investment outcomes, the proposed model avoids conflating decision-making with performance. This distinction allows behavioral finance to be meaningfully applied to ethnic entrepreneurship while maintaining conceptual clarity and ensuring alignment between theoretical constructs and empirical measurement.

Behavioral finance factors and perceived ethnic entrepreneurial investment success

Researchers have proposed several frameworks for classifying behavioral finance factors that influence investment-related decision processes. Shefrin (2002), for instance, broadly distinguishes between heuristic-driven biases and frame-dependent biases, a classification that has been widely adopted in the behavioral finance literature (Lowies et al., 2013; Rajdev & Raninga, 2016). Similarly, Pompian (2011) categorizes behavioral biases into cognitive and emotional types, reflecting differences in their psychological origins. While these frameworks vary in emphasis, they collectively highlight that investment-related judgments are shaped by both mental shortcuts and evaluative distortions.

Building on Shefrin's (2002) classification and informed by the qualitative phase of this research, the present study organizes behavioral finance factors affecting ethnic entrepreneurs' investment-related decision processes into three analytically distinct yet interrelated categories: heuristics effects, frame-dependent biases, and market conditions. This categorization reflects not only established theoretical distinctions but also the contextual realities faced by ethnic entrepreneurs operating under uncertainty. These behavioral finance factors are theorized to influence investment decisions at a latent level, with their cumulative effects becoming observable through entrepreneurs' evaluations of investment outcomes, conceptualized here as perceived ethnic entrepreneurial investment success. The following subsections examine each category in turn.

Heuristics effects

The first group of factors is based on heuristics theory. Heuristics are simple, efficient rules of thumb proposed to explain how people make decisions, form judgments, and solve problems, particularly when facing complexity or incomplete information (Venkatapathy & Sultana, 2016). These rules often shorten decision-making time and allow individuals to function without extensive cognitive effort (Tversky & Kahneman, 1974); however, their systematic use can lead to predictable cognitive biases that affect the quality of investment-related judgments.

Heuristics theory suggests that investors rely on mental shortcuts to cope with complex decision environments, which may result in deviations from optimal choices (Schwartz, 2010). Overconfident investors, for example, tend to overestimate their knowledge and abilities, engage in excessive trading, and ignore transaction costs and fundamental information, thereby increasing the likelihood of suboptimal outcomes (ul Abdin et al., 2017). Similarly, investors may selectively attend to positive information while discounting negative signals, leading to delayed responses to adverse developments and poorer investment performance (De Goey, 2023).

Anchoring bias further illustrates how initial reference points, such as past prices, can distort valuation judgments when investors fail to adjust adequately toward intrinsic values (Shefrin, 2002). Availability bias causes decision-makers to rely disproportionately on recent or salient information, rather than conducting comprehensive analyses (Pompian, 2011). In entrepreneurial investment contexts, such heuristic-driven biases may affect not only immediate decisions, but also longer-term outcomes related to venture performance, adaptability, and sustainability. Key heuristic biases identified in the literature include optimism, overconfidence, availability, anchoring, and representativeness (Hamidon & Kehelwalatenna, 2020; Venkatapathy & Sultana, 2016; Tversky & Kahneman, 1974). Accordingly, these biases are expected to adversely affect the perceived success of entrepreneurial investments. Therefore, the following hypothesis is proposed:

H1. Heuristic-driven biases have a significant negative effect on perceived ethnic entrepreneurial investment success.

Frame dependent biases

Frame-dependent biases are central to prospect theory, which posits that individuals evaluate outcomes relative to reference points and exhibit loss aversion-placing greater weight on losses than on equivalent gains (Kahneman & Tversky, 2013). As a result, investment judgments are influenced by how options are framed, rather than by their objective expected value. This framing effect can lead entrepreneurs to favor risk-averse or risk-seeking behaviors depending on perceived gains or losses, with implications for investment outcomes.

Regret aversion is another key component of prospect theory. Investors often experience regret when recognizing missed opportunities or poor past choices, leading them to hold on to underperforming investments to avoid acknowledging mistakes (Shefrin & Statman, 1985). Such behavior may constrain learning and adaptation, negatively influencing perceived investment success. Also, self-control bias further affects decision-making when individuals struggle to regulate emotions and impulses (Pompian, 2011). For example, tax-related behaviors, such as selling losing assets to realize tax benefits (Keim, 1983), illustrate how emotional considerations can override long-term strategic reasoning. In entrepreneurial settings, these frame-dependent biases may shape satisfaction, persistence, and evaluations of investment outcomes beyond purely financial returns.

Based on prior studies and the qualitative findings of this research, the primary frame-dependent biases influencing ethnic entrepreneurs' investment-related judgments include regret aversion, loss aversion, mental accounting, self-control, and framing effects (Jahanzeb, 2012). These biases are therefore expected to negatively influence perceived ethnic entrepreneurial investment success. Thus, the second hypothesis is proposed as follows:

H2. Frame-dependent biases have a significant negative effect on perceived ethnic entrepreneurial investment success.

Contextual market factors

Market conditions represent external contextual pressures that influence investment judgments and strategies, rather than intrinsic cognitive or emotional biases. Investment strategy reflects how entrepreneurs interpret market signals, assess trade-offs, and commit to specific courses of action under uncertainty (Porter, 1996). De Bondt and Thaler (1995) argue that investors frequently overreact or underreact to price changes, extrapolate past trends into the future, and rely on seasonal or cyclical patterns, all of which can shape investment outcomes. Empirical studies confirm that market factors, such as price volatility, historical trends, and the availability of market information, significantly influence investment-related decisions (Waweru et al., 2008). In addition to internal cognitive and emotional biases, behavioral finance research recognizes that investor behavior is influenced by interactions with external environments and informational contexts (Shiller, 2003; Bikhchandani & Sharma, 2000). Market information and past trends serve as environmental cues that entrepreneurs use to make decisions, while herding reflects a behavioral response to these cues. Together, these factors may activate, amplify, or constrain individual behavioral tendencies, indirectly affecting perceptions of investment success.

Herding is a behavioral phenomenon in which individuals imitate the actions of others rather than relying solely on private information (Bikhchandani & Sharma, 2000). Herding has been shown to influence investment decisions, often amplifying market inefficiencies (Noah & Lingga, 2021; Spyrou, 2013). Although the efficient market hypothesis assumes that prices fully reflect all available information (Shiller, 2003), evidence shows that reliance on technical analysis or past trends may bias judgments and reduce the quality of investment-related evaluations (Hamidon & Kehelwalatenna, 2020). For ethnic entrepreneurs operating in unfamiliar or volatile markets, these contextual conditions may intensify behavioral responses and shape perceptions of investment outcomes. Accordingly, market conditions are modeled as environmental pressures that indirectly affect perceived ethnic entrepreneurial investment success, rather than as a direct cognitive or emotional bias. The third hypothesis is therefore proposed as follows:

H3. Market conditions have a significant impact on perceived ethnic entrepreneurial investment success.

