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How Behavioral Biases Shape Career Choices of Students: A Two-Stage PLS-ANN Approach

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Abstract

Career decisions are among the most consequential choices individuals make, profoundly shaping their long-term stability and overall life satisfaction. The literature suggests that behavioral biases, specifically overconfidence, herd mentality, social comparison, status quo bias, and optimism bias, can exert considerable influence on these decisions, thereby shaping students' future career trajectories. This study adopts a behavioral perspective to examine how these biases influence career choices within a collectivist social context. A survey of 360 undergraduate and graduate business students was conducted. The collected data were analyzed using an integrated approach that combines Partial Least Squares Structural Equation Modeling (PLS-SEM) and Artificial Neural Networks (ANN), enabling the use of both linear and non-linear methods to analyze the relationship between cognitive biases and career choices. Our findings reveal that while all five biases have a measurable impact, status quo bias and social comparison are the dominant factors influencing students' career decisions. These results underscore the need for interventions that foster self-awareness, independent decision-making, and critical thinking. Such insights can guide educators, career counselors, and policymakers in designing programs to mitigate the negative effects of cognitive biases on career decision-making, ultimately enhancing career satisfaction and workforce efficiency.

Keywords: behavior economics; behavioral biases; career decision-making; business students; PLS-ANN; collectivist society; Nepal

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1. Introduction

Choosing a career represents a pivotal life decision, profoundly shaping an individual's financial stability, personal fulfillment, and overall well-being (Hilton, 1962; Bimrose & Mulvey, 2015; Kvaskova et al., 2022). For business graduates, this process is particularly intricate, as they navigate a competitive and rapidly evolving job market. This market is continuously reshaped by technological advancements, increasing globalization, and shifting industry demands. Beyond traditional corporate roles, entrepreneurship is increasingly recognized as a vital career option, particularly in developing economies, necessitating a deeper understanding of the psychological constructs that drive students towards such paths (Kakouris et al., 2024). Successfully transitioning from student life to the professional world necessitates careful consideration of various factors, including

personal strengths, prevailing job market trends, long-term career prospects, and financial security (Garcia-Aracil et al., 2018; Reitz et al., 2014; van der Horst et al., 2021).

Traditional career theories suggest that individuals make career decisions through a rational evaluation of their skills, interests, and available opportunities (Sullivan & Baruch, 2009). However, an expanding body of research challenges this view, indicating that career choices are often influenced by factors beyond pure rationality. Behavioral biases and psychological predispositions frequently shape decision-making, leading individuals to deviate from strictly logical considerations (Tversky & Kahneman, 1974; Samuelson & Zeckhauser, 1988). Insights from behavioral economics and psychology reveal that cognitive biases such as overconfidence, social comparison, and status quo bias can significantly influence career decision-making (Nosek et al., 2002; Gigerenzer, 2018).

Business students often operate in competitive environments where peer expectations, job prestige, and perceived stability, amplified by herd mentality and optimism bias, overshadow critical self-assessment. These dynamics can lead to decisions based on external perceptions rather than personal alignment, resulting in either initial job satisfaction or later regret and dissatisfaction (Judge et al., 2005). Suboptimal career choices not only compromise individual fulfillment and mental well-being but also affect organizations through lower productivity, higher turnover rates, and broader inefficiencies in the job market (Holland, 1997; Savickas, 2013; Coetzee & Stoltz, 2015).

The relevance of such biases is particularly acute in Nepal's high-stakes environment. The Nepalese labor market is characterized by a pronounced mismatch between job demand and supply, set against a youthful demographic where approximately 40% of the population is under 24 years of age (Central Bureau of Statistics, 2024). This demographic dividend, coupled with increasing educational attainment, paradoxically exacerbates challenges such as brain drain, underemployment, and widespread skill mismatches across key sectors including finance, information technology, tourism, and public services (Danish Trade Union Development Agency, 2023; Sharma, 2024). These economic pressures are compounded by the collectivist nature of Nepalese society, where strong familial and social expectations often compel graduates to pursue socially esteemed or high-paying professions, regardless of personal interest or strengths (see Markus & Kitayama, 1991; Gautam et al., 2005). Rooted in cultural norms that prioritize family obligation and group harmony over individual agency, these dynamics amplify specific behavioral biases. For instance, a pronounced herd mentality may lead students toward careers that are visibly popular among peers, while social comparison may drive them to emulate the paths of successful relatives, even if misaligned with their own capabilities (Banerjee, 1992; Akerlof, 1997; Bandura, 2001; Savickas, 2005).

Recent studies have emphasized the nuanced interaction between individual cognition and socio-cultural context in shaping career decisions (Lent et al., 1994; Lent & Brown, 2013; Rogers et al., 2008; Kulcsár et al., 2020; Ayob et al., 2022). Both internal processes (e.g., self-efficacy, outcome expectations) and external factors (e.g., cultural values, social norms) play critical roles in determining students' career intentions, including entrepreneurial aspirations (Kakouris et al., 2024). Students also often rely on moral or social justifications when choosing industries or roles (Hannah et al., 2018). These dynamics indicate that behavioral biases do not operate in isolation but are embedded within broader socio-cultural frameworks (Nisbett et al., 2001). Another important dimension involves students' rationalization of career decisions, especially when choosing fields that, while financially secure, may carry social stigma. In such cases, individuals may experience internal conflict and seek to reduce cognitive dissonance by appealing to optimism bias or status quo bias (Ruthig et al., 2007). In Nepal, where economic pressures are high and social narratives strongly influence choices, such rationalization may be widespread.

This study, therefore, aims to empirically examine how such biases influence career decisions among Nepalese business students. It is among the first to explore how these cognitive patterns are shaped and reinforced by prevailing cultural frameworks, potentially revealing culture-specific decision-making mechanisms in the Nepalese context. Findings from this research can help inform policies that promote better alignment between student preferences and labor market needs, whether by shifting societal perceptions or incentivizing less popular yet economically vital sectors. Without such evidence-based interventions, attempts to improve youth employment outcomes may fall short. This study therefore serves as a foundational contribution to Nepal's educational and economic development discourse.

The remainder of this paper is structured as follows. Section 2 presents the literature review and develops the hypotheses. Section 3 describes the research methodology. Section 4 presents an empirical analysis and implications of the findings. Section 5 concludes the paper with limitations of the study.

2. Literature Review and Hypotheses

This section provides a comprehensive review of the theoretical foundations underpinning career decision-making, transitioning from traditional psychological and economic models to a more nuanced behavioral perspective that accounts for cognitive biases. It culminates in the integration of these two perspectives and the formulation of specific hypotheses for this study.

2.1. Theoretical Foundations of Career Decision-Making

Career decision-making is a multifaceted and evolving process influenced by a complex interplay of individual, social, economic, and environmental factors (McMahon & Arthur, 2018; Gati et al., 2019). Traditional career theories offer foundational perspectives to understand how individuals navigate this process. These theories can be broadly categorized into economic, social-psychological, and developmental frameworks, each providing distinct lenses through which to understand career choices.

2.1.1. Economic Perspectives on Career Choice

Economic theories primarily emphasize rational decision-making driven by the maximization of expected earnings. These models often assume that individuals act as rational agents, meticulously evaluating options to achieve optimal outcomes. Becker's (1964) Human Capital Theory postulates that individuals invest in education and skill development based on expected financial returns, leading them to pursue careers offering high earning potential, job stability, and low entry barriers. Therefore, career choice is viewed fundamentally as an investment decision, where individuals carefully weigh the costs associated with education and training against the potential economic rewards they anticipate receiving. The basic premise of this approach is that individuals make rational decisions based on a clear, objective cost–benefit analysis to maximize utility (Becker, 1964; Tan, 2014). Rosen (1981) further elaborated on this, arguing that professions with disproportionately high earnings, such as medicine, law, and technology, attract more talent despite intense competition due to the anticipated economic returns in these fields, which are perceived to justify the associated risks and costs, reinforcing the view of career choice as a calculated economic endeavor.

2.1.2. Social-Psychological Theories of Career Choice

In contrast to purely economic models, social and psychological theories place a greater emphasis on the intricate roles of personality, motivation, and contextual influences in shaping career decisions (Roe, 1956; Holland, 1959; Lent et al., 2002). These theories intro-

duce subjective internal states and dynamic interactions with the environment, indicating that career choice is not merely driven by external rewards; it also entails achieving internal alignment and psychological satisfaction (Deci & Ryan, 1985; Jiang, 2015). This added layer of complexity provides more avenues through which cognitive biases can exert influence, not just on objective calculations, but on self-perception, motivation, and the interpretation of environmental cues.

Holland's (1959, 1997) Theory of Vocational Choice posits that individuals are more satisfied and successful in environments that match their personality type. The theory is built on six personality categories—Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC)—each associated with compatible work environments. Career fulfillment is maximized when individuals choose paths that align with their intrinsic interests and values, interact with like-minded peers, and utilize their preferred skills (Nauta, 2010).

The Social Cognitive Career Theory (SCCT), developed by Lent et al. (1994), offers an integrative framework that considers the dynamic interplay of personal, behavioral, and environmental factors. Its core constructs include self-efficacy beliefs (an individual's confidence in their ability to perform tasks), outcome expectations (beliefs about the potential results of actions), and personal goals. SCCT underscores how contextual supports and barriers, such as mentorship, discrimination, or financial limitations, mediate the transition from interest to action. This framework is particularly relevant when considering entrepreneurial aspirations, where psychological constructs like self-efficacy and outcome expectations are crucial in shaping a student's decision to pursue entrepreneurship as a viable career option (Kakouris et al., 2024). Zhou et al. (2024) also suggest that social support enhances career decision outcomes indirectly, mediated sequentially by psychological capital and self-efficacy.

Complementing these models, Self-Determination Theory (SDT) by Deci and Ryan (1985, 2000) addresses the motivational dynamics underlying career behavior. SDT posits that human behavior is driven by the fundamental need to satisfy three core psychological needs: autonomy (a sense of volition and choice), competence (feeling effective and capable), and relatedness (a sense of connection to others). When these needs are fulfilled, individuals are intrinsically motivated, leading them to pursue personally meaningful and fulfilling careers (Ryan & Deci, 2017).

2.1.3. Developmental Models of Career Trajectories

Complementing the aforementioned models, developmental theories emphasize that career decisions are not isolated, one-time events but rather processes that unfold and evolve across an individual's lifespan (McMahon & Arthur, 2018). This perspective underscores the role of time, experience, and identity construction in shaping career choices.

