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Original Research Article

Cognitive Dimensions of Human Reliability and Risk Perception in Academic Decision-Making: A Qualitative Case Study of Newly-Recruited Faculty Members in Higher Education

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Abstract

The present study aimed to analyze the cognitive dimensions of human reliability and risk perception in educational decision-making. It conducted a qualitative and in-depth investigation of the experiences of a newly recruited faculty member in the Iranian higher education system. Researchers often face structural complexities, organizational pressures, and multiple roles. Under such conditions, educational decisions are made in environments of high uncertainty, which increases the risk of cognitive error, especially among newly recruited faculty members. In this study, risk is conceptualized not merely as the probability of loss or failure, but as a cognitive and situational construct that shapes how faculty members interpret uncertainty and make educational decisions. Specifically, risk perception refers to how individuals subjectively evaluate the potential consequences of their choices in ambiguous academic contexts, which can directly influence the likelihood of human error and the overall reliability of decision-making. Research data were collected through two semi-structured interviews with a novice instructor who is also responsible for group management and analyzed using the Braun & Clarke (2006) thematic analysis method. The findings indicated three overarching themes, including cognitive-emotional challenges in risk perception, human reliability in decision-making, and effective structural and institutional factors. The research findings revealed the existence of a vicious cycle between structural pressures, cognitive erosion, and increased error in decision-making. However, strategies such as cognitive autonomy, professional responsibility, and independent problem solving played a protective role against mental attrition. Overall, this study, by combining the concepts of human reliability engineering and educational psychology, provides an interdisciplinary approach to analyzing decision-making in higher education and emphasizes the need to design policies to enhance cognitive resources and reduce structural ambiguity in academic environments.

Keywords: Higher Education; Cognitive Dimensions; Risk Perception; Newly Recruited Faculty Members; Educational Decision-Making Ability; Human Confidence.

1. Introduction

Teaching in higher education is not only the transfer of scientific concepts, but also a platform for the formation of knowledge, attitudes, and professional skills in the future generation. In this regard, the performance of faculty members as key human factors plays a fundamental role in the quality and effectiveness of the teaching-learning process [1, 2]. Research shows that several factors, including cognitive characteristics,

communication skills, and professional experience, affect the quality of teaching and educational decision-making of professors [3-5]. Today's higher education environment is increasingly complex, from increasing student diversity and changing learning styles to fluctuating educational policies and the proliferation of digital technologies. At the same time, frequent changes in university recruitment policies, performance evaluations, and academic regulations are a source of

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organizational ambiguity and decision-making uncertainty, especially for new faculty members [6].

In such circumstances, teachers' educational decisions, especially in critical moments or unforeseen situations, are accompanied by a certain degree of uncertainty [7-8]. These situations are conducive to the occurrence of human errors, which are more likely and consequential, especially among newly recruited teachers, due to limited experience [9, 6]. From the perspective of safety and reliability engineering, these conditions also require a careful analysis of human reliability and risk perception in the educational decision-making process. Human reliability refers to the probability of an individual performing correctly in performing assigned tasks in specific circumstances, especially under time, emotional, or information pressures [10]. On the other hand, risk perception refers to the mental process of interpreting and evaluating potential risks, which often differs from the objective reality of the risk and affects individuals' decision-making [11]. In the context of this study, *risk* is not limited to its traditional probabilistic or engineering definition. Rather, it is understood as a multidimensional construct that encompasses both cognitive and situational factors influencing decision-making. Educational risk arises when faculty members must make judgments under ambiguity, conflicting goals, or insufficient information, where the perceived potential for error or negative outcome affects their cognitive processing. Therefore, risk in academic decision-making is simultaneously psychological (linked to perception and interpretation) and institutional (linked to organizational structures and constraints).

These two concepts have been extensively studied in fields such as industry, health, and the military, but they still have room for work in higher education, especially at the behavioral and cognitive levels [12-13]. From the perspective of educational psychology, educational decision-making is also influenced by complex cognitive processes such as information processing, cognitive biases, and emotion regulation [14-15]. These processes, especially in the face of risk and ambiguous situations, can greatly affect the accuracy of judgment and the probability of error [14-15]. These cognitive dimensions directly affect the likelihood of error or correct decision-making when facing risk. On the other hand, the fields of safety engineering also provide a rich theoretical framework for analyzing these behaviors with concepts such as human reliability analysis (HRA), safety culture, and decision support systems [16-17]. In this regard, a review of domestic sources shows that numerous studies have examined indicators of effective teaching [18-19]; however, the main focus in them has been on behavioral factors or students' perspectives, rather than on the cognitive processes of faculty decision-making in the face of risk and uncertainty. In fact, a double research gap is evident in the literature: first, a lack of attention to the cognitive and emotional components of educational

decision-making, and second, a lack of focus on newly recruited faculty members who face more decision-making challenges at the beginning of their professional path. Also, most of the existing studies are quantitative, and a qualitative perspective based on lived experiences is less common [20-21].