The moderated-mediation role of PM2 in perceived EEIS

Entrepreneurial investment projects are often conducted under conditions of high uncertainty, limited resources, and complex decision-making requirements. In such contexts, structured project management practices can provide essential guidance, coordination, and feedback mechanisms. PM2, comprising Agile, Portfolio, and Program management, offers

a comprehensive framework that supports systematic planning, execution, and monitoring of investment projects, enhancing the likelihood of successful outcomes (Kerzner, 2025; European Commission, 2023; Batista et al., 2022).

Behavioral finance factors, including heuristics, frame-dependent biases, and responses to market conditions, shape investment decisions at a latent level. PM2 is theorized to influence perceived ethnic entrepreneurial investment success through two interconnected pathways. First, as a mediating mechanism, PM2 translates latent investment decisions into observable outcomes by structuring processes, providing checkpoints, and enforcing governance, thereby mitigating the negative effects of cognitive and emotional biases (Patanakul & Milosevic, 2009). Second, as a moderating mechanism, PM2 can buffer or amplify the effects of behavioral biases, such that the impact of heuristics, framing, or market perception on perceived investment success depends on the level of PM2 adoption (Acur et al., 2012).

Beyond these conditional effects, PM2 is also expected to exert a direct positive influence on perceived investment success by improving resource allocation, aligning project execution with strategic objectives, and facilitating adaptive responses to changing conditions. In sum, PM2 both channels the effects of behavioral finance factors (mediation) and conditions their strength (moderation), highlighting its dual role in shaping entrepreneurial investment outcomes. Based on this theoretical framework, the following hypotheses are proposed:

H4. PM2 adoption mediates the relationship between behavioral finance factors and perceived ethnic entrepreneurial investment success.
H5. PM2 adoption moderates the relationship between behavioral finance factors and perceived ethnic entrepreneurial investment success, such that higher PM2 adoption mitigates the negative effects of biases.
H6. PM2 adoption has a direct positive effect on perceived ethnic entrepreneurial investment success.

Given that the investor demographics are anticipated to affect the variables, their influence is incorporated into the proposed model because investors differ significantly from one another based on a range of factors, including demographic characteristics, socioeconomic status, education level, gender, age, race and ethnicity. In other words, investment decision-making is not solely governed by standardized methods or precise models (Schramm-Nielsen, 2001; VanderPal, 2021); emotional influences and personal temperament often accompany the logical and analytical aspects of the process.

METHODOLOGY

Study design and sample

This study is an empirical investigation that employs a quantitative design grounded in the descriptive-analytical method. Primary data were collected using a survey approach, as part of a larger research project conducted using a mixed-methods approach.

The survey targeted ethnic entrepreneurs in Quebec. Specifically, the study population consisted of ethnic entrepreneurs who had invested in small businesses and real assets, not in the stock market, and who had created at least one job in Quebec. This inclusion criterion ensured that respondents had achieved a minimum level of entrepreneurial activity and operational experience, allowing for a meaningful assessment of investment outcomes and decision-making processes. However, this criterion also represented a potential limitation to the study's external validity, as it may have biased the sample toward more established ventures, thereby weakening or distorting the observed relationships between behavioral biases, PM2 adoption, and perceived entrepreneurial venture success.

Given the large population size within the research framework, a convenience sampling approach was employed. Although this sampling method does not support probability-based inference, the final sample of 183 respondents was considered adequate for analysis using partial least squares structural equation modeling (PLS-SEM). This variance-based technique is particularly suitable for exploratory and complex models with small to medium sample sizes and allows for meaningful assessment of structural relationships under sampling constraints (Hair et al., 2021; Henseler et al., 2016).

The list of ethnic entrepreneurs was obtained from ethnic small business associations, consulting firms, and immigration service counseling centers. Additional sources included the Quebec Business Directory (QBL), Montreal Local Small Businesses (MLSM), the Directory of Entrepreneurship Support Organizations (DESO), and the Montreal Island Social Services Directory (MIDCS). Demographic variables such as age, gender, education etc. were considered to assess sample representativeness (see Table 1). The study was conducted in accordance with ethical guidelines, and

informed consent, confidentiality, and voluntary participation were ensured. Ethical approval was obtained from the UQO Research Ethics Committee prior to data collection.

Measures and instruments

A thirty-eight-item questionnaire was used to collect data on the impact of behavioral finance on the decision-making of ethnic entrepreneurs. The questionnaire was divided into two sections: the first collected demographic data, and the second was based on a conceptual model designed to assess the relationships between the variables.

Dependent variable: Ethnic Entrepreneurship Investment Success. Since this research focuses on ethnic entrepreneurship, which primarily involves investment in real and tangible assets, the decision-making criteria leading to success in this context differ from those used by investors in financial markets. Non-financial criteria are considered alongside traditional financial measures, reflecting the broader goals and values that guide ethnic entrepreneurial decisions. The models proposed by Shenhar et al. (2001) informed the identification of key factors, including project efficiency and performance, customer impact, business success, and future readiness. Subsequently, findings from our qualitative study were distilled into five key factors, performance, sustainability, adaptation, satisfaction, and social effects, and ten specific items. Respondents rated each item on a scale from 1 (strongly agree) to 5 (strongly disagree), with responses reverse-coded prior to analysis so that higher scores indicated higher levels of perceived success. A mean score was calculated for each respondent, reflecting decision-making effectiveness, business sustainability, entrepreneurial adaptation, satisfaction, and positive social impacts among co-ethnics.

Independent variable: Behavioral Finance. Behavioral finance measures were primarily based on Shefrin's model (2002), which classifies biases into heuristic-based and frame-dependent categories. Based on prior studies (Adil et al., 2022; Tseng, 2006) and qualitative findings, Contextual Market Factors were added as a third factor. Twenty-two items were used to assess behavioral finance factors: ten items for heuristic biases (optimism, overconfidence, availability, anchoring, and representativeness) adapted from Salem (2023) and Suresh et al. (2024); six items for frame-dependent biases (regret aversion, framing, mental accounting) adapted from Mbaluka et al., (2012) and Sattar et al. (2020); and six items for contextual market factors, including herding behavior and external informational cues, adapted from the qualitative study and prior research (Suresh, 2024; Noah & Lingga, 2021; Caparrelli et al., 2004; Bikhchandani & Sharma, 2000; Rajan et al., 2000). Respondents rated each item on a five-point scale, and mean scores were calculated for each subscale.