Super's (1953, 1990) career development theory views career development as a continuous process of implementing an evolving self-concept, which is continually shaped by life experiences (Hartung, 2013). This perspective highlights the critical roles of time, diverse experiences, and ongoing identity construction in shaping occupational choices. Similarly, Gottfredson's (1981) Theory of Circumscription and Compromise illustrates how children and adolescents progressively eliminate and narrow down career options. This narrowing is based on factors such as perceived social prestige, gender roles, and personal compatibility. According to this model, early life experiences play a pivotal role in shaping future aspirations and perceived opportunities. Furthermore, Savickas's (1997, 2005) Career Construction Theory argue that individuals build meaning and impose personal narratives onto their vocational behaviors and experiences, rather than passively fitting into predefined occupational roles. Central to this theory is the concept of life themes derived from

one's experiences, values, and relationships, which individuals use to construct their career identity, interpreting their past, present, and future career possibilities.

Across these diverse theoretical frameworks, a consistent theme emerges: career decision-making is inherently both personal and contextual. Theories such as Holland's typology, SCCT's interactive triad of person-behavior-environment, and SDT's emphasis on psychological needs all underscore the importance of aligning individual attributes with external conditions. These theories converge on the premise that students' career choices are most adaptive when supported by environments that foster exploration, provide realistic feedback, and accommodate evolving identities.

Table 1 provides a summary of these key career decision-making theories, highlighting their core tenets and primary focus.

Table 1. Summary of key career decision-making theories.

Theory Name	Key Proponent(s)	Core Tenet(s)	Primary Focus
Human Capital Theory	Becker (1964)	Individuals invest in education/skills to maximize future earnings.	Rational economic returns
Holland's Theory of Vocational Choice	Holland (1959, 1997)	Career satisfaction/success from matching personality type to work environment (RIASEC).	Person-environment fit
Social Cognitive Career Theory (SCCT)	Lent et al. (1994)	Interplay of self-efficacy, outcome expectations, and personal goals, mediated by context.	Self-efficacy and context
Self-Determination Theory (SDT)	Deci and Ryan (1985, 2000)	Behavior driven by needs for autonomy, competence, and relatedness.	Psychological needs
Super's Life-Span, Life-Space Theory	Super (1953, 1990)	Career development as implementing an evolving self-concept over time.	Self-concept development
Gottfredson's Theory of Circumscription and Compromise	Gottfredson (1981)	Progressive elimination of career options based on social prestige, gender roles, and compatibility.	Occupational narrowing
Savickas's Career Construction Theory	Savickas (1997, 2005, 2013)	Career is actively built through subjective meaning-making.	Personal narrative

2.2. Behavioral Perspectives

While traditional career theories often emphasize rational planning, personality-environment fit, and contextual influences, a growing body of literature highlights that individuals do not consistently make career decisions based on objective evaluation or unwavering logic. Instead, they frequently rely on cognitive shortcuts, known as heuristics, which can introduce systematic biases into the decision-making process (Tversky & Kahneman, 1974). This behavioral perspective represents a significant paradigm shift from normative models of rational choice to descriptive models that acknowledge the inherent limitations of human cognition, especially under conditions of uncertainty.

2.2.1. Bounded Rationality and Heuristic Processing

At the core of this behavioral shift is the concept of bounded rationality (Simon, 1955, 1956), which posits that decision-making is constrained by limited cognitive resources, time pressures, and incomplete information. In the context of career decisions, particularly for students who often possess limited life experience and exposure to the complexities of the

job market, such constraints are especially salient. Students may lack the necessary knowledge, self-awareness, or evaluative tools to comprehensively process intricate information about career options, labor market dynamics, or their own capabilities. Consequently, they frequently resort to heuristics, which, while efficient, are prone to systematic errors (Gigerenzer & Gaissmaier, 2011). This reliance on heuristics is not merely a flaw but often a necessary coping mechanism for navigating overwhelming information and uncertainty, particularly for students given their developmental stage and lack of experience. This understanding shifts the perspective from viewing biases as purely negative to recognizing them as inherent, albeit sometimes problematic, features of human cognition in real-world decision contexts.

2.2.2. The Influence of Prospect Theory

Prospect Theory, proposed by Kahneman and Tversky (1979), further elucidates how individuals evaluate potential losses and gains not in absolute terms, but relative to a specific reference point. The theory also reveals a tendency for individuals to overweigh certain types of information, particularly emotional, social, or vividly presented cues, while often neglecting objective base rates or probabilistic reasoning. This phenomenon has direct and profound implications for students making high-stakes career decisions, which are often compounded by significant social pressure and emotional uncertainty.

The tendency to overweight emotional, social, or vividly presented cues provides a deeper mechanism for why certain biases manifest. It explains how biases such as herd mentality, driven by social cues, or optimism bias, driven by emotional cues, can arise. This suggests that students systematically prioritize certain types of information that are more emotionally resonant or socially salient, even if they are less objectively rational. This causal link transforms the observation of biases into an understanding of their underlying cognitive processing.

2.2.3. Social Learning and Conformity in Career Choices

One of the most pervasive heuristics in the career decision-making context is social learning through observation. Students frequently observe and emulate the choices of their peers, often leading to herd behavior (Bikhchandani et al., 1992). When confronted with ambiguous choices, individuals tend to follow the majority or those perceived as successful, rather than engaging in independent, critical assessment. This behavior is further reinforced by social comparison processes (Festinger, 1954), where students benchmark their aspirations and self-worth against those of others within their immediate social environment.

These phenomena highlight that biases are not solely individual cognitive errors but can be socially transmitted and amplified within a group. Herd behavior and social comparison suggest a mechanism for spillover or contagion where suboptimal career choices made by a few can spread through a student population, leading to collective deviations from individual optimal paths. This implies that interventions aimed at improving career decisions need to consider not just individual cognition but also the social dynamics that perpetuate biased decision-making.

These cognitive biases are not merely isolated flaws in reasoning but represent systematic tendencies that can have profound and lasting implications on career paths. The literature indicates that biases such as overconfidence, herd mentality, status quo preference, social comparison, and optimism bias are particularly salient in educational and career decision-making contexts (Kruger & Dunning, 1999). Each of these biases distorts information processing and can lead to suboptimal career choices that do not genuinely align with an individual's true interests, abilities, or long-term goals. Importantly, these cognitive

biases interact dynamically with foundational career theories. For instance, overconfidence can artificially inflate self-efficacy beliefs as posited in SCCT, while herd mentality may undermine the autonomy essential to SDT. This interplay suggests that even when students have access to accurate information and rational models of career development, their decisions may still be systematically skewed by underlying cognitive tendencies. To better understand these behavioral underpinnings of student career choices, this study specifically focuses on five cognitive biases: overconfidence bias, herd mentality, social comparison, status quo bias, and optimism bias, which encompass individual misjudgments, social influence effects, and decision inertia. The subsequent section provides a detailed discussion of each bias and formulates corresponding hypotheses.

2.3. Specific Cognitive Biases and Hypotheses

This section defines five specific cognitive biases identified as particularly influential in educational and career contexts, detailing their manifestations and proposing hypotheses for their impact on business graduates' career decisions.

2.3.1. Overconfidence Bias

Overconfidence bias refers to an individual's systematic overestimation of their knowledge, ability, or control over outcomes (Moore & Healy, 2008). It manifests in three forms: overestimation (believing one's performance is better than it actually is), overplacement (believing one is better than others), and overprecision (unwarranted certainty in the accuracy of one's beliefs or predictions). In educational and career contexts, overconfidence can lead students to misjudge their preparedness for demanding career paths or overrate their qualifications in competitive job markets (Santos-Pinto & de la Rosa, 2020). In a collectivist society like Nepal, individuals often pursue socially valued careers based on inflated self-beliefs and external pressures, with limited opportunities for feedback or course correction (Markus & Kitayama, 1991; Triandis, 1995).

This bias is frequently reinforced by self-serving attribution, where successes are attributed internally and failures externally, and by illusory superiority, the tendency to rate oneself as above average (Dunning et al., 2004). Students with an enterprising personality type may be more prone to overconfidence or optimism bias. Similarly, overconfidence bias can artificially inflate self-efficacy beliefs, leading students to pursue paths beyond their actual skillset. The literature suggests that elevated levels of confidence among students, particularly in business-related disciplines, are often disproportionate to actual ability (Kruger & Dunning, 1999). Such miscalibration can result in inadequate preparation, unrealistic career aspirations, or significant disappointment during job application processes (Alicke & Govorun, 2005; Kahneman, 2011). This creates a paradox: while some confidence is beneficial for motivation, an overestimation of one's capabilities can undermine the very competence required for success. This suggests a causal chain where an initial overconfidence leads to poor preparation, which then leads to rejection or disappointment.

Hypothesis 1 (H1). *Overconfidence bias significantly influences the career decisions of business graduates.*

2.3.2. Herd Mentality

Herd mentality describes the tendency of individuals to conform to the choices and behaviors of a group, often without engaging in independent critical assessment (Banerjee, 1992). It is particularly prevalent in adolescence and early adulthood, where peer validation and the strong desire for belonging significantly shape decision-making. In career contexts, students may opt for popular majors or professions not due to intrinsic interest, but because these options are perceived as socially respectable or widely pursued by their peers (Bikhchandani et al., 1998; Kniveton, 2004; Raafat et al., 2009).

Key drivers of herd behavior include the Fear of Missing Out (FOMO), reliance on conventional wisdom, and the comfort derived from normative conformity (Asch, 1951; Cialdini & Goldstein, 2004). While conformity may mitigate anxiety in uncertain situations, it can also lead to career choices that are misaligned with personal interests, resulting in academic disengagement or dissatisfaction (Howard et al., 2011). Stronger peer attachment has been shown to significantly affect career aspirations, with greater group identification correlating with increased conformity (Ryan & Deci, 2000). Therefore, individuals with a social personality type may be more susceptible to herd mentality (Nauta, 2010). This reveals a crucial trade-off: individuals gain social comfort and reduce decision anxiety by following the herd, but potentially at the cost of personal fulfillment and long-term career satisfaction. Furthermore, this behavior can lead to overcrowding in certain job fields, making it harder for both job seekers and employers (Scharfstein & Stein, 2000; Zhang & Liu, 2012). This highlights a deeper conflict between social needs and individual authenticity in career decision-making.

