



Identification and Prioritization of Factors Affecting Whistleblowing Behavior on Tax Violations Using the ISM Structural Equation Modeling Technique

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ABSTRACT

Whistleblowing on tax violations refers to the disclosure of tax fraud and income concealment with the aim of protecting public interest and promoting tax justice. This behavior is shaped by individual, organizational, and social factors and serves as an effective tool for reducing tax corruption and strengthening public trust. The present study, conducted in summer 2025, adopted a mixed qualitative–quantitative design. In the qualitative phase, grounded theory was used, and in the quantitative phase, the FDAHP method was applied. Data were gathered through interviews with 15 experts. The qualitative analysis first identified 32 components, which were refined to 25 key factors after three rounds of fuzzy Delphi. These included secure reporting channels, legal and regulatory requirements, financial incentives, strengthened tax justice, reduced pressure on compliant taxpayers, and fear of retaliation. Structural equation modeling showed that the most influential drivers of whistleblowing were legal and regulatory frameworks, education and awareness, financial reward systems, severity of violations, trust in oversight institutions, justice-oriented motivations, organizational support, protection of whistleblower identity, and increased transparency and public trust. Finally, technological and information infrastructures were found to be the most impacted factors within the system.

Keywords: Whistleblowing Behavior, Whistleblowing of Violations, Tax Violations, Grounded Theory, Fuzzy Delphi



1. Introduction

In recent decades, the growing complexity of economic activities and the expansion of tax evasion methods have posed significant challenges for national tax systems. Ensuring tax justice and strengthening public trust require transparency tools that can effectively confront violations. One important tool is tax violation whistleblowing, through which individuals reveal fraud and income concealment and thereby contribute to reducing tax corruption (Bernasconi, 2023). Whistleblowing provides a mechanism for reporting misconduct, fraud, and corruption inside or outside organizations and plays a key role in enhancing institutional efficiency and integrity. Since financial and administrative corruption undermines investment, damages public trust, and disrupts macroeconomic programs, global experiences show that countries with institutionalized reporting systems and strong whistleblower protections have achieved better outcomes in combating corruption and improving transparency (Lewis, 2021; Okoro et al., 2022). Transparency International also highlights the importance of disclosure systems in improving countries' CPI rankings.

In Iran, despite several anti-corruption regulations—such as the Law on Intensifying Punishment of Bribery, Embezzlement, and Fraud (1988), the Law on Handling Administrative Violations (1993), and the Law on Promoting Administrative Health and Combating Corruption (2011)—instances of corruption continue to appear. The National Tax Administration, due to its direct connection with public revenues, is highly vulnerable, and any corruption within it has widespread economic consequences. Designing effective whistleblowing models can therefore serve as a strategic tool for identifying and preventing violations. From a theoretical perspective, whistleblowing is a complex organizational behavior shaped by variables such as organizational culture (Rajeevan, 2019), job identity, ethical leadership (Aghili & Nikmanesh, 2020), legal protections (Bashir et al., 2011; Launa, 2016), and ethical considerations (Safari et al., 2019), demonstrating that legislation alone is insufficient; cultural, organizational, and legal supports are essential to reduce the personal and social costs of disclosure. Additionally, accountants and auditors—who often witness irregularities in tax organizations—face ethical

and professional dilemmas when deciding whether to report misconduct, a process with significant consequences for individuals and institutions (Kaptein, 2022). Evidence also shows that the absence of a strong whistleblowing system and inadequate protection leads to silence in the face of corruption and increases opportunistic behavior. According to the 2020 ACFE report, over 40 percent of fraud detection results from internal reporting, underscoring the critical role of whistleblowing mechanisms. Internationally, countries like Sweden, Denmark, and New Zealand have achieved top CPI rankings through robust whistleblower protections, whereas countries lacking such systems remain highly vulnerable to corruption. Given Iran's low CPI standing in recent years (Cetin Kaya & Altintas, 2021), revising anti-corruption strategies and adopting global best practices have become essential.