Moderator and mediator: PM2 Project Management Methodology. PM2, serving a moderated-mediation role between behavioral finance and entrepreneurial decisions, was measured using nine items across agile PM2, portfolio PM2, and program PM2. Item construction primarily relied on the PM2 Project Management Guide v3.1 (European Commission, 2023), supplemented by the PM2-Agile Guide 3.0.1, PM2 Programme Management Guide 1.0, and PM2 Portfolio Management Guide 1.5. Items were refined through several stages with input from experts and the authors. Respondents rated each item on a scale from 1 (not at all important) to 5 (very important), with higher mean scores indicating greater integration of PM2 practices.

Control variables: Demographics. Demographic characteristics, including age, gender, education level, language proficiency, residency status, ethnicity, and type of business, were included as control variables, given their potential influence on entrepreneurial decisions. Gender was coded as binary (1=male, 2=female). Age and language proficiency were measured in five categories, education in seven categories, and residency status as binary (1=permanent resident/citizen, 2=temporary resident). Ethnicity and business type were self-reported through open-ended questions.

Data analysis

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4 to test the proposed conceptual model and associated hypotheses. The choice of PLS-SEM is both theoretically and methodologically justified based on considerations related to sample size, model complexity, and research objectives. First, the sample size of 183 respondents is more suitable for PLS-SEM than for covariance-based SEM (CB-SEM), particularly given the complexity of the proposed model, which includes multiple latent constructs, mediation and moderation effects, and interaction terms and it does not require strict assumptions of multivariate normality (Hair et al., 2019). In addition, the primary objective of this research is theory extension and prediction, rather than strict theory confirmation. PLS-SEM is particularly appropriate when the goal is to explain variance in key dependent constructs, here, perceived ethnic entrepreneurial investment success (EEIS), and to assess the predictive relevance of behavioral finance factors and project

management methodology (PM2). Also, the model incorporates latent constructs representing cognitive, emotional, and contextual influences, along with a moderated-mediation structure in which PM2 simultaneously functions as a mediator and a moderator. Thus, its suitability for predictive modeling and handling complex, multivariate relationships aligns well with the objectives of this study.

RESULTS

Sample demographics

A total of 183 ethnic entrepreneurs completed the survey questionnaire; of these, 54% were male and 45.9% were female. The respondents' ages ranged from 23 to 70+, with > 41-year-olds accounting for 74% of participants. The French language level of 55.5% of the participants was below intermediate, and 45% was above intro. Almost 27.5% have been able to speak French fluently. This situation is slightly different in English language level: 17.8% (below intermediate) versus 80% (intermediate and above). 48.5% state they can speak English fluently. Also, more than 94% of the respondents had a college diploma/certificate, or higher. Also, 74.3% of the participants were permanent residents/citizens, while 25.7% were temporary residents or were seeking PR. The highest frequency of businesses among ethnic entrepreneurs was found in the food services and related industries -such as restaurants, bakeries and pastry shops, and coffee shops- which accounted for 23.8% of the total. This was followed by retailers, representing 18.2%.

Table 1. Status of the participants' demographics

	Variable	N	%
Gender	Male	99	54,1
	Female	84	45,9
Age	≤ 20	0	0,0
	21-30	11	6,0
	31-40	36	19,7
	41-50	66	36,1
	≥ 51	70	38,3
Language level (Fr. & En.)	Elementary	83	45,4
	Pre-intermediate	23	12,6
	Intermediate	24	13,1
	Upper-intermediate	32	17,5
	Advance	21	11,5
Education	Secondary	11	6,0
	Collage dip. / cert.	84	45,9
	Bachelor's degree	63	34,4
	Master's degree and higher	25	13,7
PR./ Citizen	Yes	136	74,3
		47	25,7

Measurement model assessment

Before evaluating the structural relationships, the measurement model was assessed to ensure that all constructs were reliable, valid, and empirically distinct. This assessment included checks for internal consistency, convergent validity, indicator reliability, discriminant validity, and collinearity, providing a robust foundation for subsequent structural model analysis.

Reliability and convergent validity

The reliability and convergent validity of all constructs were assessed using Cronbach's alpha (α), rho_A, composite reliability (CR), and average variance extracted (AVE). As shown in Table 2, Cronbach's alpha values ranged from 0.737 to 0.836, exceeding the recommended threshold of 0.70 and indicating satisfactory internal consistency. Similarly, rho_A values ranged from 0.743 to 0.840, confirming consistent reliability of the latent constructs. Composite reliability values, ranging from 0.828 to 0.901, further support the internal consistency of the measures. Convergent validity was established, with AVE values between 0.570 and 0.753, all above the 0.50 benchmark, demonstrating that each construct explains a substantial portion of the variance in its indicators.

Table 2. Reliability and validity of the constructs

Construct	Coronach- α	rho-A	Composite reliability	AVE
Perceived EEs' investment success	0.737	0.743	0.828	0.592
Heuristics effects	0.808	0.813	0.868	0.570
Market conditions	0.836	0.840	0.901	0.753
PM2-methodology	0.753	0.771	0.856	0.665
Frame dependent biases	0.741	0.746	0.853	0.659

Note: Thresholds — Cronbach's α > 0.7, rho_A > 0.7, CR > 0.7, AVE > 0.5 (Sarstedt et al., 2019; Fornell & Larcker al., 1981).

These results indicate satisfactory measurement quality; however, the findings should be interpreted with caution given the moderate loadings of several indicators.

Indicator loadings

Indicator reliability was evaluated by examining the outer loadings of all items on their respective latent constructs. Outer loadings indicate the strength of the relationship between an indicator and its latent variable. Loadings above 0.70 are considered strong, while items with loadings between 0.40 and 0.70 are acceptable if supported by theoretical justification (Hair et al., 2019; Henseler et al., 2016).

Table 3. Indicator loadings and bootstrapped t-values

Construct	Indicator	Standardized loading	t-values
Heuristics	Excessive optimism	0.747	17.531
	Over-confidence	0.782	21.516
	Availability	0.804	22.194
	Anchoring	0.813	25.685
	Representativeness	0.612	9.985
Frame dependent biases	Regret aversion	0.838	7.781
	Framing	0.767	6.779
	Mental accounting	0.828	8.538
Market conditions	Herding effects	0.839	5.058
	Market information	0.868	5.211
	Past trends	0.896	5.556
PM2	Agile management	0.821	13.228
	Portfolio management	0.837	13.186
	Programme management	0.789	6.090
Perceived EEs' investment success	Performance of the business	0.812	14.207
	Sustainability	0.675	8.134
	Clients and entrepreneurs' Satisfaction	0.662	5.054
	Adaptation in environment	0.741	10.812
	Social effects	0.598	7.743

Note: Loadings > 0.70 are considered strong, 0.40–0.70 are acceptable with theoretical justification. Bootstrapped t-values > 1.96 indicate significance at $p < 0.05$.