Hypothesis 2 (H2). *Herd mentality significantly influences the career decisions of business graduates.*

2.3.3. Social Comparison Bias

Social comparison theory, introduced by Festinger (1954), posits that individuals evaluate their abilities and opinions by comparing themselves to others, especially in the absence of objective benchmarks. This process can involve both upward comparisons (with those perceived as superior) and downward comparisons (with those perceived as inferior), depending on the motivation for self-evaluation or self-enhancement (Wood, 1989). Individuals with a social personality type may be more susceptible to social comparison, prioritizing socially endorsed or peer-popular career paths over their intrinsic interests (Nauta, 2010; Keere & Burchartz, 2025). Also, the social comparison bias may undermine individual autonomy, as students often gauge the desirability of specific paths or assess their own potential by observing the trajectories of their peers (Rosenbaum, 2001), and such bias can be strong, especially in collectivist societies (White & Lehman, 2005; Baldwin & Mussweiler, 2018).

While such comparisons can serve as a motivator for self-improvement, they may also generate anxiety, regret, or diminish decision certainty, particularly when perceived performance lags behind that of peers (Buunk & Gibbons, 2007). The literature indicates that social comparison negatively predicts career choice certainty and can contribute to conformity-based decision-making (Lee et al., 2015). This implies that while comparison is a natural human process, its unregulated or excessive application can become a cognitive bias that destabilizes an individual's confidence and autonomy in career choice, rather than fostering growth (Festinger, 1954; Buunk & Gibbons, 2007). The key concern lies in the outcome of the comparison process.

Hypothesis 3 (H3). *Social comparison significantly influences the career decisions of business graduates.*

2.3.4. Status Quo Bias

Status quo bias refers to a cognitive preference for maintaining current states over initiating change, even when demonstrably better alternatives exist (Samuelson & Zeckhauser, 1988). This bias is fueled by cognitive inertia (resistance to processing new information), loss aversion (the tendency to weigh potential losses more heavily than equivalent gains), and a general comfort with familiarity (Kahneman et al., 1991). Among students, status quo bias may manifest as a reluctance to change majors or explore unfamiliar career paths, even when their current trajectory is misaligned with their interests or strengths. For instance, many students may choose traditional corporate jobs simply because they are comfortable

with familiar work structures, even when better opportunities exist in emerging industries (Anderson, 2003; Dean et al., 2017). It is particularly prominent when students face an overwhelming array of options or harbor a fear of the uncertainty associated with new directions. Consequently, many persist in career choices based on initial convenience or prevailing social norms, thereby foregoing opportunities for more meaningful alignment (Polman, 2012), thereby prematurely narrowing the "zone of acceptable alternative" as outlined in Gottfredson (1981). Furthermore, status quo bias may hinder the exploration of alternative learning experiences, thereby limiting the development of robust career interests and goals (Bandura, 1986; Lent et al., 1994). Kakouris et al. (2024) argue that career decisions (both employment and entrepreneurial) are influenced by psychological constructs and the intention to engage in entrepreneurship. Status quo bias may be more problematic in collectivist societies because individuals often prioritize maintaining social harmony and meeting family or group expectations, making them more likely to stick with familiar or traditionally valued career paths (Kim & Drolet, 2003).

This bias highlights that inaction, or maintaining the current state, is not a neutral choice but an active preference driven by specific cognitive mechanisms. The hidden cost in this scenario is the foregone opportunity for better alignment or fulfillment, suggesting that students might be passively making suboptimal choices by simply not changing course, rather than actively choosing a poor fit.

Hypothesis 4 (H4). *Status quo bias significantly influences the career decisions of business graduates.*

2.3.5. Optimism Bias

Optimism bias refers to the tendency of individuals to overestimate the likelihood of positive outcomes and simultaneously underestimate the probability of negative ones (Weinstein, 1980). This bias can lead students to overlook potential challenges in their chosen fields, underestimate the intensity of competition, or neglect the necessity for rigorous preparation (Lovallo & Kahneman, 2003; Shepperd et al., 2013). The optimism bias can also distort outcome expectations, fostering unrealistic assumptions about career success in the SCCT framework. While a certain degree of optimism can foster motivation and resilience (Carver & Scheier, 2014), excessive optimism can result in overcommitment to poorly suited paths, delayed contingency planning, and eventual disillusionment when expectations are unmet (Jefferson et al., 2017). Optimism bias is also closely linked to the planning fallacy, where individuals misjudge the time required for tasks or the difficulty of achieving goals (Buehler et al., 1994).

Optimism bias can be particularly problematic in collectivist societies when career decisions are driven by social expectations rather than personal capabilities, leading individuals to underestimate potential barriers in prestigious or group-valued career paths (Chang et al., 2003). In individualist cultures, optimism bias may still occur, but the emphasis on personal agency and self-assessment may promote more realistic evaluations of one's career prospects (Heine & Hamamura, 2007). The literature suggests that collectivist norms often encourage socially desirable optimism, which can reinforce unrealistic career expectations and reduce openness to feedback or change (Chang et al., 2003; Heine & Hamamura, 2007).

Hypothesis 5 (H5). *Optimism bias significantly influences the career decisions of business graduates.*

Figure 1 depicts the conceptual framework of cognitive biases and career decision-making, while Table 2 summarizes these five cognitive biases, their characteristics, and their specific manifestations within the career decision-making context, alongside their corresponding hypotheses.

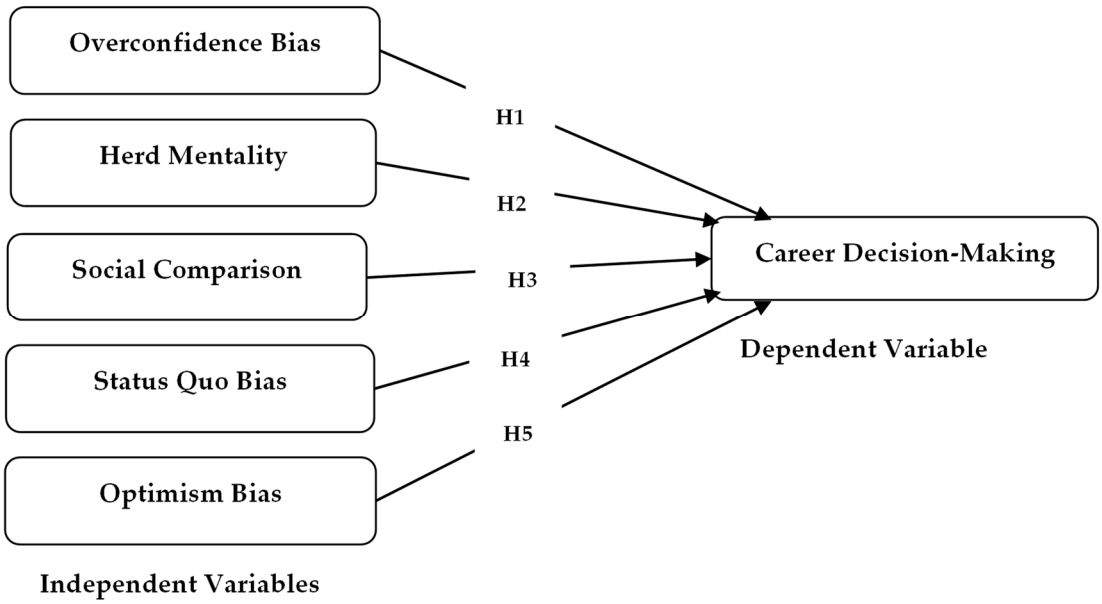

Figure 1. Conceptual framework.

Table 2. Cognitive biases and their manifestations in career decision-making.

Bias	Definition	Key Characteristics	Manifestation in Career Context	Corresponding Hypothesis
Overconfidence Bias	Systematic overestimation of knowledge, ability, or control over outcomes.	Overestimation, Overplacement, Overprecision, Self-serving attribution, Illusory superiority	Misjudging preparedness, overrating qualifications, leading to poor preparation or unrealistic aspirations.	H1
Herd Mentality	Tendency to conform to group choices without independent critical assessment.	Fear of Missing Out (FOMO), Conventional wisdom, Normative conformity	Choosing popular majors/professions based on social perception rather than intrinsic interest.	H2
Social Comparison Bias	Evaluating abilities/opinions by comparing oneself to others, especially without objective benchmarks.	Upward/Downward comparisons	Gauging the desirability of paths or own potential by observing peers, leading to anxiety or reduced certainty.	H3
Status Quo Bias	Cognitive preference for maintaining current states over change, even when better alternatives exist.	Cognitive inertia, Loss aversion, Comfort with familiarity	Resistance to changing majors or exploring unfamiliar paths, even when misaligned with interests.	H4

Table 2. *Cont.*

Bias	Definition	Key Characteristics	Manifestation in Career Context	Corresponding Hypothesis
Optimism Bias	Tendency to overestimate positive outcomes and underestimate negative ones.	Overlooking challenges, Underestimating competition, Planning fallacy	Overcommitment to poorly suited paths, delayed contingency planning, and eventual disillusionment.	H5

3. Research Methodology

3.1. Research Design and Approach

This study adopts a quantitative survey design to systematically investigate the influence of various behavioral biases on career decision-making among business students in Nepal. The quantitative approach allows us to facilitate the measurement of constructs, enable robust statistical analysis, and support the generalization of findings. This methodology provides a structured framework for exploring the hypothesized relationship between specific cognitive predispositions and career choices.

The research specifically delineates five independent variables, each representing a distinct behavioral bias: overconfidence bias, herd mentality, social comparison, status quo bias, and optimism bias. Career decision-making is established as the dependent variable, representing the outcome influenced by these biases. The deliberate selection of these five specific biases signals a focused theoretical grounding for the investigation as outlined in the previous section to pinpoint particular psychological mechanisms influencing vocational choices. This allows for a more nuanced understanding of which biases exert the most significant influence, rather than merely confirming the general impact of cognitive shortcuts. Such specificity enhances the study's theoretical contribution and its practical applicability, potentially guiding the development of targeted interventions or educational programs aimed at improving career decision-making processes in the Nepalese context.

3.2. Participants and Sampling Procedures

The target population for this study comprised Bachelor of Business Administration (BBA) and Master of Business Administration (MBA) students enrolled at Pokhara University. This institution was strategically chosen as the second-largest university in Nepal by student enrollment, providing a substantial and representative pool of participants for the research. These students are typically in a critical phase of their academic and personal development, actively contemplating and making significant career choices, aligning directly with the objectives of this study.