This study focuses specifically on tax whistleblowing—unlike most prior research that examined general public-sector or corporate whistleblowing. By integrating international theoretical models with Iran's cultural and institutional context, it explores behavioral, psychological, and organizational drivers of whistleblowing. Using a mixed-method design (qualitative–quantitative), it identifies the influencing factors and proposes a localized framework for enhancing tax transparency and protecting whistleblowers. Such research is vital both for understanding employees' motivations and behaviors and for supporting policymaking, legislative protections, and practical implementation mechanisms. Accordingly, this study aims to develop a coherent model for whistleblowing in tax violations that contributes to the research literature and offers actionable insights for tax authorities and policymakers. Given the growing importance of tax transparency and anti-corruption efforts, the study examines a comprehensive framework that includes causal, contextual, and intervening conditions, as well as whistleblowing strategies and outcomes. Grounded theory is used to identify influencing and affected factors, followed by Fuzzy DEMATEL to analyze causal relationships and prioritize variables. The findings can inform the development of protective policies, legal mechanisms, and technological infrastructures for safeguarding whistleblowers. Moreover, the results guide future researchers in expanding the scientific literature on tax

whistleblowing and proposing solutions to strengthen the integrity and efficiency of the national tax system.

Literature Review

Whistleblowing on tax violations is a complex behavioral phenomenon that cannot be adequately explained through legal or descriptive perspectives alone. Rather, it should be understood within an integrated theoretical framework that links individual motivations, ethical evaluation, and institutional conditions. To achieve this, the present study draws upon three foundational behavioral and psychological theories: The Theory of Planned Behavior (Ajzen, 1991), Prosocial Organizational Behavior (Brief & Motowidlo, 1986), and the Moral Intensity Model (Jones, 1991), while situating tax whistleblowing within broader discussions of behavioral economics, public governance, institutional trust, and tax morale. According to the Theory of Planned Behavior, individuals' intentions to report tax violations are shaped by their attitudes toward whistleblowing, perceived social norms, and perceived behavioral control (Ajzen, 1991). In the tax context, favorable attitudes arise when individuals believe that disclosure promotes tax justice and protects public resources, while subjective norms are influenced by organizational culture and societal acceptance of reporting misconduct. Perceived behavioral control depends largely on the existence of secure reporting channels, legal protection, and confidence in supervisory institutions.

Prosocial Organizational Behavior conceptualizes whistleblowing as an ethical and socially responsible act aimed at protecting collective interests, even in the absence of personal rewards (Brief & Motowidlo, 1986). This perspective explains why individuals may engage in tax whistleblowing

despite risks such as retaliation, social stigma, or career harm, particularly in environments where public resources are vulnerable and formal enforcement mechanisms are weak (Hausserman et al., 2023).

The Moral Intensity Model further complements this framework by emphasizing that ethical decision-making is influenced by the perceived severity and consequences of misconduct (Jones, 1991). Tax violations that are viewed as large-scale, systematic, or harmful to public welfare increase moral intensity and strengthen individuals' motivation to disclose wrongdoing (Bernasconi et al., 2022; OECD, 2021).

Integrating these theories provides a coherent explanation of tax whistleblowing behavior as the outcome of an interaction between behavioral intentions, prosocial ethical motivations, and contextual institutional factors. The findings of this study support this integrated framework, highlighting the central role of positive attitudes toward disclosure, moral responsibility, trust in institutions, and secure reporting mechanisms in shaping whistleblowing intentions. Consequently, effective tax whistleblowing policies require not only legal enforcement but also governance strategies that enhance institutional trust, strengthen tax morale, and address behavioral and psychological drivers of disclosure (Bigelman, 2010; Burgstaller & Pfeil, 2024).

In addition to prosocial motivations, recent behavioral research emphasizes that whistleblowing behavior-particularly in sensitive domains such as tax violations-often emerges from the coexistence and interaction of altruistic intentions and opportunistic personality traits, rather than from purely moral or purely self-interested drivers. While prosocial organizational behavior highlights ethical responsibility and concern for collective welfare (Brief & Motowidlo, 1986), individual differences such as Machiavellianism introduce a more strategic and calculative dimension to disclosure decisions. Machiavellian individuals are characterized by goal-oriented behavior, sensitivity to personal gain, and a heightened awareness of risks and power asymmetries (Christie & Geis, 1970; Dahling, Whitaker, & Levy, 2009). In the context of tax whistleblowing, such individuals may engage in disclosure not solely due to moral obligation, but when institutional conditions-such as strong legal protection, anonymity guarantees, and financial incentives-align with their self-interest. This does not negate the role of prosocial motives; rather, it suggests a conditional interaction in which ethical concern and instrumental rationality coexist. Empirical studies indicate that whistleblowing intentions are often strongest when moral intensity is high and when individuals perceive that personal risks are mitigated and potential benefits are tangible (Jones, 1991; Lee, Ng, Shevlin, & Venkat, 2025). Accordingly, the integration of the Theory of Planned Behavior with personality-based perspectives allows for a more nuanced explanation of observed behaviors, whereby attitudes toward whistleblowing and perceived behavioral control are filtered through

individual cost–benefit calculations shaped by traits such as Machiavellianism. This interactional view moves beyond parallel description and demonstrates that effective tax whistleblowing systems must simultaneously appeal to ethical norms and manage opportunistic tendencies through robust institutional design, thereby transforming self-interest into a functional mechanism for enhancing transparency and tax compliance (Gao, Li, & Zhang, 2024; Kenny & Fotaki, 2023).