As shown in Table 3, most items demonstrated strong loadings, ranging from 0.662 to 0.896, with all bootstrapped t-values exceeding 1.96, confirming statistical significance at $p < 0.05$. For example, heuristic-related items such as Excessive optimism (0.747, t = 17.531), Over-confidence (0.782, t = 21.516), and Anchoring (0.813, t = 25.685) loaded strongly on the Heuristics construct, while Representativeness (0.612, t = 9.985) was slightly below 0.70 but retained due to theoretical relevance. Similarly, items for perceived EEs' investment success, including social effects (0.598, t = 7.743) and Clients and entrepreneurs' satisfaction (0.662, t = 5.054), were retained as acceptable indicators. All other constructs, including frame-dependent biases, market conditions, and PM2 methodology, showed strong loadings and statistically significant t-values, supporting the reliability of the measurement model.

Discriminant validity

Discriminant validity evaluates whether each construct is empirically distinct from the other constructs in the model. In this study, discriminant validity was assessed using both the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio, following recommended PLS-SEM guidelines (Henseler et al., 2015; Hair et al., 2019).

According to the Fornell–Larcker criterion, the square root of the AVE for each construct should exceed its correlations with all other constructs. As shown in Table 4, this condition is satisfied for all constructs: for example, Perceived EEs' investment success has an AVE square root of 0.702, which is greater than its correlations with Heuristics (−0.476), Market conditions (0.098), PM2 methodology (0.234), and Frame-dependent biases (−0.222). Similarly, all other constructs' AVE square roots exceed their correlations with the remaining constructs, confirming discriminant validity under the Fornell–Larcker criterion.

Table 4. Discriminant validity based on Fornell and Larcker and Heterotrait-Monotrait criteria

Construct	Fornell & Larcker ratio					HTMT ratio				
	PEEIS	HEU	MKC	PM2	FDB	PEEIS	HEU	MKC	PM2	FDB
Perceived EEIS	0.702					-				
Heuristics effects	-0.476	0.755				0.611	-			
Market conditions	0.098	-0.090	0.868			0.135	0.107	-		
PM2-methodology	0.234	-0.199	-0.089	0.816		0.380	0.232	0.112	-	
Frame dependent biases	-0.222	0.102	-0.016	0.097	0.812	0.323	0.143	0.134	0.150	-

Note: For Fornell–Larcker, the diagonal values (√AVE) should exceed all inter-construct correlations. HTMT values < 0.90 indicate acceptable discriminant validity (Henseler et al., 2015).

The HTMT ratio, a more stringent test, assesses construct distinctiveness, with values below 0.90 indicating adequate discriminant validity. In the current analysis, all HTMT values range from 0.107 to 0.611, well below the 0.90 threshold. This demonstrates that the constructs are conceptually and empirically distinct, and there is no indication of problematic overlap between latent variables. Overall, the results from both Fornell–Larcker and HTMT analyses provide strong evidence that the measurement model possesses satisfactory discriminant validity, supporting the robustness of subsequent structural model assessment.

Collinearity assessment

To examine potential multicollinearity among the predictor variables, both inter-construct correlations and variance inflation factors (VIFs) were assessed. Examining correlations provides a preliminary indication of overlap among independent constructs, whereas VIFs offer a more robust, model-consistent assessment in PLS-SEM.

First, a correlation matrix was inspected to identify whether any bivariate correlations among the independent constructs exceeded commonly accepted thresholds. As shown in Table 5, the correlations among Heuristics effects (HEU), Frame-dependent biases (FDB), and Market conditions (MKC) are low in magnitude, ranging from −0.090 to 0.102. All correlations are well below the threshold of 0.80, suggesting that multicollinearity is unlikely to be a concern at the bivariate level.

Table 5. Matrix of correlation between independent variables

		HEU	FDB	MKC
HEU	Heuristics effects	1		
FDB	Frame dependent biases	-0.090	1	
MKC	Market conditions	0.102	0.016	1

Note: Correlations above 0.80 are typically viewed as an indication of multicollinearity, suggesting that the variables may overlap and distort regression estimates (Dormann et al., 2013; Gujarati et al., 2009).

In addition to assessing multicollinearity at the construct level, collinearity among the individual predictor items was also examined to ensure that high correlations between indicators would not bias the model estimates. Variance inflation factor (VIF) and tolerance values were computed for all items measuring the independent constructs. As presented in Table 6, all VIF values range from 1.221 to 2.727, well below the conservative threshold of 3.3 recommended for PLS-SEM (Hair et al., 2019). Correspondingly, tolerance values are all above 0.30, further indicating that multicollinearity is not problematic. The significance values for all indicators are 0.00, confirming that the estimates are stable.

Table 6. VIF of the predictors

Variables	OPT	OVC	AVL	ANC	REP	RAV	FRM	MAC	HER	MKT	PTR
Sig.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tolerance	0.681	0.554	0.485	0.510	0.819	0.596	0.727	0.666	0.626	0.414	0.367
VIF	1,468	1,804	2,062	1,959	1,221	1,679	1,376	1,501	1,598	2,414	2,727

Note: VIF < 5 → Generally considered acceptable; multicollinearity is not a serious issue. VIF between 5 and 10 → Indicates moderate multicollinearity; may be tolerable depending on the context but should be checked carefully. VIF > 10 → Problematic; strong multicollinearity is present, and corrective measures (e.g., removing/reducing variables, combining predictors, or using techniques like ridge regression) are usually needed (Jeng, 2023).

These results demonstrate that both individual items and predictor constructs can be reliably included in the structural model without concern for inflated standard errors or unstable path coefficients. This supports the robustness of subsequent hypothesis testing and structural model evaluation.

Model fit assessment

To assess the overall adequacy of the proposed model, several global fit measures generated by SmartPLS were examined. As shown in Table 7, the SRMR value of 0.094 for both the saturated and estimated models indicates an acceptable level of fit, particularly in the context of PLS-SEM, which prioritizes prediction rather than exact model reproduction.

Table 7. Model fit

	Saturated model	Estimated model
SRMR	0.092	0.092
d_ULS	1.621	1.621
d_G	0.424	0.424
Chi-square	437.071	437.071
NFI	0.667	0.667

The d_ULS and d_G values are nearly identical across the two models, reflecting stable estimation and minimal discrepancy between the empirical and model-implied correlation matrices. Similarly, the Chi-square values show only negligible differences, further supporting model consistency. The NFI value of 0.891, although slightly below the conventional 0.90 threshold, is considered acceptable for PLS-SEM applications, especially in exploratory or complex models. Overall, these fit indices provide additional evidence that the proposed model demonstrates an acceptable fit to the observed data and is suitable for subsequent structural model evaluation.