While the overarching selection process of respondents was random, the recruitment efforts were specifically directed towards business students who were actively engaged in career decision-making processes, such as final-year students or recent graduates. This strategic targeting of individuals currently grappling with career choices is a critical methodological consideration. It ensures that the collected data is not merely from business students in general but from those for whom career decisions are salient and immediate. This approach maximizes the contextual validity and practical utility of the findings, as participants possess current, lived experience with the phenomenon under investigation, thereby providing richer and more authentic insights. This focused targeting enhances the internal validity by reducing noise from irrelevant experiences and directly strengthens the applicability of the findings to the specific context of career guidance and education for graduating students.

Prior to the main data collection, a pilot study was conducted with a sample of 30 respondents. The primary objective of this pilot was to evaluate the clarity, comprehensibility, and reliability of the survey questionnaire items. The results of the pilot study indicated no significant issues with the instrument, thus precluding the need for any modifications before proceeding with the final data collection. The full-scale survey was conducted during January and February 2025. The questionnaire was administered via the internet (online survey) and in-person on the university campus in Pokhara to maximize reach and response rates, accommodating students' preferences and accessibility.

A total of 387 survey responses were initially received. We excluded 27 surveys due to incomplete responses on questions pertinent to our research hypotheses (see Table A1), which resulted in a final sample of 360 completed surveys. This final sample size substantially exceeded the minimum threshold determined through an a priori power analysis conducted using G*Power 3.1.9.7. The parameters for this analysis were set at an effect size of 0.7321, a significance level (α) of 0.05, and a desired power level of 0.95. Under these conditions, the analysis indicated that a minimum sample size of 12 would be sufficient to detect the anticipated effect. With 360 valid responses, the achieved sample size ensured excellent statistical power, calculated at 0.9649. This robust statistical power, significantly exceeding the minimum requirement, confirms the dependability and generalizability of the study's findings. A very low risk of Type II error is implied, making the study's conclusions highly reliable. This robust sample size contributes significantly to the external validity of the results, thereby strengthening the study's contribution.

3.3. Measures and Instrumentation

Primary data were collected using a structured questionnaire. The questionnaire utilized a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to capture respondents' perceptions and attitudes regarding behavioral biases and career decision-making.

The instrument was designed to measure behavioral biases influencing career decision-making among business students. All constructs were operationalized using validated indicators adapted from prior research to ensure content validity and comparability with existing literature. It ensures that the study is measuring precisely what it intends to measure, grounded in established theoretical frameworks, and reduces the risk of measurement error and enhances confidence that the observed relationships are between the intended constructs, thereby bolstering comparability of the results with other studies in the field. The comprehensive details on the variable operationalization, including constructs, statements, and source references, are detailed in Table A1.

The validity and reliability of the questionnaire were rigorously assessed through several statistical measures. Internal consistency reliability was evaluated using Cronbach's Alpha (CA) and Composite Reliability (CR), while convergent validity was assessed using Average Variance Extracted (AVE). Acceptable thresholds for these measures were set at CA > 0.70, CR > 0.70, and AVE > 0.50, consistent with established guidelines recommended by Fornell and Larcker (1981) and Hair et al. (2019). Discriminant validity, which ensures that each construct is conceptually distinct from others, was confirmed using the Fornell-Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio. Addressing both convergent and discriminant validity is also crucial for the integrity of Structural Equation Modeling (SEM) analyses because the quality of the measurement model directly impacts the validity of the structural model. Our comprehensive validation process significantly strengthens the overall credibility of the findings.

3.4. Data Analysis Techniques

This study adopted a two-stage methodological approach, integrating Partial Least Squares Structural Equation Modeling (PLS-SEM) and Artificial Neural Networks (ANN), to comprehensively explore the complex interaction between behavioral biases and career decision-making.

3.4.1. Partial Least Squares Structural Equation Modeling (PLS-SEM)

The first stage of the analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM), executed using SmartPLS 3.0. In line with existing related studies, PLS-SEM was selected as a robust technique particularly suited for modeling latent constructs in situations where theoretical development is ongoing and the model involves multiple variables and indicators, as highlighted by Sarstedt et al. (2021). Its predictive orientation and inherent flexibility in handling non-normal data distributions made it especially appropriate for research involving psychological and behavioral constructs, which frequently exhibit such characteristics. To generate stable estimates of path coefficients and assess the significance of structural relationships, a bootstrap resampling procedure with 5000 iterations was employed, in line with recommended best practices for PLS-SEM from Hair et al. (2019) and Henseler et al. (2015).

Following the structural model assessment, Importance–Performance Map Analysis (IPMA) was applied. IPMA served to identify the most influential behavioral biases on career decision-making and to highlight areas requiring strategic attention based on their relative importance and performance levels. This analytical step provides actionable insights beyond mere statistical significance, guiding practical implications.

3.4.2. Artificial Neural Networks (ANN)

The second analytical stage incorporated Artificial Neural Networks (ANNs) to address the inherent limitations of linear modeling techniques in capturing the complex, non-linear dynamics often present in individual decision-making processes. ANNs enable the modeling of such non-linear relationships that are frequently undetectable through conventional statistical methods. A multilayer perceptron (MLP) model was constructed using IBM SPSS 26. This model applied a feedforward-backpropagation algorithm with sigmoid activation functions, a common and effective architecture for capturing complex patterns in data. To ensure model reliability and generalizability, ten-fold cross-validation was employed. This technique is crucial for reducing the risk of overfitting and provides a more robust estimate of model performance on unseen data.

3.4.3. Integration of PLS-SEM and ANN

The integration of PLS-SEM and ANN represents a sophisticated and synergistic methodological strategy. While PLS-SEM elucidates the linear, theory-driven relationships between constructs, providing clear insights into the structural pathways, ANN captures complex, data-driven patterns that offer additional, often non-linear, insights into the predictive structure of behavioral influences on career decision-making. Cognitive biases might interact in intricate, non-additive ways, or their influence might only manifest above certain thresholds (Hogarth, 1987; Kahneman, 2011). PLS-SEM provides an interpretable structural model, validating theoretical pathways (e.g., demonstrating that a specific bias generally increases a certain outcome). Conversely, ANN, while often considered a 'black box' model, can uncover hidden, intricate patterns and interactions that traditional linear models may not be able to capture (see Bishop, 2006; Lee et al., 2019). This dual analytical approach provides a more holistic and nuanced understanding of the phenomenon under consideration.

3.5. Ethical Considerations

Ethical approval for this survey was granted by the Research Management Cell, School of Business, Pokhara University, and strict ethical standards were maintained throughout data collection. Informed consent was obtained from all student participants prior to their completion of the questionnaire, ensuring they fully understood the study's purpose, their role, and their rights. Participation in the study was entirely voluntary, and participants were assured that their anonymity would be fully maintained to protect their identity and privacy. All collected data were used solely for academic research purposes and handled with the utmost confidentiality throughout the analysis and reporting phases.

4. Survey Results and Analysis

This section presents the empirical findings derived from the survey data and the subsequent statistical analyses, including Partial Least Squares Structural Equation Modeling (PLS-SEM) and Artificial Neural Network (ANN) modeling. The results are presented systematically to address the research objectives regarding the influence of behavioral biases on career decision-making.

4.1. Demographic Distribution of the Survey Respondents

The study surveyed 360 respondents, providing a comprehensive demographic overview and insights into their career decision-making perspectives. The age distribution within the sample indicates a relatively even spread, with 32.8% of students falling within the 18–22 age range, 30.8% in the 22–26 category, and the largest segment, 36.4%, comprising individuals 26 years and above. The gender composition is nearly balanced, with 52.8% male and 47.2% female respondents. In terms of academic programs, students are almost equally split between BBA (50.6%) and MBA (49.4%). The sample exhibits diverse academic interests, with specializations distributed among marketing (33.3%), finance (32.5%), and human resources (34.2%). Career aspirations also vary, with 33.6% of students aiming for corporate roles, 34.2% planning entrepreneurship, and 32.2% intending to pursue further education. The finding that one-third of respondents indicated entrepreneurship as a career choice, coupled with Nepal's imperative to develop its entrepreneurial ecosystem for economic growth (Kakouris et al., 2024), underscores the importance of fostering an entrepreneurial mindset in students through career interventions. Table 3 provides a detailed demographic profile of the respondents.

When examining factors that influence career decisions, personal interest is the most frequently cited factor (26.4%), underscoring the intrinsic drive many students possess. This is closely followed by peer influence (25.6%), market demand (25%), and family advice (23.1%), indicating a complex interplay of internal aspirations and external pressures shaping their choices among the respondents. The frequency with which students seek career advice presents a varied and insightful picture: 35.3% engage in frequent consultations, 36.1% do so occasionally, yet a notable 28.6% report never seeking formal guidance. This distribution suggests that while a significant portion of students actively seeks career-related insights, a substantial segment remains disengaged from formal career discussions. This group, which reports never seeking guidance, is especially noteworthy.

In terms of career priorities, students consider growth opportunities (28.1%) as the most important factor in choosing a career, followed closely by job stability (27.2%), work–life balance (25.8%), and salary (18.9%). The finding that salary holds low importance for career choice in Nepal, contrary to economic realities, suggests human capital theory has limited applicability there, and a deviation potentially explained by collectivist social norms.

Table 3. Demographic profile of the respondents.

Characteristics	Sub-Categories	Frequency	Percent
Age	18–22 years	118	32.8
	22–26 years	111	30.8
	26 years and above	131	36.4
Gender	Male	190	52.8
	Female	170	47.2
Academic Program	BBA	182	50.6
	MBA	178	49.4
Specialization	Marketing	120	33.3
	Finance	117	32.5
	Human Resources (HR)	123	34.2
Career Plan	Corporate Role	121	33.6
	Entrepreneurship	123	34.2
	Further Education	116	32.2
Influence Career Decision-Making	Personal Interest	95	26.4
	Peer Influence	92	25.6
	Family Advice	83	23.1
	Market Demand	90	25
Frequency of Career Advice	Frequently	127	35.3
	Occasionally	130	36.1
	Never	103	28.6
Important Factor for choosing Career	Salary	68	18.9
	Job Stability	98	27.2
	Growth Opportunities	101	28.1
	Work Life Balance	93	25.8
Biggest Challenge in Career Decision	Lack of information	107	29.7
	Uncertainty about my skills	80	22.2
	Pressure from others	79	21.9
	Difficulty in choosing between options	94	26.1
Total		360	100

Source: Authors' calculation from the collected survey data.