Research Background

Rostami and Rezaei (2024) conducted a study titled “Tax Whistleblowing in Iran and Reporting Systems.” The findings indicate that although establishing system-based platforms for reporting violations is a positive step toward developing transparency, without ensuring data confidentiality and the necessary legal protections, sufficient motivation and trust for widespread use of these mechanisms will not be created. Therefore, the study emphasizes the need for legal and institutional reforms alongside technical systems.

Abbasi and Taheri (2023) examined the role of whistleblowing in enhancing “financial discipline in state-owned companies.” Their results showed that the establishment of internal reporting mechanisms leads to a reduction in opportunities for fraud and strengthens auditing processes. Moreover, the independence of inspection units and employee training were

identified as key factors for increasing the effectiveness of the whistleblowing system. These findings highlight the importance of synergy between the human dimension (training and employee motivation) and the structural dimension (regulatory independence).

Mousavi and Kazemi (2022) conducted a study titled “Identification and Ranking of Antecedents of Whistleblowing in Iran.” The results indicated that individual factors such as professional ethics and risk tolerance, structural factors such as the existence of secure channels and managerial support, and cultural factors such as societal attitudes toward corruption all play a decisive role in shaping whistleblowers’ motivations. Therefore, whistleblowing in Iran is a multidimensional phenomenon that must be analyzed simultaneously from psychological, social, and organizational perspectives.

Motahari et al. (2022) in a study titled “Analyzing the Impact of Whistleblowing on Financial Discipline in State-Owned Companies” examined this issue. The results showed that factors such as the personal characteristics of the reporter, the influence and power of the offender, available monitoring resources for violations, and decisive action by regulatory bodies have a direct impact on improving financial discipline. Consequently, the study emphasizes the importance of fair and prompt action against offenders as a key deterrent.

Li et al. (2025), in a study titled “Deterrent Effects of Tax Whistleblower Laws: Evidence from the New York False Claims Act,” focused on the New York False Claims Act. The findings indicate that requiring companies to provide legal incentives for whistleblowers, in addition to positive outcomes such as increased transparency, also results in negative consequences, such as the growth of false reports. However, the overall results showed that the net economic benefits of these laws are positive, and countries can use this evidence to design effective policies.

The Organization for Economic Cooperation and Development (OECD, 2023) presented a report titled “Tax Crime Research Maturity Model.” This model indicates that countries with access to strong analytical and data tools perform better in effectively utilizing whistleblower programs. It is also recommended that whistleblowing alone is not sufficient and should be complemented by tools such as automatic information exchange, transactional data analysis, and inter-agency cooperation to maximize effectiveness.

Park and Blenkinsopp (2021), in a study conducted in South Korea, examined the “Impact of Ethical Training on Whistleblowers’ Intentions.” The results showed that employees who received ethical training are significantly more likely to report financial violations. Therefore, ethical training in organizations is introduced as a key factor for institutionalizing a whistleblowing culture and enhancing financial integrity.

Johansen and Stolper (2021), in a study titled “The Deterrent Effect of Whistleblowing,” examined this phenomenon. The findings indicate that disclosure and information dissemination by whistleblowers can have a strong deterrent effect against violations, especially when media and regulatory bodies are involved. However, the study warns that this deterrent effect may

be temporary unless supported by legal prosecution and long-term institutional changes.

Li et al. (2020), in their research focusing on “Social Media, Whistleblowing, and Corporate Fraud,” found that media and social networks play an important role in increasing individuals’ willingness to report violations. Moreover, public support and a positive media environment can strengthen whistleblowers’ confidence and lead to more successful disclosures.