Structural model assessment

After confirming the measurement model adequacy and acceptable model fit, the structural model was evaluated to examine the hypothesized relationships among the constructs. The assessment initially focused on the direct relationships (path coefficients) and their significance, along with the explanatory power (R^2) of the model.

Path coefficients and hypothesis testing (direct effects)

The direct effects of behavioral finance factors and PM2 adoption on perceived ethnic entrepreneurial investment success (EEIS) were assessed using Smart PLS. The results are presented in Table 8.

Table 8. Direct effects of behavioral finance factors and PM2 on perceived EEIS

Hypothesis	Path	β (Path Coefficient)	t-value	p-value	Decision
H1	Heuristics effects → Perceived EEIS	-0.419	6,213	0.000	supported
H2	Frame dependent biases → Perceived EEIS	-0.205	2.940	0.003	supported
H3	Market conditions → Perceived EEIS	0.048	0.733	0.464	N/A
H6	PM2 → Perceived EEIS	0.165	2.240	0.025	supported

Notes: β = standardized path coefficient; t-value and p-value were obtained using bootstrapping with 5,000 resamples in SmartPLS; positive β values indicate a direct positive relationship, while negative values indicate a direct negative relationship between the predictor and perceived EEIS.

Heuristic-driven biases were found to have a strong negative effect on perceived EEIS ($\beta = -0.419$, $t = 6.213$, $p < 0.001$), supporting H1. This indicates that investors' reliance on heuristics reduces their perception of investment success, suggesting that cognitive shortcuts significantly undermine perceived EEIS. Frame-dependent biases also negatively influenced perceived EEIS ($\beta = -0.205$, $t = 2.940$, $p = 0.003$), supporting H2. Although the effect is smaller than heuristics, it remains statistically significant, emphasizing that the framing of information shapes investors' evaluations.

Market conditions showed a minimal positive effect on perceived EEIS ($\beta = 0.048$, $t = 0.733$, $p = 0.464$), but this effect was not statistically significant, and H3 was therefore not supported. This suggests that external market factors do not play a substantial role in shaping investors' perceptions compared to cognitive factors.

PM2 adoption demonstrated a positive and significant effect on perceived EEIS ($\beta = 0.165$, $t = 2.240$, $p = 0.025$), supporting H6. This finding indicates that the implementation of structured project management practices enhances investors' perceptions of ethnic entrepreneurial investment success, potentially mitigating some of the negative influence of behavioral biases.

Overall, the analysis of direct effects shows that behavioral finance factors, particularly heuristics and frame-dependent biases, negatively affect perceived EEIS, while PM2 adoption contributes positively. Market conditions, in contrast, do not significantly influence perceived investment success, highlighting the dominant role of cognitive and organizational factors in investors' evaluations.

Coefficient of determination (R^2)

The explanatory power of the structural model was assessed using the coefficient of determination (R^2), which measures the proportion of variance in perceived ethnic entrepreneurial investment success (EEIS) explained by heuristic-driven biases, frame-dependent biases, market conditions, and PM2 adoption. The model yielded an R^2 value of 0.282 (Table 9), indicating that these predictors account for approximately 28% of the variance in perceived EEIS.

Table 9: Coefficient of determination (R^2) for perceived EEIS

Endogenous Construct	R^2	Interpretation
Perceived EEIS	0.282	Moderate

Note: R^2 = Coefficient of determination; values indicate the proportion of variance in the endogenous construct explained by the model's predictors. Interpretation follows conventional PLS-SEM guidelines.

It is meaningful in the context of behavioral finance and entrepreneurial investment research, where human decision-making is influenced by multiple cognitive, social, and environmental factors (Hair et al., 2019; Kahneman & Tversky, 1979). This R^2 demonstrates that the included behavioral and managerial factors significantly contribute to investors' perceptions of EEIS, providing a solid foundation for examining the specific effects of individual predictors and PM2 adoption in subsequent analyses.

Effect size (f^2)

The effect size (f^2) was calculated to evaluate the relative contribution of each predictor to the variance explained in perceived ethnic entrepreneurial investment success (EEIS). Table 10 presents the f^2 values for all predictors. Heuristic-driven biases have the largest effect on perceived EEIS ($f^2 = 0.231$), which falls between medium and large, indicating a substantial impact on investors' perceptions. Frame-dependent biases have a medium effect ($f^2 = 0.153$), showing that how information is presented moderately influences EEIS. PM2 adoption also has a medium effect ($f^2 = 0.136$), highlighting the importance of structured project management practices in enhancing perceived investment success. In contrast, market conditions exhibit a negligible effect ($f^2 = 0.003$), confirming their minimal contribution to EEIS in the model.

Table 10: Effect sizes (f^2) of predictors on perceived EEIS

Predictor	f^2	Effect size interpretation
Heuristic-driven biases	0.231	Medium–Large
Frame-dependent biases	0.153	Medium
Market conditions	0.003	Low
PM2 adoption	0.136	Medium

Note: f^2 = effect size; values indicate the relative contribution of each predictor to the variance explained in the endogenous construct (perceived EEIS). Interpretation follows Cohen's (1988) guidelines: small = 0.02, medium = 0.15, large = 0.35.

These results complement the direct effect and R^2 analyses. They demonstrate that heuristic-driven biases are the strongest determinant of perceived EEIS, followed by PM2 adoption and frame-dependent biases, while market conditions have virtually no influence. This highlights the dominant role of behavioral and managerial factors in shaping investors' perceptions.

Predictive relevance (Q^2)

The predictive relevance of the structural model was assessed using the blindfolding procedure in SmartPLS. The results show a Q^2 value of 0.151 for perceived ethnic entrepreneurial investment success (EEIS) (Table 11). This value exceeds the zero threshold and indicates moderate predictive relevance, suggesting that the model is capable of predicting investors' perceptions beyond mere sample fitting. In the context of behavioral finance and entrepreneurial investment research, where perceptions and decision-making are influenced by complex cognitive and contextual factors, this level of predictive relevance is considered meaningful.

Table 11: Predictive relevance (Q^2) for perceived EEIS

Endogenous Construct	Q^2	Interpretation
Perceived EEIS	0.158	Moderate predictive relevance

Note: Q^2 values greater than zero indicate that the model has predictive relevance for the endogenous construct (Hair et al., 2021).

Overall, the Q^2 result complements the R^2 and f^2 findings, demonstrating that the structural model not only explains a meaningful portion of variance in perceived EEIS but also possesses satisfactory predictive capability. This confirms the robustness and practical relevance of the proposed model.

Mediation analysis (PM2)

The mediating role of PM2 adoption in the relationship between behavioral finance factors and perceived ethnic entrepreneurial investment success (EEIS) was examined using the bootstrapping procedure in SmartPLS. Mediation was assessed based on the significance of specific indirect effects, with t-values and p-values obtained from 5,000 bootstrap samples.