Among the respondents, the biggest challenges in career decision-making include a lack of information (29.7%), difficulty choosing between options (26.1%), uncertainty about skills (22.2%), and pressure from others (21.9%). The relatively high importance of "Peer Influence" (25.6%) as a decision factor, coupled with "lack of information" (29.7%) and "difficulty in choosing between options" (26.1%) as major challenges, points to a potential conflict in student decision-making. Students may consciously aspire to make choices based on personal growth and intrinsic factors, but in the face of uncertainty and a lack of clear direction, they might implicitly default to socially validated paths as postulated in Ryan and Deci (2000). This tendency may also stem from Nepal's weak labor market conditions and collectivist social context.

4.2. Assessment of Measurement Model

The assessment of the measurement model, presented in Table 4, confirms the reliability and validity of all constructs. Internal consistency reliability was assessed using Cronbach's Alpha (CA) and Composite Reliability (CR), while convergent validity was evaluated through Average Variance Extracted (AVE) and factor loadings. All constructs

met the recommended thresholds (CA and CR > 0.70, AVE > 0.50) as per established guidelines (Hair et al., 2019; Fornell & Larcker, 1981).

Table 4. Measurement model.

Constructs	Indicator	Loadings	Cronbach's Alpha (CA)	Composite Reliability (CR)	(AVE)
Career Decision-Making (CDM)	CDM1	0.673	0.871	0.907	0.664
	CDM2	0.875			
	CDM3	0.815			
	CDM4	0.807			
	CDM5	0.887			
Herd Mentality (HM)	HM1	0.842	0.885	0.917	0.688
	HM2	0.884			
	HM3	0.877			
	HM4	0.71			
	HM5	0.823			
Optimism Bias (OB)	OB1	0.919	0.964	0.972	0.873
	OB2	0.96			
	OB3	0.926			
	OB4	0.92			
	OB5	0.946			
Overconfidence Bias (OCB)	OCB1	0.862	0.922	0.942	0.765
	OCB2	0.873			
	OCB3	0.899			
	OCB4	0.957			
	OCB5	0.77			
Social Comparison (SC)	SC1	0.894	0.873	0.911	0.675
	SC2	0.921			
	SC3	0.891			
	SC4	0.69			
	SC5	0.678			
Status Quo Bias (SQB)	SQB1	0.877	0.876	0.912	0.677
	SQB2	0.881			
	SQB3	0.922			
	SQB4	0.72			
	SQB5	0.686			

Source: Survey data.

Delving into the specifics, Career Decision-Making (CDM) demonstrated strong reliability with a Cronbach's Alpha (CA) of 0.871, a Composite Reliability (CR) of 0.907, and an Average Variance Extracted (AVE) of 0.664, with individual item loadings consistently strong, ranging from 0.673 to 0.887. Herd Mentality (HM) also exhibited high reliability (CA = 0.885, CR = 0.917, AVE = 0.688) with loadings from 0.710 to 0.884. Optimism Bias (OB) achieved excellent reliability (CA = 0.964, CR = 0.972, AVE = 0.873) with high loadings

(0.919–0.960). Overconfidence Bias (OCB) similarly showed strong reliability (CA = 0.922, CR = 0.942, AVE = 0.765) with loadings between 0.770 and 0.957. Both Social Comparison (SC) and Status Quo Bias (SQB) met all criteria (CA > 0.87, CR > 0.91, AVE > 0.67), with loadings ranging from 0.678 to 0.921. The consistent high performance across all these psychometric indicators suggests that the survey instrument effectively captured the intended latent constructs. This robust measurement model provides a strong foundation for using structural equation modeling. The graphical representation of the measurement model is provided in Figure 2.

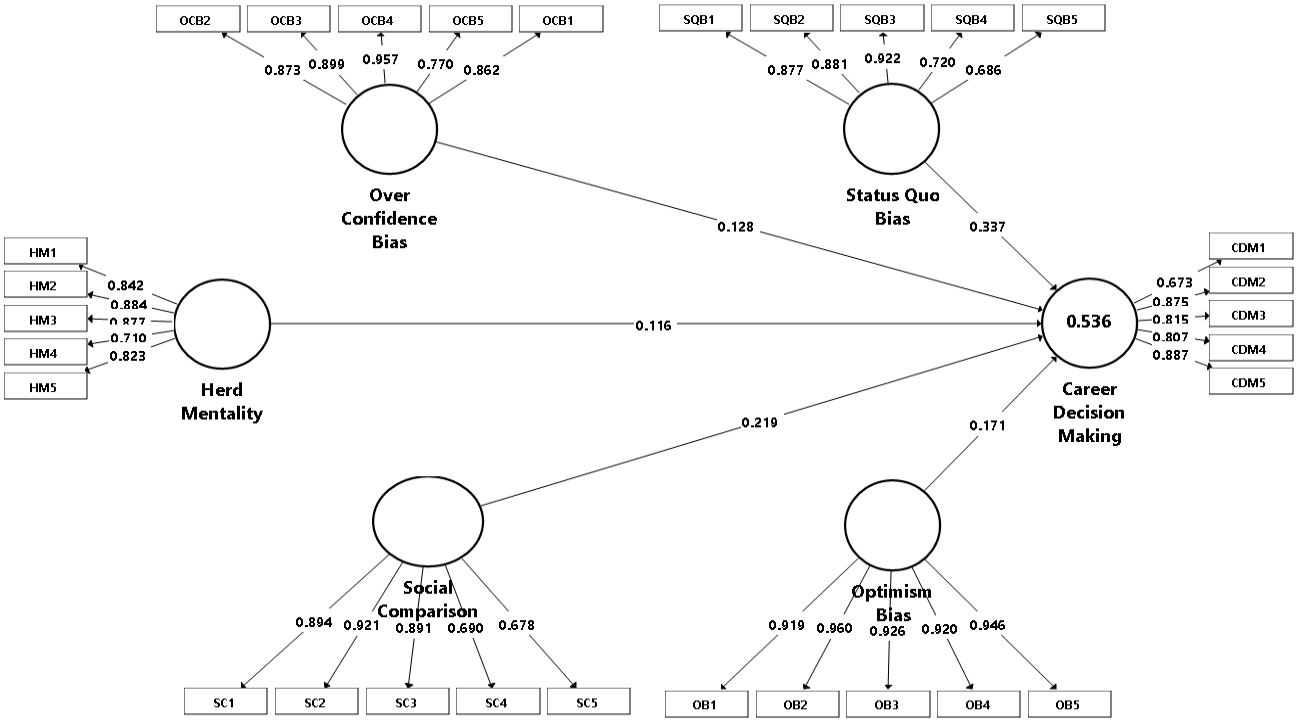

Figure 2. Measurement model.

4.3. Assessment of Discriminant Validity

The assessment of discriminant validity is crucial for ensuring that each construct in our model measures a unique and distinct concept, rather than overlapping with other constructs (Fornell & Larcker, 1981; Henseler et al., 2015). Therefore, we performed the discriminant validity of the constructs using the Fornell-Larcker Criterion and the Heterotrait–Monotrait (HTMT) Ratio, and the test results are presented in Table 5. Panel A shows that the square root of the Average Variance Extracted (AVE) for each construct (diagonal values) is greater than its correlations with other constructs, thereby satisfying the Fornell–Larcker Criterion and confirming discriminant validity. For example, the square root of AVE for Career Decision-Making (CDM) is 0.815, which is greater than its correlations with Herd Mentality (0.504), Optimism Bias (0.446), Overconfidence Bias (0.473), Social Comparison (0.580), and Status Quo Bias (0.634). This pattern holds true for all constructs, indicating their distinctiveness.

Panel B in Table 5 presents the HTMT ratios, where all values fall below the recommended threshold of 0.85, further verifying discriminant validity. For instance, the HTMT ratio between Herd Mentality and Career Decision-Making is 0.568, and between Status Quo Bias and Career Decision-Making is 0.724, both well within the acceptable range. The discriminant validity through these two distinct and rigorous methods indicates that we are able to separately capture bias empirically. This is critical in behavioral research, where biases can often be highly correlated or conceptually overlap.

Table 5. Fornell–Larcker criteria and HTMT ratio.

	CDM	HM	OB	OCB	SC	SQB
Panel A: Fornell–Larcker Criteria						
CDM	0.815					
HM	0.504	0.83				
OB	0.446	0.374	0.934			
OCB	0.473	0.526	0.290	0.874		
SC	0.580	0.506	0.299	0.422	0.822	
SQB	0.634	0.432	0.381	0.421	0.582	0.823
Panel B: HTMT Ratio						
HM	0.568					
OB	0.482	0.398				
OCB	0.516	0.571	0.299			
SC	0.666	0.572	0.323	0.462		
SQB	0.724	0.481	0.407	0.458	0.664	

Source: Survey data.

4.4. Assessment of Structural Model

The assessment of the structural model provides insights into the predictive relevance, multicollinearity, and overall fit of the proposed theoretical model. Table 6 presents the f^2, Variance Inflation Factor (VIF), R^2, and Q^2 values. The f^2 values indicate the effect size of each construct on the dependent variable, Career Decision-Making. Status Quo Bias exhibits the largest effect size (0.143), followed by Social Comparison (0.059) and Optimism Bias (0.050), while Herd Mentality (0.017), and Overconfidence Bias (0.023) show smaller effects. The variance inflation factor (VIF) values, which assess multicollinearity, fall between 1.253 and 1.743. These are well below a threshold of 3.3, confirming the absence of significant multicollinearity in the structural model (see Kock & Lynn, 2012). The R^2 value of 0.536 indicates that behavioral biases collectively explain 53.6% of the variance in business students' Career Decision-Making. The model exhibits predictive relevance, evidenced by a Q^2 value of 0.349, exceeding the moderate threshold of 0.15 (Hair et al., 2022), indicating robust out-of-sample predictive power for Career Decision-Making. The model fit indices of the Saturated Model also indicate an acceptable fit with an SRMR (Standardized Root Mean Square Residual) of 0.069. This value is below the recommended threshold of 0.08, suggesting a good fit. The Chi-Square value is 2358.848, and the NFI (Normed Fit Index) is 0.785, indicating a moderately acceptable model fit (Henseler et al., 2015).