In addition, a specific group of professors who are at the beginning of their professional careers (newly recruited professors) has received less attention. At the same time, research shows that this group, due to a lack of experience, is more vulnerable in educational decision-making [22-24]. In the context of higher education, the role of faculty members in academic and management decisions is very decisive. It has a significant impact on the quality of teaching and the improvement of university performance [25-26]. In addition, a proper understanding of hazards and risk assessment, especially in academic crisis management, facilitates improved decision-making processes and increased human reliability [27]. Research has also shown that cognitive biases can play an important role in shaping individuals' attitudes and decision-making, and their correction can be effective in improving psychological indicators and individual motivation [28]. Furthermore, an entrepreneurial mindset has been considered as one of the influential factors in decision-making intentions and behaviors, especially in academic environments [29]. Therefore, it is of great importance to examine the cognitive dimensions of human reliability and risk perception in faculty members' educational decision-making, especially in specific situations such as being newly recruited and assuming managerial responsibilities.

In response to this gap, the present study, using a qualitative and case study approach, examines the cognitive dimensions of human reliability and risk perception in educational decision-making among newly recruited university professors. The focus of this research is on the lived experiences and in-depth analysis of the personal narratives of these professors in facing decision-making situations under risk and uncertainty. The innovation of the present study lies in combining educational psychology concepts (such as cognitive processing and decision bias) with human reliability analysis frameworks in systems engineering; an interdisciplinary approach that has been less used in higher education studies. In fact, the present study, to fill this interdisciplinary gap, attempts to answer the question of how newly recruited faculty members make decisions in educational situations with risk and uncertainty, and what cognitive processes play a role in this path, relying on the lived experiences of newly recruited faculty members.

2. Method

This study is designed with a qualitative approach and as a single-sample case study to examine the cognitive dimensions of human reliability and risk perception in the

educational decision-making of newly recruited faculty members. The research sample is a faculty member of the psychology department of a non-profit university approved by the Ministry of Science, who has been working there for less than a year and has been appointed as the group director and head of the two disciplines of psychology and educational sciences at the same time. The sample was selected purposively due to the unique characteristics of the individual and her suitability for the research purpose.

This study employed a single-case, in-depth qualitative design. Single-case studies are an accepted and rigorous strategy in qualitative research when the objective is to generate a deep, contextualized understanding of a phenomenon rather than to produce statistical generalizations. Classic methodological texts and case-study methodologists [30] recognize that single-case designs can provide rich theoretical insights, facilitate the development of conceptual models, and illuminate mechanisms that may not be visible in larger-sample studies. Therefore, the purpose of the present study is explanatory and theory-generating: to explore cognitive dimensions of human reliability and risk perception in depth, rather than to claim broad statistical representativeness.

To collect data, a semi-structured and in-depth interview was conducted using a designed interview guide. The interview began with a general and open-ended question, "Please tell us about your experience in educational decision-making in the past year," so that the participant had enough space to express her views and experiences. The interview was held in two sessions, each session lasting an average of 60 minutes, and was audio-recorded with the participant's permission and then transcribed in detail. Data analysis was conducted using thematic analysis based on the framework of Braun and Clarke (2006). Data were analyzed following Braun and Clarke's (2006) six-step thematic analysis. Two researchers independently conducted the initial coding: the principal investigator (first author) and a research associate. Each transcript was coded separately, after which the two coders compared codes and discussed discrepancies until consensus was reached. Intercoder agreement was assessed through percent agreement and iterative reconciliation; disagreements were resolved through discussion and, when necessary, consultation with a third senior researcher. To enhance credibility and reduce bias, we used several trustworthiness strategies: (a) member checking — preliminary themes and interpretations were returned to the participant for confirmation, (b) peer debriefing with research colleagues, and (c) audit trail documentation of coding decisions. The sufficiency of data was judged by iterative review and the emergence of stable themes (i.e., thematic saturation), indicating that the dataset provided adequate depth for the study's explanatory aims.