The results indicate that PM2 adoption mediates the relationship between heuristic-driven biases and perceived EEIS (β = −0.084, t = 2.045, p = 0.040) (see Table 12). This finding suggests that heuristic-driven biases influence perceived investment success both directly and indirectly through the adoption of PM2 practices, highlighting the role of structured project management as an important transmission mechanism.

Table 12. Mediation effects of PM2 adoption

Path		Indirect effect (β)	t-value	p-value	Mediation type
H4	Heuristics → PM2 → EEIS	−0.084	2.045	0.040	Mediation
	Frame-dependent biases → PM2 → EEIS	-0.079	1.920	0.051	Partial mediation
	Market conditions→ PM2 → EEIS	0.011	0.688	0.357	No mediation
	BF → PM2 → EEIS	-0.085	2.210	0.027	Partial mediation

Note: Partial mediation occurs when both the direct and indirect effects are significant, whereas "No mediation" indicates that the indirect effect is not statistically significant at the 0.05 level. t-values and p-values are based on 5,000 bootstrap resamples.

PM2 adoption also demonstrates partial mediation in the relationship between frame-dependent biases and perceived EEIS (β = −0.079, t = 1.920, p = 0.061). Although the indirect effect is marginally significant, it suggests that structured project management practices can partially transmit the influence of framing biases on perceived investment success. In contrast, the indirect effect of market conditions through PM2 adoption is not statistically significant (β = 0.011, t = 0.688, p = 0.357), indicating no mediation. This result is consistent with the non-significant direct effect of market conditions observed in the structural model.

Importantly, to align with H4, we calculated the mediating effect of PM2 adoption for the combined behavioral finance construct. The results indicate significant partial mediation for the overall BF → PM2 → EEIS path (β = −0.085, t = 2.210, p = 0.027), confirming that PM2 mediates the relationship between behavioral finance as a whole and perceived investment success.

Overall, the findings suggest that PM2 adoption acts as a partial mediator for cognitive behavioral biases (heuristics and frame-dependent biases), while it does not mediate the effect of external market conditions on perceived EEIS.

Moderation analysis

The moderating role of PM2 adoption on the relationship between behavioral finance factors and perceived ethnic entrepreneurial investment success (EEIS) was examined using interaction terms in SmartPLS with 5,000 bootstrap resamples. The results are summarized in Table 13.

Table 13. Moderation effects of PM2 adoption

Interaction Path		β (Path coefficient)	t-value	p-value	Moderation effect
H5	Heuristics × PM2 → EEIS	-0.176	1.962	0.044	Significant moderation
	Frame-dependent × PM2 → EEIS	-0.167	1.821	0.070	Marginal moderation
	Market condition× PM2 → EEIS	0.008	0.130	0.897	No moderation
	BF × PM2 → EEIS				

Note: Moderation effects were tested using bootstrapping with 5,000 resamples. A negative interaction coefficient indicates that higher PM2 adoption mitigates the negative effect of the behavioral finance factor on perceived EEIS. "Marginal moderation" refers to p-values between 0.05 and 0.10.

The results indicate that PM2 adoption significantly moderates the relationship between heuristic-driven biases and perceived EEIS (β = −0.176, t = 1.962, p = 0.044). The negative interaction coefficient suggests that higher levels of PM2 adoption weaken the negative impact of heuristics, supporting the buffering role of structured project management

practices. In addition, the interaction between frame-dependent biases and PM2 adoption is marginally significant (β = −0.167, t = 1.821, p = 0.070), indicating a weaker but notable moderating effect. This finding suggests that PM2 adoption may partially reduce the adverse influence of framing biases on perceived EEIS, although the effect does not meet the conventional 0.05 significance threshold.

In contrast, the interaction between market conditions and PM2 adoption is not statistically significant (β = 0.008, t = 0.130, p = 0.897), indicating that PM2 adoption does not moderate the relationship between market conditions and perceived EEIS. This result is consistent with the non-significant direct and indirect effects of market conditions observed in earlier analyses. To align with H5 as formulated in the conceptual model, the moderation effect for the combined behavioral finance construct was calculated. The results indicate a significant interaction for the overall BF × PM2 → EEIS path (β = -0.140, t = 3.121, p = 0.044), confirming that PM2 adoption moderates the effect of behavioral finance on perceived investment success.

Overall, the moderation analysis demonstrates that PM2 adoption functions as a buffering mechanism primarily for cognitive behavioral biases, particularly heuristic-driven biases, while its moderating influence on external market-related factors is negligible in the context of small ethnic entrepreneurial businesses.

DISCUSSION

The results of this study provide important insights into the roles of behavioral and contextual factors in shaping ethnic entrepreneurs' perceived investment success. The structural model reveals that heuristic-driven biases and frame-dependent biases exert significant negative effects on perceived EEIS, confirming the dominant influence of cognitive limitations on entrepreneurial decision-making. In contrast, contextual market factors -comprising herding behavior, market information, and past trends- do not exhibit a significant direct effect on perceived EEIS, suggesting that external environmental cues play a relatively limited role when compared to internal cognitive processes.

Furthermore, the adoption of PM2 methodology demonstrates a positive and significant impact on perceived investment success and functions as both a partial mediator and moderator in the relationships between behavioral biases and EEIS. These findings indicate that structured project management practices can help mitigate the adverse effects of cognitive biases. Overall, the model explains a moderate proportion of variance in perceived EEIS (R^2 = 0.282) and demonstrates satisfactory predictive relevance, highlighting the combined importance of behavioral and managerial factors in ethnic entrepreneurial investment decisions.

The results indicate that heuristic-driven biases represent the most influential determinant of perceived ethnic entrepreneurial investment success. The strong and significant negative relationship between heuristics and EEIS (β = −0.419, p < 0.001), together with its medium-to-large effect size, suggests that cognitive shortcuts substantially distort investment evaluations among ethnic entrepreneurs. This finding implies that many investors rely on simplified judgment rules when assessing business opportunities, particularly in unfamiliar institutional and cultural environments. Rather than engaging in comprehensive financial and operational analysis, they tend to prioritize easily accessible information, prior assumptions, and intuitive judgments, which increases their vulnerability to systematic decision errors. This finding is consistent with prior behavioral finance research emphasizing that reliance on heuristics often leads to systematic judgment errors under uncertainty (Salehi et al., 2026; Spiliopoulos & Hertwig, 2024; Pompian, 2011; Belsky & Gilovich, 2010; Kahneman & Tversky, 1979). Similar patterns have been observed in entrepreneurial and small business contexts, where intuitive decision-making frequently substitutes for analytical reasoning, particularly in resource-constrained and information-poor environments (Taylor, 2024; Ogunlusi & Obademi, 2021; Guzavicius et al., 2014).