Research Methodology

This study adopts a mixed-method (qualitative–quantitative) approach to examine the behavioral, organizational, and structural dimensions of whistleblowing on tax violations. Given the complexity and contextual nature of tax whistleblowing, combining qualitative exploration with quantitative validation allows for both theory development and empirical rigor. In the qualitative phase, a systematic review of prior research on whistleblowing, tax misconduct, and ethical decision-making was conducted to establish an initial conceptual framework. Subsequently, semi-structured interviews were carried out with experts selected through purposive sampling, based on their professional experience in taxation, auditing, anti-corruption, and familiarity with reporting mechanisms. A total of 15 in-depth interviews were conducted until theoretical saturation was achieved. Data were analyzed using the grounded theory approach, including open, axial, and selective coding. This process led to the identification and refinement of key concepts and their interrelationships, resulting in 32 initial variables related to tax whistleblowing behavior. Based on the qualitative findings, a structured questionnaire was developed as the first round of the Fuzzy Delphi method. In the quantitative phase, the Fuzzy Delphi technique was employed to screen and prioritize the extracted variables and to achieve expert consensus under uncertainty. The process was conducted in three iterative rounds, leading to the selection of the most influential components affecting whistleblowing on tax violations. Next, to examine the interdependencies among the selected variables and to determine their levels of influence and dependence, Interpretive Structural Modeling (ISM) was applied. ISM enabled the classification of variables into hierarchical levels, distinguishing key driving factors from dependent ones. The results indicated that legal

frameworks, ethical motivations, and organizational support function as core driving variables, whereas technological and informational infrastructure emerged as more dependent factors, highlighting the necessity of supportive institutional and cultural conditions for effective technological implementation. Overall, the integration of qualitative theory development with Fuzzy Delphi and ISM techniques resulted in a validated, coherent, and interpretable model of tax whistleblowing behavior. This methodological design enhances the study’s robustness and provides a solid empirical basis for policy formulation and institutional decision-making in the field of tax transparency and integrity.

Analysis of Findings

In this study, expert interviews in the field of whistleblowing behavior on tax violations were collected and analyzed using three coding methods (open, axial, and selective) during the theory-building phase. As previously mentioned, the researcher utilized the full range of grounded theory processes in this study, including open, axial, and selective coding, as well as memo-writing and diagramming. For open coding, the relevant table—which includes two sections: the interviews and the initial extracted codes, secondary conceptual codes, and the categories derived from them—was fully utilized.

A: As observed in Tables 1, the effort is to extract the key points and issues emphasized by the interviewees. Attention to these key points, which have been derived from the interview texts, helps the researcher creatively select titles that are appropriate to the specific characteristics related to the study. After coding and completing the associated steps, all key points from the interviews were assigned titles as follows.

Table 1: Summary of Research Interviews (Qualitative Section)

Initial Coding (Interviews)	
–	The harsher the economic conditions, the greater the public sensitivity to tax violations and the willingness to report them.
–	Access to accurate and integrated organizational data increases the whistleblower's trust in the correctness of reports and reduces the risk of errors.
–	Financial rewards partially compensate for the potential risks associated with disclosure for the individual.
–	By detecting and reporting tax violations, more resources become available to the government, which can be spent in public sectors.
–	It is important that disclosure cases are not left unresolved, as leaving them incomplete undermines public trust.
–	A whistleblower without guaranteed personal security will not have sufficient motivation to provide accurate evidence.
–	Transparent and organized control mechanisms facilitate the detection of financial violations.
–	Personality, along with previous experience, can predict whistleblowing behavior.
–	Trust in investigative authorities is directly related to the level of transparency in the investigation process and accurate information dissemination.
–	The existence of transparent organizational policies can reduce the risk of disclosing customer violations.

At this stage, by creating lines of codes during the coding phase and utilizing them, 247 items related to the content and identification of factors influencing whistleblowing behavior on tax violations were identified.

B: In this stage, the formation of main categories and classes takes place. The researcher, in this section, examines the relationships among the concepts extracted from the interviews (initial coding) and the fundamental bases of the study (identification of factors influencing whistleblowing behavior on tax violations) and strives to establish a comprehensive, complete, logical, and integrated connection among

these categories. Based on this, the main categories and classes are configured, enabling the researcher to conduct axial coding and ultimately take the necessary steps to identify the targeted factors that are effective in determining whistleblowing behavior on tax violations.

As a result, based on the interviews conducted in this study, the researcher seeks to answer the following question: What are the factors influencing whistleblowing behavior on tax violations, and is it possible to identify the rank and position of each of them?