Table 6. Predictive relevance and VIF.

Constructs	f^2	VIF	R^2	Q^2
Herd Mentality	0.017	1.685		
Optimism Bias	0.050	1.253		
Overconfidence Bias	0.023	1.499		
Social Comparison	0.059	1.743		
Status Quo Bias	0.143	1.703		
Career Decision-Making			0.536	0.349

Source: Survey data.

The hypothesis testing results, presented in Table 7, confirm that behavioral biases considered in this study have a significant and measurable influence on Career Decision-Making (CDM). Every single one of the five proposed paths (H1 through H5) received robust empirical support, consistently exhibiting positive beta values, high t-statistics, low *p*-values (below 0.05), and confidence intervals that exclude zero, thereby confirming the statistical significance of each of the beta estimates. Figure 3 depicts path analysis with beta coefficient.

Table 7. Hypothesis testing.

Hypothesis	Path	Beta (β)	t-Statistics	95% Confidence Interval	*p*-Value
H1	OCB => CDM	0.128	2.699	[0.033, 0.218]	0.007
H2	HM => CDM	0.116	2.440	[0.029, 0.215]	0.015
H3	SC => CDM	0.219	4.661	[0.126, 0.309]	0.000
H4	SQB => CDM	0.337	6.781	[0.242, 0.430]	0.000
H5	OB => CDM	0.171	3.825	[0.084, 0.259]	0.000

Source: Survey data.

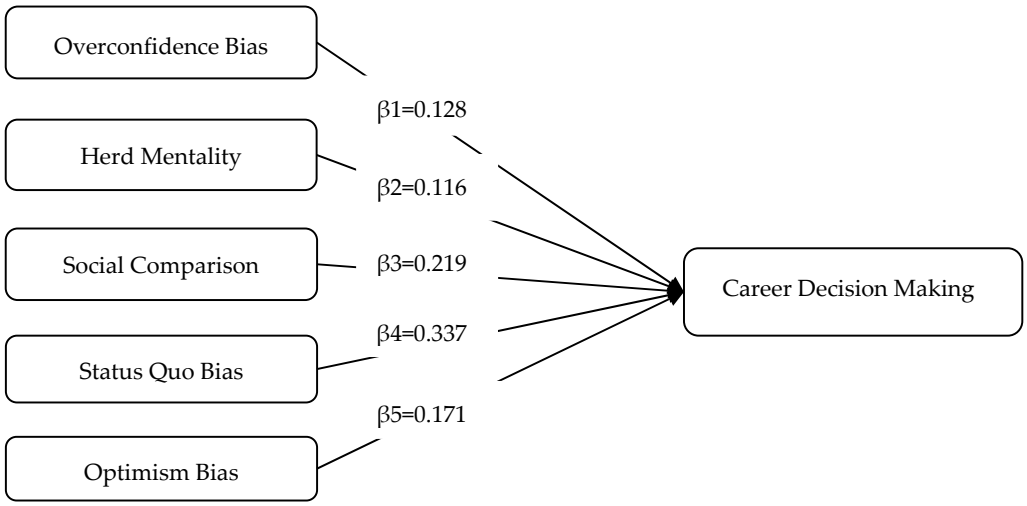

Figure 3. Path analysis with beta coefficient.

The magnitude of the beta coefficients provides a clear and compelling indication of the practical significance of each relationship. A higher beta coefficient indicates greater influence on Career Decision-Making. Among the five biases considered, Status Quo bias has the highest beta coefficient (0.337), followed by Social Comparison (0.219) and Optimism bias (0.171), while Herd Mentality has the lowest beta coefficient (0.116), like the beta estimate (0.128) for Overconfidence bias. This clear hierarchy may represent the psychological imprint of Nepal's political and economic instability on career decision-making. Decades of a volatile political environment, prolonged underemployment rate[1], and heavy reliance on remittances (through employment abroad) may have created an environment where risk aversion dominates career choices. This potentially explains why Status Quo bias emerges as the strongest predictor, while Social Comparison's significance may capture Nepal's collectivist social fabric, where kinship networks facilitate career opportunity access. Meanwhile, Optimism bias may function as a psychological buffer against high youth unemployment, enabling persistence despite systemic barriers. Conversely, the weak influence of Herd Mentality (β = 0.116) and Overconfidence (β = 0.128) reflects how Nepal's economic precarity punishes conformity and self-assuredness. Given high level of

mismatch between labor market demands and graduate competencies (UNDP, 2020), blind imitation ('herding') poses substantial risks.

4.5. Importance–Performance Map Analysis (IPMA)

The Importance–Performance Map Analysis (IPMA) is a valuable tool that integrates the total effect (importance) and performance of constructs to identify critical areas for improvement (Hair et al., 2022). By prioritizing behavioral biases that most strongly influence career decision-making, this analysis guides targeted interventions where they will yield the greatest practical impact.

Figure 4 presents the IPMA based on PLS-SEM results, plotting the importance and performance of each behavioral bias affecting career decision-making. Status Quo Bias demonstrates the highest importance (0.337) but only moderate performance (55.351%), establishing it as the top priority for intervention. Social Comparison also exhibits substantial importance (0.219) with relatively higher performance (68.166%), indicating its active influence warrants continued monitoring. Optimism Bias shows moderate importance (0.171) coupled with the lowest performance (54.222%), revealing a significant unmet need for attention. Conversely, Overconfidence Bias has lower importance (0.128) despite high performance (71.772%), suggesting limited relevance for improvement efforts. Similarly, Herd Mentality displays low importance (0.116) and the highest performance (75.772%), confirming its minimal strategic priority.

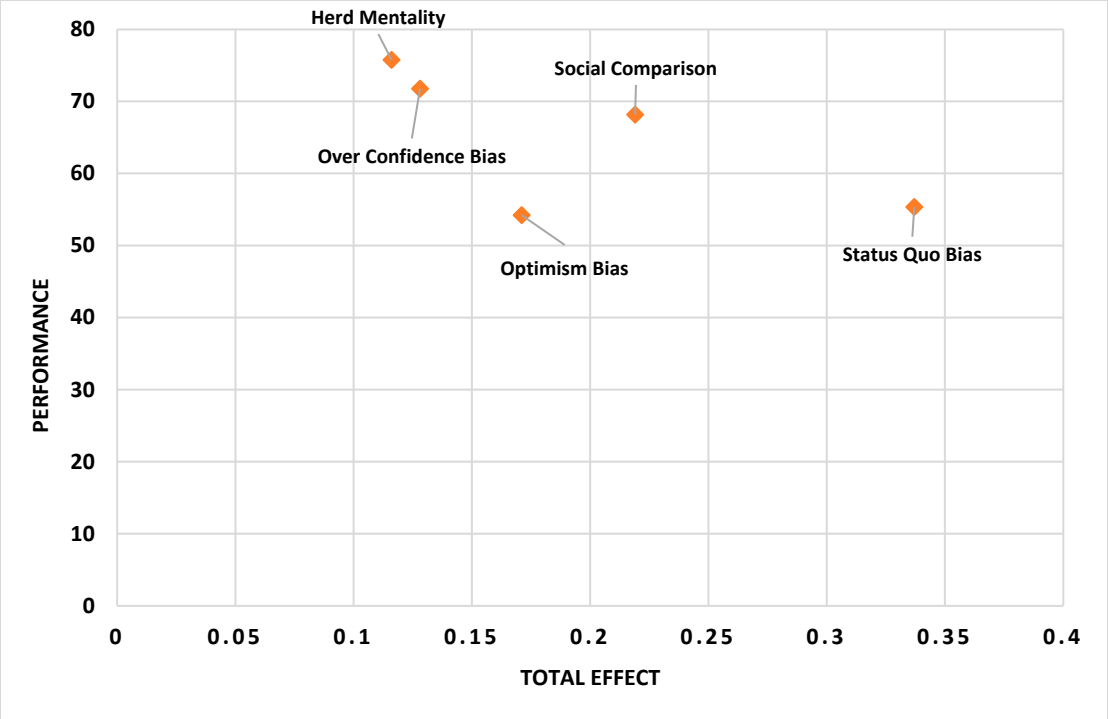

Figure 4. Importance–Performance map based on PLS-SEM.

Collectively, the IPMA underscores Status Quo Bias as the most influential yet inadequately addressed factor in Career Decision-Making. This analysis extends beyond statistical significance by offering a resource-allocation perspective: Biases with high importance but low-to-moderate performance (e.g., Status Quo Bias and Optimism Bias) represent high-leverage intervention points, as students currently manage them poorly despite their strong impact. In contrast, biases with lower importance but high performance (e.g., Herd Mentality and Overconfidence Bias) are either effectively managed by students or inherently less consequential, making them lower-priority targets. For career

counseling and educational programs, IPMA provides an evidence-based framework to concentrate resources on developing strategies that counter Status Quo and Optimism Biases, maximizing improvements in career decision quality.

4.6. Artificial Neural Network (ANN) Analysis

To capture the complex and non-linear associations between behavioral biases and career decision-making, this study employed an ANN model. Figure 5 displays the ANN diagram where the cognitive biases are 'Input Neurons' and Career Decision-Making is the 'Output Neuron', with hidden layers anticipated as cognitive biases. While PLS-SEM is effective for estimating linear relationships and direct paths among latent constructs, it may not adequately account for the intricate, dynamic interactions often observed in human behavioral processes. Since behavioral biases often interact in ways that are not straightforward, ANN was seen as a better fit, as it does not rely on fixed formulas or assumptions and learns patterns directly from the data.