The analysis process included initial coding, classification of codes into themes, review of themes, and

their final definition. In order to increase the validity and reliability of the data, a review method with direct participant participation and feedback from research colleagues was used. Also, to comply with ethical considerations, all stages of the research were conducted with informed consent from the participant and approval from the university ethics committee.

3. Finding

The following section presents the research findings based on the analysis of a semi-structured interview with a newly recruited faculty member in the country's higher education system. The participant is a 34-year-old woman with a PhD in psychology who was recruited in February 2023 through the official call of the "Mehr Razavi" system of the Ministry of Science, Research and Technology, at one of the universities affiliated with this ministry. Upon her initial employment, she was simultaneously appointed as the director of the Psychology and Educational Sciences Department, which has also placed numerous managerial responsibilities on her shoulders. Data collection was conducted through two semi-structured and in-depth interviews, in two separate sessions (each session lasting an average of 60 minutes). The interviews began with an open-ended, exploratory opening question, "Please tell us about your experience in educational decision-making in the past year," and were guided to key questions based on an interview guide designed by the researcher. The interviews were recorded with the informed consent of the participant, transcribed in full, and then analyzed using thematic analysis based on Braun & Clarke's (2006) six-step process. These steps included: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and finally writing the final report.

Focusing on the cognitive dimensions of human reliability and risk perception in educational decision-making, five main themes were extracted from the participant narratives, each representing an aspect of decision-making mechanisms in complex, ambiguous, and stressful academic situations.

The analysis of the interview transcripts led to the extraction of a comprehensive set of 80 empirical statements (primary codes) that accurately and multifacetedly represent the experience of a novice faculty member in the role of department head and university lecturer. These primary codes indicate that the individual faces multiple structural and organizational challenges, including sudden appointments without participation, systematic gaps in curriculum frameworks, and disruptions in educational prerequisites and co-requisites. At the same time, non-professional pressures and inappropriate managerial interventions have made the workplace difficult and caused role conflicts and conflicts of personal values with organizational requirements.

Issues related to the shortage of skilled personnel, time constraints, and decision-making under conditions of ambiguity impose complex layers of job pressure and

stress on the individual. On the other hand, the codes reflect the individual's efforts to maintain intellectual independence, adhere to professional principles, and compensate for deficiencies through creative solutions and multi-role management. Also, the experience of burnout, one-sided workload, and ineffective administrative communication illuminates the

psychological and emotional dimensions of job difficulties. Finally, this initial set of codes provides a clear picture of the complex interaction between the individual, the organizational structure, and culture. It provides the necessary infrastructure for deeper thematic-based analyses. Thematic analysis is then conducted based on Braun & Clarke's (2006) six-step process.

Table 1. Organizing and basic themes

Organizing theme	Basic themes
Educational and management processes and structures (13 codes)	Appointment without participation, informal managerial learning, designing the curriculum structure, adapting to imposed requirements, initial systemic vacuum, disruption in educational continuity, poor awareness of academic regulations, inconsistency in prerequisites, assigning courses to unrelated individuals, recruitment based on structural needs rather than merit, lack of specialized human resources, technological limitations in education, lack of appropriate infrastructure
Pressures and psychological burden in decision-making and management (15 codes)	Non-professional organizational pressure, strict adherence to rules, time stress in decision-making, administrative time constraints, decision-making under conditions of ambiguity, symptoms of burnout, imbalance of tasks in the team, one-sided workload, formal expression of dissatisfaction, psychological burden resulting from the managerial role, mental-physical exhaustion, the effect of pressure on motivation, psychological burden resulting from incompatible interactions, the indirect effect of incompatible people, fatigue from multifaceted expectations
Human interactions, roles and reliability (14 codes)	Management's professional inconsistency, direct colleague inefficiency, intergroup intervention without expertise, inefficient workforce overload, concern about training adequacy, successful experience in risk, use of decision-making authority, decision clarification with manager, cognitive autonomy, confidence in decision in new situation, informal experience transfer, independent problem solving, multitasking, organizational multi-role
Role conflicts, communication style, and values (9 codes)	Failure to maintain professional privacy, conflict of communication style with student expectations, alternation between passivity and resistance, commitment to professional principles, influence of secondary judgments, revision of cognitive judgment, professional responsibility, conflict of personal value with organizational role, empathy while in an official role
Structural and administrative limitations and inefficiencies (15 codes)	Disruption in planning, organization's unresponsiveness to educational needs, compensation for lack of resources through personal means, research decline, complexity in organizing human resources, disregard for educational priorities, disregard for scientific growth, resistance to quality, perception of professional limitations, intention to leave the job, perception of structural differences between organizations, comfort in a one-dimensional role, low control over final decisions, gap between responsibility and authority, ineffective administrative communication.
Risk perception and learning environment (14 codes)	Disruption of values with the student body, direct and transparent communication, erosion of professional motivation, student satisfaction with teaching, balance between discipline and intimacy, the role of perception in teaching evaluation, motivation in academic guidance, dissatisfaction with organizational decisions, comfort in another academic environment, experience of motivated learners, positive educational feedback from students, the effect of multiple roles on job satisfaction, perception of instrumental goal setting in learners, experience of unmotivated learners in a new environment