Table 2: Secondary Coding of Interviews

Subcategories	Verbal statement
Economic conditions and level of inequality	The harsher the economic conditions, the greater the public sensitivity to tax violations and the willingness to report them.
Technological and informational infrastructure	Access to accurate and integrated organizational data increases the whistleblower's trust in the correctness of reports and reduces the risk of errors.
Financial reward programs	Financial rewards partially compensate for the potential risks associated with disclosure for the individual.
Increase in government revenues and improvement in resource allocation	By detecting and reporting tax violations, more resources become available to the government, which can be spent in public sectors.
Persistence in pursuing violations	It is important that disclosure cases are not left unresolved, as leaving them incomplete undermines public trust.
Preservation of identity and personal security	A whistleblower without guaranteed personal security will not have sufficient motivation to provide accurate evidence.
Organizational factors	Transparent and organized control mechanisms facilitate the detection of financial violations.
Individual characteristics of the whistleblower	Personality, along with previous experience, can predict whistleblowing behavior.
Trust in investigative authorities	Trust in investigative authorities is directly related to the level of transparency in the investigation process and accurate information dissemination.
Type of relationship between the employee and the offender	The existence of transparent organizational policies can reduce the risk of disclosing customer violations

After identifying the main categories through selective coding, the grounded theory analysis was finalized, resulting in the extraction of 32 key factors related to tax whistleblowing behavior.

To establish the expert panel, a snowball (chain) sampling method was applied. Initially, two experts

in whistleblowing behavior were identified and asked to nominate other qualified specialists in the field. This process produced a list of 55 potential experts. After receiving a brief overview of the research objectives, topic, and expected time commitment, 35 experts and senior managers specializing in organizational behavior, auditing, and tax violations agreed to participate and constituted the study population.

Subsequently, an initial questionnaire was

developed. Following a preliminary screening to remove duplicate or overlapping indicators, the 32 core components were confirmed and used to design the first-round Fuzzy Delphi questionnaire. This instrument served as a theoretical bridge between the qualitative and quantitative phases by operationalizing abstract behavioral and psychological constructs-such as ethical judgment, perceived behavioral control, subjective norms, prosocial motivations, and moral intensity-into measurable indicators.

The questionnaire was then distributed to the 35 experts as the first round of the fuzzy Delphi process, providing the basis for expert validation, refinement of indicators, and systematic quantification of the determinants of tax whistleblowing behavior.

Table 3: Aggregation of Experts' Opinions for the First-Round Questionnaire

Questions	Importance Scale				
	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Legal and regulatory framework	1	4	7	11	12
Training and awareness		4	3	11	17
Financial reward programs		2	3	6	24
Strengthening tax justice and reducing the burden on compliant taxpayers		4	4	9	18
Deterrence and prevention of future violations	1	3	6	10	15
Existence of official and secure reporting channels		2	4	12	17
Organizational support for whistleblowers	1	1	3	11	19
Individual characteristics of the whistleblower	2	1	7	8	17
Justice-oriented motivations	1	3	7	9	15
Severity and magnitude of the violation		4	7	2	22
Consultation with regulatory or legal authorities before acting	7	8	11	4	5
Fear of retaliation and reprisal		7	11	4	13

Cronbach's alpha for the first-round questionnaire was 0.879, exceeding the acceptable threshold of 0.7 and confirming its reliability. Subsequently, data normality was assessed using skewness and kurtosis statistics. Based on these results, several items failed to meet the required criteria and were removed, as they did not achieve theoretical saturation from the experts' perspective. Accordingly, a second-round questionnaire, similar in structure to the first, was distributed to the experts, and the responses were analyzed. As theoretical saturation was still not achieved, a third-round questionnaire was administered.

Analysis of Third-Round Responses

In this stage, the completed third-round questionnaires were analyzed. Following data collection, expert responses were aggregated, and mean values were calculated, consistent with the procedures applied in the previous rounds. The aggregated results of expert opinions in the third round are presented in Table 4.