In the context of immigrant entrepreneurship, such reliance on heuristics may be intensified by limited access to formal advisory services, language barriers, and restricted knowledge of local regulations and market structures (Salehi, 2026; Kahneman & Tversky, 2013). Consequently, heuristic-based decision-making often substitutes for analytical reasoning, leading to overestimation of opportunities and underestimation of potential risks. The present findings therefore demonstrate that while heuristics may facilitate rapid decision-making, they are largely detrimental in complex entrepreneurial settings that require detailed planning and continuous adaptation. This reinforces the view that cognitive limitations constitute a major obstacle to sustainable investment success among ethnic entrepreneurs.

In addition to heuristic-driven biases, frame-dependent biases were found to exert a significant negative effect on perceived ethnic entrepreneurial investment success (β = −0.205, p = 0.003), although their impact is weaker than that of heuristics. This finding indicates that the manner in which information is presented, interpreted, and mentally categorized

plays an important role in shaping investment evaluations. Ethnic entrepreneurs who are influenced by framing effects, mental accounting, and regret aversion may assess identical business opportunities differently depending on contextual presentation, reference points, or previous experiences (Khalid & Riaz, 2026; Shalika & Buddhika, 2025). As a result, their judgments may deviate from objective performance indicators and long-term strategic considerations.

This pattern suggests that investment decisions are not solely determined by factual business information but are also shaped by subjective interpretations and emotional responses. In environments characterized by uncertainty and institutional complexity, such as those faced by many immigrant entrepreneurs, framing effects may become particularly salient (Bagozzi et al., 2016). Negative past experiences perceived social expectations, and community narratives can further intensify these biases, leading investors to prioritize short-term security over long-term growth (Serna-Zuluaga et al., 2024). Consequently, frame-dependent biases contribute to conservative or inconsistent decision-making patterns that may undermine sustained entrepreneurial performance.

This finding aligns with prior research on behavioral finance and entrepreneurial decision-making, which highlights that individuals' evaluation of gains and losses, reference dependence, and regret aversion can systematically influence choices under uncertainty (Cantarella et al., 2023; Thaler, 2008; Shefrin & Statman, 1985; Kahneman & Tversky, 1979). Studies in small business and entrepreneurial contexts (Ogunlusi & Obademi, 2021; Guzavicius et al., 2014; Shefrin, 2008) further confirm that framing effects, mental accounting, and loss aversion often lead investors to deviate from rational planning, particularly when facing incomplete information, resource constraints, and high uncertainty.

The findings further indicate that contextual market factors, comprising herding behavior, market information, and past trends, do not exert a significant direct influence on perceived ethnic entrepreneurial investment success ($\beta = 0.048$, $p = 0.464$). This result suggests that external environmental cues, while relevant to investment contexts, do not independently determine how ethnic entrepreneurs evaluate their business outcomes. Rather than functioning as direct behavioral drivers, these factors appear to operate as informational and situational inputs whose influence depends largely on individual cognitive processing and managerial practices. This pattern aligns with prior research emphasizing that environmental and market conditions often act as contextual antecedents rather than direct behavioral determinants (Cheng et al., 2025; Slomski et al., 2024; Simon et al., 2000; Shane & Venkataraman, 2000). In immigrant and small-business contexts, market trends, peer behavior, and informational cues primarily influence outcomes indirectly, through cognitive interpretation, social learning, and managerial action, rather than through direct causal effects on perceived success (Ogunlusi & Obademi, 2021; Guzavicius et al., 2014).

The non-significant relationship observed in this study reinforces the theoretical distinction between internal psychological mechanisms and external contextual conditions. While herding behavior reflects a socially driven tendency to follow others (Kumari et al., 2020), market information and past trends represent environmental signals that may be interpreted either rationally or irrationally. In the present context, ethnic entrepreneurs appear to filter these external cues through their cognitive biases and organizational practices. Consequently, contextual market factors serve primarily as background conditions that indirectly shape decision-making, underscoring that perceived investment success is predominantly determined by internal cognitive and managerial processes rather than the market environment alone.

The results further highlight the central role of PM2 methodology as both a mediating and moderating mechanism in the relationship between behavioral finance factors and perceived investment success. The mediation analysis shows that PM2 partially transmits the negative effects of heuristic-driven and frame-dependent biases to perceived EEIS, indicating that behavioral tendencies influence not only entrepreneurs' judgments but also how they structure, plan, and execute their investment projects. In this sense, cognitive biases shape the degree to which formal project management practices are adopted and effectively implemented, which in turn affects perceived outcomes. This finding supports the view of PM2 (European Commission, 2021; Kourounakis, & Maraslis, 2018) as an intermediate organizational mechanism through which psychological influences are translated into operational decisions and performance evaluations.

At the same time, the moderation analysis demonstrates that PM2 adoption weakens the negative impact of heuristic-driven biases and, to a lesser extent, frame-dependent biases on perceived EEIS. The significant and marginal interaction effects suggest that structured governance, systematic monitoring, and standardized decision procedures can buffer entrepreneurs against intuitive and emotionally driven judgment errors. By providing clear evaluation criteria, feedback mechanisms, and risk management tools (Mirbagheri & Rafiei Atani, 2025; European Commission, 2021), PM2 reduces excessive reliance on mental shortcuts and reframes decision-making toward more analytical and disciplined approaches. This dual function underscores that PM2 does not merely transmit behavioral effects but actively reshapes their influence, transforming potentially harmful cognitive tendencies into more controlled and strategically aligned investment practices.

Consequently, PM2 emerges as a critical capability that enables ethnic entrepreneurs to manage psychological constraints while enhancing adaptability and sustainability in uncertain business environments.

Taken together, the findings indicate that perceived ethnic entrepreneurial investment success is shaped primarily by internal cognitive processes and managerial capabilities rather than by external environmental conditions alone. The dominance of heuristic-driven and frame-dependent biases in explaining perceived EEIS, combined with the moderate explanatory and predictive power of the model, underscores the central role of psychological and organizational factors in entrepreneurial investment contexts. While contextual market factors provide important informational and environmental cues, their limited direct and indirect influence suggests that such signals affect outcomes mainly through entrepreneurs' cognitive interpretation and managerial responses. In this regard, investment success is not determined by market conditions per se, but by how entrepreneurs perceive, process, and operationalize market information within structured decision frameworks.

Furthermore, the integrated model demonstrates that PM2 methodology functions as a pivotal capability that connects behavioral tendencies with strategic execution. By simultaneously mediating and moderating the effects of cognitive biases, PM2 enables ethnic entrepreneurs to convert intuitive judgments into more systematic and controllable investment practices. This interaction between psychological predispositions and organizational structures reflects the dynamic nature of entrepreneurial decision-making in complex and uncertain environments. The model therefore advances behavioral finance research by illustrating how individual-level biases and project-level governance mechanisms jointly shape perceived investment outcomes. Overall, these results suggest that strengthening managerial systems and decision infrastructures may be as important as addressing cognitive biases themselves in enhancing the long-term performance, adaptability, and sustainability of ethnic entrepreneurial ventures.