In Table 1, the organizing themes are categorized by examining the 80 initial conceptual codes extracted from the qualitative data. Each organizing theme includes a set of basic codes that reflect different dimensions of the experience and perception of new faculty members in the educational decision-making process. Specifically, six organizing themes can be identified in this table, each of which, according to the nature of the subset basic codes,

covers different aspects of structure, psychological pressures, human interactions, role conflicts, organizational constraints, and perception of the learning environment. This structural categorization provides a more comprehensive understanding of the factors affecting faculty members' decision-making and provides the basis for more in-depth analyses in the next stages of the research.

Table 2. Overarching, organizing, and basic themes

Inclusive themes	Organizing theme	Basic theme example
Cognitive-emotional challenges in risk perception and professional roles	Psychological stress and burnout, role and value conflict, experience of communication and management conflicts, gaps in the organizational system and communications	Work pressure, role ambiguity, conflict between personal values and organizational role, and ineffective relationships
Human reliability in decision-making and professional self-leadership	Management competencies and decision-making autonomy, individual resources for coping, adaptation, and comparative understanding of differences between organizations	Decision-making under ambiguity, confidence in decision-making in a new situation, understanding structural differences between organizations, independent problem-solving, and professional responsibility
Structural and organizational factors affecting educational decision-making	Educational and management processes and structures, resource and infrastructure limitations, characteristics of the learning environment and students	Regulations, processes, lack of resources, lack of institutional transparency, and the impact of student characteristics on the evaluation and implementation of educational programs

Table 2 shows the classification of organizing themes into overarching themes. In this table, using the

third stage of thematic analysis based on Braun & Clarke's (2006) six-stage model, the organizing themes

extracted in the previous stage were analytically reviewed and aggregated into three overarching themes. These overarching themes represent a deeper conceptual structure of the qualitative data. The first overarching theme, “Cognitive-emotional challenges in risk perception and professional roles,” reflects the psychological experiences and emotional tensions of newly recruited faculty members in their interactions with the academic environment, organizational relationships, and job roles. The second overarching theme, “Human reliability in decision-making and professional self-leadership,” reflects the individual resources, cognitive capabilities, and managerial competencies of faculty members in dealing with risky educational situations and

contingency decisions. Finally, the third overarching theme, “Structural and Organizational Factors Affecting Educational Decision-Making,” addresses the institutional context and contextual conditions that affect educational decision-making, which can directly or indirectly affect the level of human trust and risk perception. This three-layer organization (basic themes → organizing themes → overarching themes) allows for the analysis of the phenomenon under study at different levels and provides a coherent conceptual framework for explaining the cognitive dimensions of human trustworthiness and risk perception in the context of higher education.

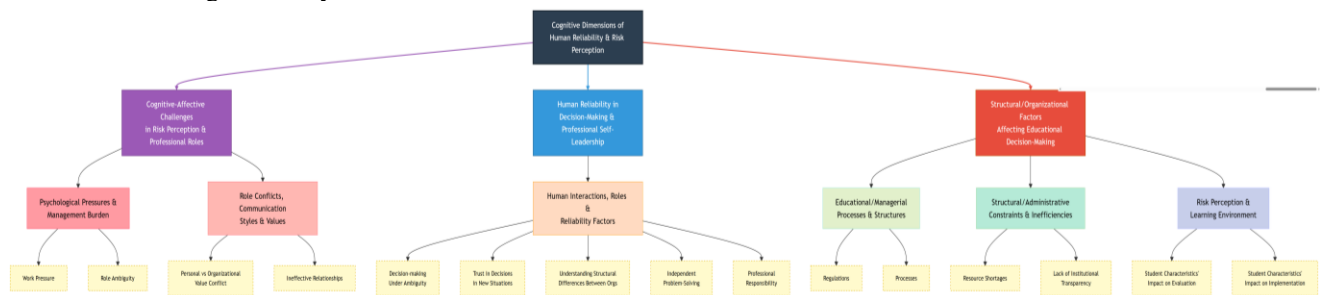


Figure 1. Final conceptual model

Figure 1 presents an integrated framework of cognitive dimensions of educational decision-making in newly recruited faculty members, derived from the qualitative analysis of lived experiences. The model illustrates how three major domains—cognitive-emotional challenges, human reliability, and structural-organizational factors—interact dynamically in the decision-making process. Arrows represent reciprocal influences, showing that changes in one domain (e.g., organizational pressure) can alter risk perception and reliability.