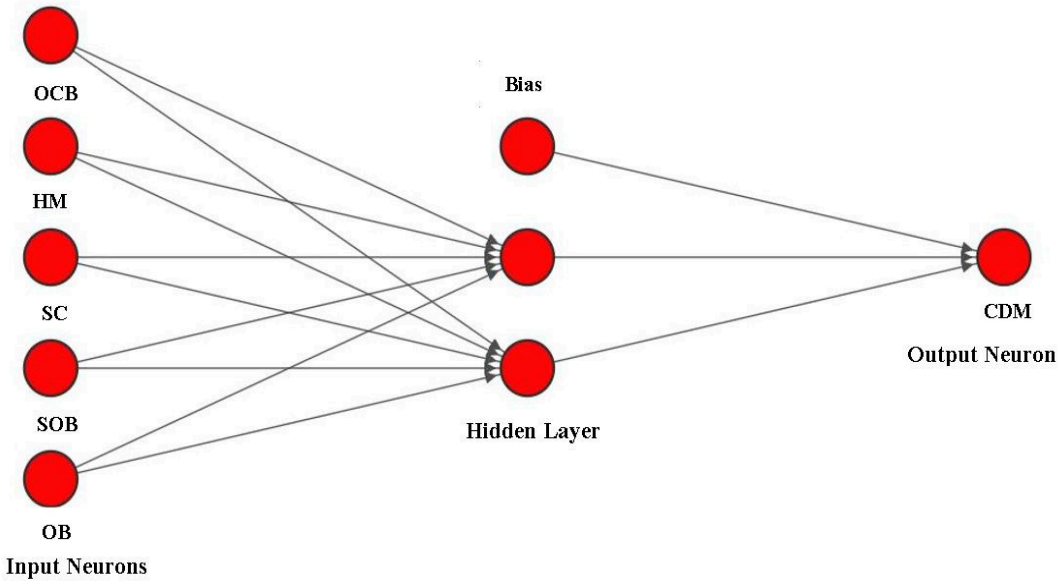

Figure 5. ANN diagram.

The model applied a feed-forward-backward-propagation (FFBP) method using multiple layers of nodes (perceptrons) and sigmoid functions. These features help the model adjust and improve its predictions by learning from errors over many cycles. A ten-fold cross-validation approach was used during the analysis, where the data was divided into ten parts, and the model was trained on nine parts and tested on the remaining one. This process was repeated until every part had been tested once, helping to avoid overfitting and ensuring that the results are more reliable and trustworthy across different data samples. Table 8 presents the Root Mean Square Error (RMSE) values across ten neural networks (NN I to NN X), demonstrating the model's fit. The training RMSE ranged from 0.4423 to 0.5641 (mean = 0.5110, SD = 0.0192), while the testing RMSE varied between 0.3360 and 0.4955 (mean = 0.4592, SD = 0.0689). These relatively low RMSE values indicate strong predictive performance, confirming the ANN model's reliability.

Figure 6 visually represents the error distribution, showing a steady reduction in prediction error across iterations. The effectiveness of 10-fold cross-validation in producing consistently low and comparable RMSE values for both training and testing sets is a strong indicator that the ANN model has learned generalizable patterns from the data rather than simply memorizing the training examples. This significantly enhances confidence in the model's ability to predict Career Decision-Making based on behavioral biases in

new, unseen data, validating the choice of a non-linear approach for capturing complex behavioral dynamics. This robust predictive performance means that the findings derived from the ANN's sensitivity analysis, particularly regarding the relative importance of biases in a non-linear context, are highly credible. It suggests that even if some biases do not show strong linear relationships, their complex, indirect, or interactive effects are effectively captured, offering a more complete and nuanced understanding of their influence on career choices than linear models alone.

Table 8. Root Mean Square Error (RMSE) and Sum of Squared Errors (SSE) across 10-fold cross-validation of the ANN Model.

Training			**Testing**			**Total Samples**
N	SSE	RMSE	N	SSE	RMSE	
324	103.107	0.5641	36	8.840	0.4955	360
321	83.583	0.5103	39	8.551	0.4682	360
315	68.805	0.4674	45	9.251	0.4534	360
326	63.771	0.4423	34	4.019	0.3438	360
320	64.492	0.4489	40	5.099	0.3570	360
324	70.083	0.4651	36	8.005	0.4716	360
316	80.554	0.5049	44	9.172	0.4566	360
323	64.588	0.4472	37	5.092	0.3710	360
323	69.400	0.4635	37	5.555	0.3875	360
320	65.338	0.4519	40	4.515	0.3360	360
Mean	84.049	0.5110	Mean	8.243	0.4592	
S.D.	6.3091	0.0192	S.D.	2.352	0.0689	

Source: Survey data.

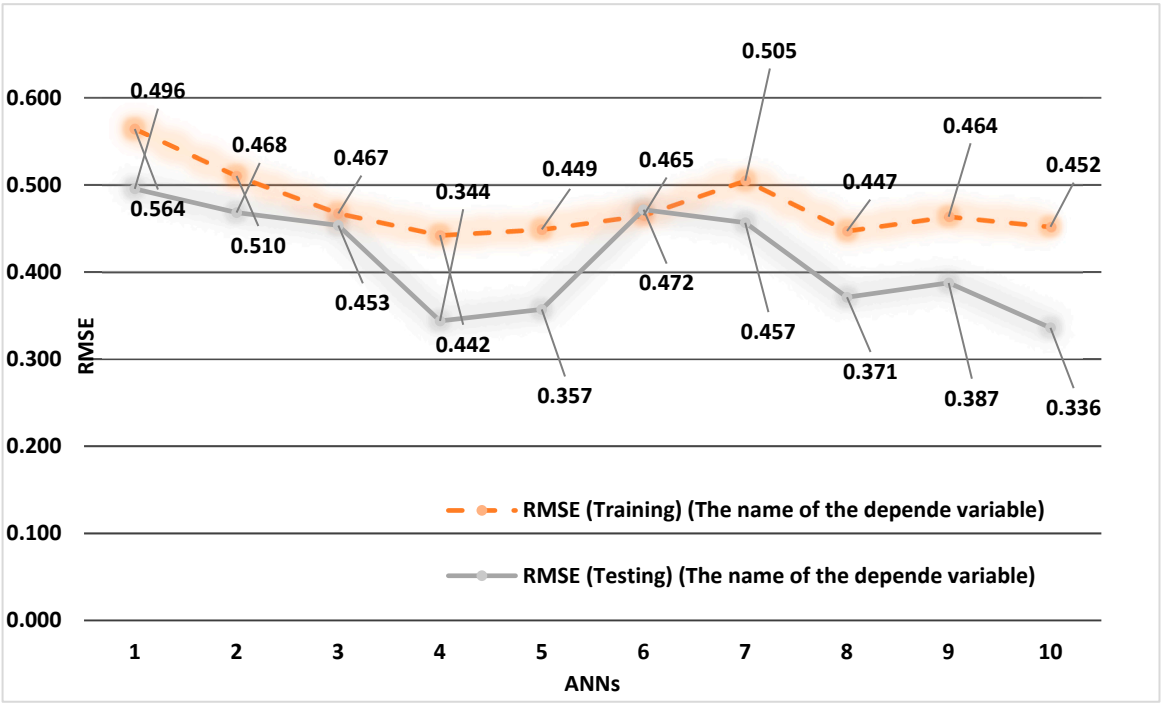

Figure 6. Comparison of RMSE for training and testing sets across 10 ANN models.

The sensitivity analysis, assessing the relative importance of each behavioral bias in the ANN model, is summarized in Table 9. Status Quo Bias (SQB) showed the highest influence (100%), followed by Social Comparison (81.19%) and Herd Mentality (72.87%), indicating their strong predictive relevance in Career Decision-Making. Overconfidence Bias (70.43%) and Optimism Bias (65.54%) also contributed significantly, although to a lesser extent. These findings support the critical role of behavioral biases in shaping career choices, with SQB emerging as the most dominant factor. We also found that Status Quo Bias and Social Comparison consistently emerge as the most dominant factors in both linear and non-linear models (PLS-SEM and ANN). The robust results suggest that their influence on career decisions is pervasive and robust, regardless of the complexity or linearity of the underlying relationships. Their impact is not merely a direct, simple effect but also manifests through complex, potentially indirect, or interactive pathways. This dual confirmation from two distinct modeling approaches significantly strengthens the evidence for the critical role of Status Quo Bias and Social Comparison in shaping the career choices of business students in Nepal. The results also imply that interventions targeting these two biases are likely to be effective across a broader spectrum of student decision-making scenarios, solidifying their position as primary targets for educational and counseling efforts aimed at fostering more autonomous and informed career decisions.

Table 9. Sensitivity analysis.

Neural Network	OCB	HM	SC	SQB	OB
NN(I)	0.91	0.70	0.57	1.00	0.34
NN(II)	0.66	0.87	0.45	1.00	0.57
NN(III)	0.57	0.58	0.83	1.00	0.58
NN(IV)	0.79	0.75	0.97	1.00	0.62
NN(V)	0.59	0.72	0.96	1.00	0.59
NN(VI)	0.69	0.69	0.72	1.00	0.80
NN(VII)	0.58	0.62	0.72	0.91	1.00
NN(VIII)	0.62	0.73	1.00	0.90	0.71
NN(IX)	0.68	0.95	0.81	1.00	0.60
NN(X)	0.83	0.55	0.92	1.00	0.63
Average	0.69	0.71	0.80	0.98	0.64
Percentage (%)	70.43%	72.87%	81.19%	100.00%	65.54%

Source: Field survey, 2025.

4.7. Comparative Analysis of PLS-SEM and ANN Results

The comparative analysis of PLS-SEM and ANN results, presented in Table 10, reveals both convergence and divergence in how behavioral biases predict Career Decision-Making.

Both methods consistently identified Status Quo Bias as the most influential predictor of Career Decision-Making (PLS-SEM: $\beta = 0.337$, rank 1; ANN: 100.00 percent, rank 1) and Social Comparison as the second strongest factor (PLS-SEM: $\beta = 0.219$, rank 2; ANN: 81.19 percent, rank 2). This strong agreement suggests a stable and significant influence of these two biases on students' career decisions.

However, notable differences emerged for other behavioral constructs. Optimism Bias ranked third in PLS-SEM ($\beta = 0.171$) but was the least important in the ANN model (65.54 percent, rank 5), suggesting its influence may be predominantly linear and less impactful in complex, non-linear patterns. Conversely, Herd Mentality showed the least linear impact in PLS-SEM ($\beta = 0.116$, rank 5), yet ranked third in ANN importance (72.87 percent),

indicating it may exert significant influence through non-linear mechanisms undetectable by PLS-SEM. Overconfidence Bias maintained moderate importance across both methods, though its ANN rank (4th, 70.43%) was slightly higher than in SEM (4th, β = 0.128).

Table 10. Comparison of PLS-SEM and ANN Results Predicting Career Decision-Making.