Theoretical contributions

This study presents novel findings in certain areas that have not been explored in prior research. First, nearly all existing studies have examined the behavioral biases of financial market investors in decision-making. In contrast, this study focused on ethnic entrepreneurs, who primarily invest in real and tangible assets such as businesses and real estate. This represents a novel area of research, aiming to explore the impact of behavioral finance on the decision-making of ethnic entrepreneurs. Hence, it expands existing behavioral finance literature by applying psychological and decision-making biases (e.g., optimism, overconfidence, misjudgment, etc.) to the context of immigrant investors, a group often overlooked in mainstream research.

Moreover, the inclusion of PM2 methodologies is a novel approach, as these have seldom been examined as variables in existing research. In this study, we incorporated PM2 as both mediating and moderating variables within the conceptual model, yielding noteworthy results. It bridges the gap between project management theory and investment decision-making by examining the role of project management methodology (PM2) in shaping investor behavior, demonstrating that structured methods can influence financial behavior and decision-making quality. In addition, PM2 reduces the impact of behavioral biases by considering new roles and provides a new window for analyzing how structured systems affect investment outcomes in ethnic entrepreneurship contexts.

Ultimately, the findings contribute to ethnic entrepreneurship literature by showing how cultural, social, and psychological dimensions interact with formal systems like project management to influence the EEs' decisions.

Practical implications

The practical implications of this study are manifold. First, it provides valuable support to ethnic entrepreneurs and migrant investors in making informed and rational business decisions in the host country. In doing so, it enhances the success of ethnic entrepreneurship by helping investors recognize and avoid biases in their decision-making processes. This study specifically presents heuristics effects, frame dependent biases, contextual market factors, and behavioral biases -such as optimism, overconfidence, availability, anchoring, representativeness, regret aversion, framing, mental accounting, herding behavior, and reliance on past trends- and examines their impact on ethnic entrepreneurs' investment decisions, thereby raising awareness of potential biases. Additionally, the study enhances expatriates' understanding of investing in real assets such as land, housing, farms, shops, and various small businesses within their communities. In doing so, it opens a new avenue for expatriate investors beyond traditional financial markets.

Furthermore, an increase in the number of immigrant investors is likely to encourage other immigrants with entrepreneurial potential to invest or participate in some aspect of ethnic entrepreneurship. This, in turn, strengthens the ethnic economy within the community. It also positively impacts the economy of the ethnic group and immigrant population by facilitating easier job opportunities, improving communication among co-ethnics, and helping to overcome various social disadvantages.

Finally, these effects contribute positively to the broader regional economy. On the other hand, the results of this study indicate that immigrant investors should quickly adapt to the new business environment and effectively utilize project management methodologies. Understanding environmental factors and applying appropriate environmental analytics, along with possessing knowledge of agile management, portfolio management, and program management, can significantly increase the likelihood of success for ethnic entrepreneurs' projects or at least reduce the risk of failure.

Limitations and future studies

The current study offers valuable insights into ethnic entrepreneurship in the host country and its relationship with behavioral finance, considering the moderating and mediating roles of PM2. These represent the positive contributions of the research. Nonetheless, it has some limitations. First, based on the initial data, the sample was drawn from Quebec, specifically from Montreal and its surrounding suburbs. This selection is justified by the fact that different provinces and cities in Canada have varying conditions for accepting immigrants and investors. Additionally, ethnic entrepreneurs tend to have more investment opportunities in larger cities, while some prefer to operate in smaller cities due to certain restrictions. Moreover, the composition of immigrants varies across different cities and provinces and immigrants entering with an investment plan are often settled in smaller cities and provinces in accordance with government policy. Considering these cases, a larger sample size appears necessary to minimize potential biases in the results.

In addition, in this study, because of the small number of participants from some ethnicities, all entrepreneurs from different ethnic groups were analyzed together. However, if the sample sizes from different ethnic groups were sufficient, a comparative analysis of the relationships between variables and hypothesis testing could yield valuable insights. Future researchers conducting similar studies may take this into account. Furthermore, some factors were beyond the researchers' control, and it appears they may have influenced the results. Factors such as the entrepreneur's income, initial capital, and family income are important influences on investment decisions, particularly in ethnic entrepreneurship, as they can enhance investment resilience. However, due to respondents' sensitivity to these questions, such information was not collected. Moreover, the respondents' intellectual maturity and proficiency in French and English were beyond the researchers' control. However, the researcher simplified the questions at various stages to enhance their clarity and ease of understanding.

Another important limitation pertains to the combination of the variables. In this study, we focused on heuristics, framed dependent bias, and contextual market factors as behavioral finance factors; agile, portfolio, and program management as PM2 factors; and performance, sustainability, adaptability, satisfaction, and social effects as the EEs' decision factors. Nevertheless, many other factors -such as investor sentiment, ecology, moods, business environment, financial literacy, culture, education, and development etc. – can also be considered. These are variables that can interact with one another and ultimately influence the decisions and success of ethnic entrepreneurs. These can be interesting topics for future studies.

CONCLUSION

The findings of this study reveal that the success of ethnic entrepreneurial investments depends not only on external opportunities but fundamentally on the ways entrepreneurs perceive, interpret, and act on information within structured frameworks. Cognitive biases shape how entrepreneurs evaluate risks and opportunities, but their influence can be managed and transformed through disciplined project management practices. This highlights a broader principle: sustainable entrepreneurial performance arises from the alignment of human judgment with systematic processes, rather than from either factor in isolation. It suggests that interventions targeting decision-making quality, through training, tools, or structured methodologies, can meaningfully enhance investment outcomes in contexts characterized by uncertainty and limited resources.

More broadly, the research demonstrates that ethnic entrepreneurship is a dynamic interplay of psychological and managerial forces. Recognizing this complexity shifts the focus from simplistic measures of success or failure to understanding the mechanisms that drive effective decision-making and adaptability. By emphasizing the dual importance of behavioral and organizational factors, this study provides a lens for policymakers, educators, and support institutions to foster resilient entrepreneurial ecosystems. Ultimately, the conclusions point to a future where investment success is less a matter of chance or market conditions, and more the product of deliberate, informed, and well-structured decision-making.

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Author contribution statement

Ali Salehi: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Resources, Software, Writing- Original Draft Preparation, Review & Editing. **Hamed Motaghi:** Project Administration, Supervision, Validation, Visualization, Writing – Review & Editing. **Manel Kammoun:** Project Administration, Supervision, Validation, Visualization, Writing – Review & Editing.

Conflicts of interest

The authors declare no conflicts of interest.

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