This integrative framework visually clarifies how the “vicious cycle” of structural strain and cognitive erosion emerges, and how adaptive strategies can disrupt it. At a macro level, the three overarching themes demonstrate the dynamic interplay between cognitive-emotional challenges (such as psychological stress, role ambiguity, and value conflict) that influence risk perception; human reliability (including self-leadership strategies like decision-making under ambiguity and professional accountability) that act as adaptive mechanisms; and structural factors (such as resource constraints, administrative inefficiency, and learning environment characteristics) that define the decision-making context.

By integrating frameworks from human reliability engineering (HRA) and educational psychology, this model bridges the theoretical gap between industrial safety studies and higher education. The key insight is the identification of a “vicious cycle of structural strain—cognitive erosion,” in which organizational constraints (e.g., resource limitations) reduce reliability in decision-

making and distort risk perception—a mechanism explaining higher error rates among newly hired faculty members.

4. Conclusion

This research, in the form of an in-depth qualitative case study of the experience of a newly recruited faculty member, examines the cognitive components of decision-making in high-risk situations and responds to some theoretical gaps in higher education that have been previously raised by [2] and [5] in the context of neglecting the internal processes of effective teaching and cognitive competencies. The HRA framework, which was first used in high-risk industries such as nuclear power plants [10], is innovatively localized in this research to the academic environment, enabling the cognitive analysis of fallibility in the context of higher education [17, 13].

The findings suggest that combining human reliability engineering (HRA) and educational psychology frameworks provides a novel approach to analyzing decision-making processes under risk in higher education. As noted in the introduction, previous studies have focused on behavioral indicators or student perspectives, whereas this study, by exploring lived experiences, has revealed the cognitive mechanisms influencing risk perception. The findings confirm that newly hired faculty members face a vicious cycle of structural stress-cognitive attrition: organizational constraints (such as resource shortages and administrative inefficiency) on the one hand, and the conflict of multiple

roles (management/teaching) on the other, leading to increased error in decision-making.

Findings [28] and [7] also confirm these negative effects on the executive and cognitive performance of professors in the academic context. Objective examples such as “one-sided workload” (code 26) and “mental-physical exhaustion” (code 53) illustrate the destructive interaction between organizational stress and the decline in human reliability. However, the data show that professors use cognitive resilience resources to moderate challenges, including cognitive autonomy (code 33) in designing course structures, professional responsibility (code 39) in adhering to educational principles, and independent problem solving (code 50) in compensating for deficiencies.

These strategies, in line with Gigerenzer’s (2011) [11] theory, suggest the development of a “cognitive toolbox” for managing uncertainty. According to the findings [14], the use of cognitive strategies, including mental risk restructuring (redefining and adjusting one’s attitude towards risk), plays an effective role in moderating common biases in situations of uncertainty. The central contribution of organizational factors to the findings confirms Swain & Guttman’s (1983) [10] idea

that human reliability is not simply an individual characteristic, but a product of interaction with the institutional context. Issues such as the “responsibility-authority gap” (code 72) and “low control over final decision-making” (code 71) provide evidence that flawed administrative systems undermine the capacity for optimal decision-making.

Specifically, this research addresses theoretical gaps related to the under-recognition of cognitive decision-making processes [2, 5] and the neglect of the occupational vulnerability of novice teachers [22, 24]. By integrating HRA and educational psychology, an integrated framework for analyzing decision-making under ambiguity has been provided, an approach that goes beyond focusing solely on the outward behavior or evaluation of students [18].

Findings indicate that novice professors are affected by three key factors, including organizational constraints (lack of resources and ineffective communication; 6, 26), cognitive burnout (one-sided workload and mental-physical exhaustion; 7, 28), and institutional pressure, which interact to increase error in high-risk decision-making [10, 13].