Predictor	PLS-SEM β	SEM Rank	ANN Importance (Percent)	ANN Rank
Status Quo Bias	0.337 ***	1	100.00	1
Social Comparison	0.219 ***	2	81.19	2
Optimism Bias	0.171 ***	3	65.54	5
Overconfidence Bias	0.128 ***	4	70.43	4
Herd Mentality	0.116 ***	5	72.87	3

Note. β = standardized path coefficient; ANN = Artificial Neural Network; Importance = Normalized relative importance. *** $p < 0.001$.

This specific divergence is a critical theoretical and practical observation. It suggests that behavioral biases do not operate uniformly. Optimism Bias might have a more direct, straightforward effect on career decisions (e.g., directly influencing risk-taking in career choices), which is well-captured by linear models. In contrast, Herd Mentality might exert its influence through more complex, indirect, or interactive pathways (e.g., amplifying the effects of social comparison or subtly shaping perceptions of career paths over time), which are better captured by the non-linear capabilities of ANN. This differentiation implies that interventions should be tailored not just to the type of bias, but also to the nature of its influence. For biases with predominantly linear effects, direct educational or cognitive restructuring techniques might be effective. For biases with strong non-linear effects, more experiential, systemic, or context-aware interventions might be necessary to address their subtle and complex manifestations, leading to more sophisticated and effective career guidance strategies.

4.8. Further Discussions and Implications

In our survey, we found that a substantial segment of respondents (students) remain disengaged from formal career discussions. Their disengagement from formal career support could stem from various underlying factors, such as high self-efficacy, a strong preference for independent decision-making, or a lack of awareness regarding available resources. Crucially, this group might be more susceptible to unaddressed biases precisely because they lack external perspectives or structured information. This observation suggests that a singular approach to career support may be ineffective, and targeted outreach or alternative engagement formats, such as embedding guidance within academic courses or peer-led initiatives, might be necessary to equip these students for career navigation, especially given that "lack of information" is identified as the leading challenge (29.7%) in career decision-making.

The survey highlights a fascinating disconnect: while 26.4% of respondents identified "personal interest" as the most important factor influencing their career decisions, a much larger 52% reported a lack of information or uncertainty about their skills as their biggest challenge. This suggests a potential cognitive dissonance. Students may consciously value intrinsic factors like personal growth and interest, but implicitly or subconsciously, they might be more swayed by external pressures or a lack of self-awareness regarding their capabilities. This underscores the critical need for comprehensive career guidance that can help students reconcile their stated aspirations with the practical realities and underlying influences driving their career choices.

Furthermore, the PLS-SEM analysis reveals that Status Quo bias has a large effect size (f^2), and the largest path coefficient, suggesting that intervention efforts focusing on mitigating Status Quo Bias are likely to yield the most substantial overall impact on improving career decision-making quality. The analysis also reveals that the cognitive biases considered collectively explain more than 50% of the variations in career decision-making among the business students. In social and behavioral sciences, an R-squared value exceeding 0.50 is considered to represent a strong explanatory power for a model (Hair et al., 2022). This indicates that the set of behavioral biases examined in this study is not merely a minor influence but is indeed a central and highly impactful determinant of how students make career choices. This finding elevates the importance of a behavioral perspective in career development theory and practice. This high explanatory power suggests that interventions specifically targeting these behavioral biases could yield significant improvements in the quality and autonomy of students' career decisions. It implies that traditional career guidance approaches, which may focus solely on skills, interests, and market information, might be overlooking a crucial psychological dimension that accounts for over half of the variability in decision outcomes.

The comparative analysis of the results from PLS-SEM and ANN implies that while PLS-SEM effectively captures linear and theory-driven relationships among variables, ANN is capable of identifying complex, non-linear patterns that may not be evident through traditional statistical approaches. The convergence on Status Quo Bias and Social Comparison, coupled with the divergence on Optimism Bias and Herd Mentality, empirically validates the necessity of employing multiple analytical paradigms in similar behavioral research. A single method would have provided an incomplete or potentially misleading picture. This demonstrates that human decision-making is multifaceted, involving both direct, theory-driven relationships and complex, emergent patterns. The integration of both techniques provides a more robust and comprehensive understanding of the underlying factors shaping individuals' career choices. This finding serves as a strong methodological recommendation for future research in behavioral economics, psychology, and related fields. To truly capture the intricate dynamics of human behavior, researchers should increasingly consider adopting hybrid analytical approaches that combine the interpretability of traditional statistical models with the predictive power of machine learning techniques. This will lead to more robust theoretical models and more effective, evidence-based interventions.

Moreover, the contrasting importance of Herd Mentality and Optimism Bias across both models highlights the need for multidimensional guidance. While Herd Mentality appeared less significant in linear SEM models, its high non-linear influence in ANN reveals that some biases may exert their effects in more subtle, indirect ways. This calls for comprehensive strategies that balance quantitative self-insight tools with scenario-based experiential learning, allowing students to recognize and reflect on hidden patterns in their behavior. Additionally, although Overconfidence Bias and Optimism Bias can positively fuel motivation, unchecked expressions of these tendencies can lead to impractical expectations and poor readiness. Yet, a balanced level of optimism, as discussed in entrepreneurial psychology, is likely a crucial trait for students considering the inherent risks of starting a business. Understanding how optimism bias operates in this context could inform interventions aimed at encouraging realistic entrepreneurial ambitions (Kakouris et al., 2024). Counseling strategies should, therefore, include realistic goal setting, risk awareness, and adaptive planning techniques to strike a balance between ambition and feasibility. Altogether, these findings hold considerable implications for enhancing student readiness, satisfaction, and alignment with long-term career goals.

5. Summary and Conclusions

This study conducted a survey of 360 business students from Pokhara University in Nepal to examine how behavioral biases influence students' career decisions. The survey data reveals that the students' career choice is largely guided by their personal interests and peer influence, and they place more value on the growth opportunities and job stability for choosing a career. But they find a lack of information and uncertainty about their skills as the biggest challenges in their career decision.

To test the hypotheses of our study, we implemented a two-stage PLS-ANN approach, allowing us to capture both linear and non-linear relationships between the cognitive biases and Career Decision-Making. The PLS-SEM analysis shows that while all biases have a significant influence on Career Decision-Making, the status quo bias and social comparison have greater influence. The importance of these two biases is also confirmed in the ANN analysis. The ANN analysis, however, ranked differently from other biases in the hierarchy. Therefore, this study concludes that behavioral biases strongly influence students' career choices, and the integrated approach of PLS-ANN helps to unfold both linear and non-linear relationships between Career Decision-Making and cognitive biases. The robust results from this study suggest that traditional career guidance frameworks need to embed behavioral perspectives (biases). Addressing these biases can help students align their career paths with their strengths, aspirations, and long-term goals, moving beyond external pressures or cognitive tendencies. Ensuring awareness and intervention strategies can ultimately lead to more confident, well-prepared graduates entering the workforce. And future career guidance frameworks should explicitly incorporate behavioral science principles, diagnostic tools for identifying biases, and intervention techniques designed to mitigate their negative effects, thereby fostering greater autonomy and self-alignment in students' career choices.

Despite the valuable insights derived from the two-stage PLS-ANN analytical approach, this study is subject to certain limitations. Firstly, the sample is restricted to students from a specific educational context, potentially limiting the generalizability of the findings across different spatial or institutional settings. Future studies should expand the sample across diverse geographic and academic backgrounds to enhance external validity. Secondly, the cross-sectional design precludes any causal inference; longitudinal data could offer a deeper understanding of how biases evolve over time and influence long-term career trajectories. Additionally, while ANN provides valuable non-linear insights, it lacks the transparency of SEM in explaining theoretical linkages, limiting interpretability for theoretical development. Moreover, this study focused solely on behavioral biases; future research could explore the interaction of these biases with emotional, environmental, or socioeconomic factors, which may further contextualize decision-making behavior. Employing hybrid methods such as integrating qualitative interviews alongside SEM and ANN models could also enrich the understanding of underlying cognitive processes. Lastly, future studies may consider examining intervention-based models, evaluating the effectiveness of career counseling programs specifically designed to mitigate these biases.

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Appendix A

Table A1. Operationalization of variables.

S.N.	Construct	Indicator	Statement	Sources
1	Overconfidence Bias	OCB1	I am confident in choosing the best career without much guidance.	(Moore & Healy, 2008; Dunning et al., 2004; Zell et al., 2020)
2		OCB2	My skills match my chosen career, despite challenges.	
3		OCB3	I am sure I will succeed in my career.	
4		OCB4	I rarely reconsider my career decisions.	
5		OCB5	I feel more prepared for my career than my peers.	
6	Herd Mentality	HM1	I consider popular career paths among classmates.	(Banerjee, 1992; Raafat et al., 2009; Bikhchandani et al., 1998)
7		HM2	I feel confident following careers others choose.	
8		HM3	I prefer career paths common in my program.	
9		HM4	Choosing a career others follow reassures me.	
10		HM5	I am more comfortable following trends than unconventional paths.	
11	Social Comparison	SC1	I compare my career choices with classmates.	(Buunk & Gibbons, 2007; Gerber et al., 2018)
12		SC2	I feel pressure to choose a respected career.	
13		SC3	Others' success influences my career preferences.	
14		SC4	I consider how others will view my career choice.	
15		SC5	I want a career that others will approve of.	
16	Status Quo Bias	SQB1	I prefer careers that match my initial goals.	(Samuelson & Zeckhauser, 1988; Anderson, 2003)
17		SQB2	I stick to familiar career options.	
18		SQB3	Changing my career direction is difficult.	
19		SQB4	I hesitate to choose careers different from my plans.	
20		SQB5	I feel safer with stable, familiar careers.	

Table A1. *Cont.*

S.N.	Construct	Indicator	Statement	Sources
21	Optimism Bias	OB1	I believe my career will be successful without major obstacles.	(Jefferson et al., 2017; Shepperd et al., 2013)
22		OB2	My career choice will bring satisfaction and success.	
23		OB3	I expect to get a job in my field soon after graduation.	
24		OB4	I feel prepared for challenges in my career.	
25		OB5	I am optimistic about my career, despite setbacks.	
26	Career Decision-Making	CDM1	I am confident I chose the right career.	(Gati et al., 1996; Lent et al., 1994)
27		CDM2	I am committed to my career path.	
28		CDM3	My career choice reflects my strengths and goals.	
29		CDM4	I feel prepared to enter my career field.	
30		CDM5	I am satisfied with my career decision process.	

Note

[1] According to a World Bank report (World Bank, 2023), the unemployment rate in Nepal exceeds 40% (World Bank, 2023).

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