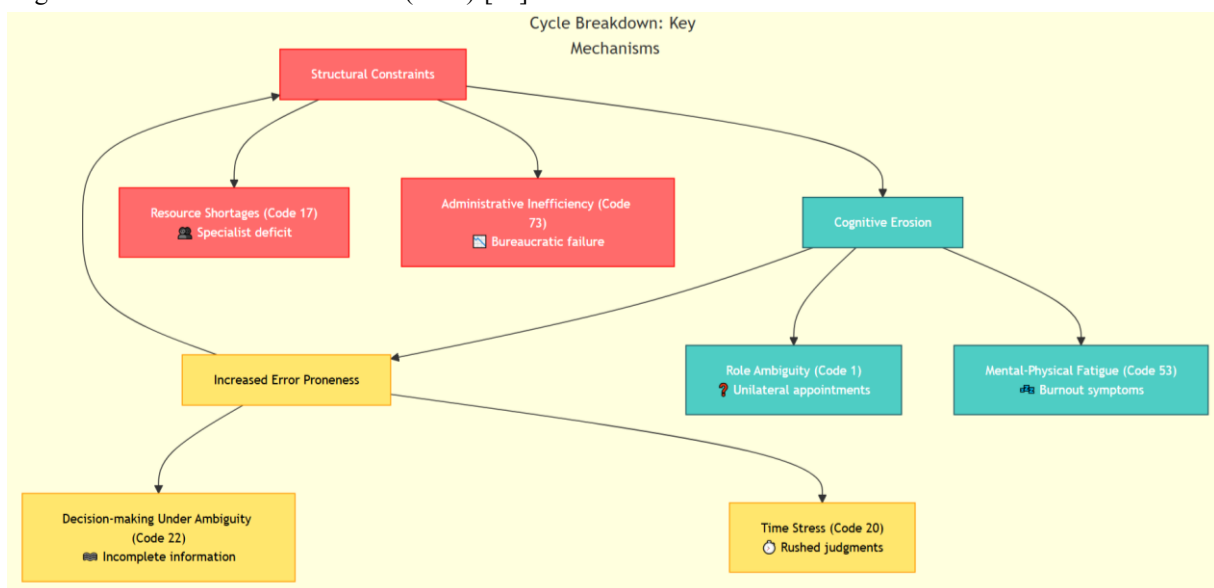


Figure 2. Failure cycle: key mechanisms

Figure 2 illustrates the cycle of failure and its key mechanisms. Data suggest that professors use three key cognitive strategies to break the vicious cycle: cognitive autonomy (cognitive exploration theory) [11], professional accountability (effective teaching models) (Moslehi and Davari, 2022), and independent problem solving (resilience in risk management) [16]. These strategies form the core of the “cognitive toolbox” [11], which is consistent with the findings [5] about teachers’ cognitive competencies.

The central contribution of structural factors to the findings also reveals four crucial points: the responsibility-authority gap (fully consistent with the

“risk model of managerial decision-making” [8], confirmed by the study [26] on inadequate faculty participation); low control in decision-making (in line with the “bureaucracy effect on professional judgment” [6], reflecting the findings [27] on institutional risk management). These cases support the basic HRA theory that human reliability is a product of individual-organizational interaction [10, 17]. As has been suggested in studies [17], the ongoing interaction between organizational policies and individual cognitive capacity is a key indicator in the occurrence or control of human error. Although this study provides valuable insights into cognitive decision-making processes by analyzing an

individual's experience in depth, the use of a single case as a data source limits the generalizability of the results. However, the depth of analysis and the resulting theoretical development can serve as a basis for future research in more diverse samples.

Future research should not only expand to more diverse and multicultural universities, but also compare different academic disciplines (e.g., engineering, humanities, and medical education) to examine how contextual variables influence cognitive reliability and risk perception. In addition, longitudinal or mixed-methods studies could explore how these mental processes evolve as faculty gain experience. Finally, comparative studies between public and private universities in Iran could provide insights into how institutional culture shapes academic decision-making under risk. Also, examining the role of new technologies, including artificial intelligence, in enhancing or weakening educational risk perceptions [16] and in developing technological literacy and related teaching styles [21] could broaden the horizons of interdisciplinary research.

Overall, this research is a novel attempt at indigenous and interdisciplinary theorizing about the cognitive decision-making process in Iranian higher education, which, by integrating educational psychology, human reliability theories, and empirical insights, provides an analytical framework that can be developed in future research. Ultimately, this research is an important step towards a deeper understanding of the cognitive decision-making processes in the country's higher education, which can pave the way for improving academic policies and practices.

Conflict of Interests

No conflict of interest has been expressed by the authors.

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