Table 4: Aggregation of Experts' Opinions for the Third-Round Questionnaire

Question number	Questions	Importance Scale				
		Very Low	Low	Medium	High	Very High
q1	Legal and regulatory framework		1	2	4	28
q2	Favorable organizational and cultural conditions		1	1	5	28
q3	Technological and informational infrastructure		2	3	5	25
q4	Bureaucratic structure of the tax organization		3	9	12	11
q5	Training and awareness		2	3	7	23
q6	Financial reward programs		2	4	5	24
q7	Strengthening tax justice and reducing the burden on compliant taxpayers		1	4	11	19
q8	Increasing transparency and public trust		1	2	5	27
q9	Increase in government revenues and improvement in resource allocation		1	6	7	21
q10	Deterrence and prevention of future violations		1	3	9	22
q11	Protection of citizens and investors		2	4	7	22
q12	Existence of official and secure reporting channels		1	3	4	27
q13	Organizational support for whistleblowers		2	4	7	22
q14	Preservation of identity and personal security		3	3	6	23
q15	Accurate collection and documentation of evidence		1	4	6	24
q16	Persistence in pursuing violations		1	4	7	23
q17	Individual characteristics of the whistleblower		2	3	4	26
q18	Narcissism		2	3	8	22
q19	Organizational factors		2	3	7	23
q20	Machiavellianism		2	5	5	23
q21	Justice-oriented motivations		3	3	5	24
q22	Severity and magnitude of the violation		3	3	7	22
q23	Fear of retaliation and reprisal			1	5	29
q24	Trust in investigative authorities		3	2	9	21
q25	Social and cultural support		2	4	6	23

The Cronbach's alpha for the third-round questionnaire was 0.941, exceeding the 0.7 threshold and confirming its reliability.

Calculation of Fuzzy Values

At this stage, the fuzzy value of each research question was calculated based on expert judgments. Examination of the Stopping Criterion: The results of the third-round calculations are reported in Table 6. All DE fuzzified (DE fuzzy) values exceeded the average scale value of 3, indicating that all questionnaire components are influential in tax whistleblowing behavior. Moreover, no new components were proposed by the experts, confirming the achievement of the research objective-identifying

the key factors influencing tax whistleblowing strategies. Finally, expert consensus was assessed. As predefined, consensus was considered achieved when at least 70% of experts selected the same response option for each item. The results of this agreement criterion are presented in Table 5.

Table 5: Fuzzy Values and DE fuzzy Values of Third-Round Questionnaire Items and Experts' Consensus Criterion

Questions	Fuzzy Values and DE fuzzy Values of Third-Round				Examination of Experts' Consensus or Agreement Criterion			
	Fuzzy Value of Each Question			DE fuzzy Value of Each Question	Consensus Status	Highest Aggregated Value	Consensus rate	Questions Consensus Status
	U	M	L					
q1	5	3.83	2	3.556	Approved	28	85.47	Consensus
q2	5	3.62	2	3.611	Approved	28	86.19	Consensus
q3	5	3.57	2	3.542	Approved	25	81.9	Consensus
q4	5	3.7	2	3.524	Approved	12	69.52	No consensus
q5	5	3.55	2	3.567	Approved	23	80.95	Consensus
q6	5	3.73	2	3.519	Approved	24	80.71	Consensus
q7	5	3.71	2	3.578	Approved	19	79.76	Consensus
q8	5	3.53	2	3.571	Approved	27	85	Consensus
q9	5	3.75	2	3.513	Approved	21	79.28	Consensus
q10	5	3.63	2	3.583	Approved	22	81.9	Consensus
q11	5	3.579	2	3.545	Approved	22	79.76	Consensus
q12	5	3.63	2	3.524	Approved	27	84.28	Consensus
q13	5	3.66	2	3.545	Approved	22	79.76	Consensus
q14	5	3.6	2	3.556	Approved	23	79.52	Consensus
q15	5	3.63	2	3.533	Approved	24	82.14	Consensus
q16	5	3.57	2	3.545	Approved	23	81.66	Consensus
q17	5	3.72	2	3.524	Approved	26	82.38	Consensus
q18	5	3.7	2	3.576	Approved	22	80.47	Consensus
q19	5	3.5	2	3.567	Approved	23	80.95	Consensus
q20	5	3.62	2	3.500	Approved	23	79.52	Consensus
q21	5	3.7	2	3.542	Approved	24	80	Consensus
q22	5	4	3	3.567	Approved	22	79.04	Consensus
q23	5	3.81	2	4.000	Approved	29	88.09	Consensus
q24	5	3.6	2	3.606	Approved	21	79.28	Consensus
q25	5	3.83	2	3.533	Approved	23	80.23	Consensus

As shown in Table 6, all items achieved an agreement level above 70%, confirming expert consensus and satisfying the stopping criterion of the Delphi process. Accordingly, 25 key components were identified as significant determinants of whistleblowing behavior in tax violations. These components represent the core research outcomes and provide a basis for behavioral and policy intervention design.

Subsequently, the components were assigned abbreviations (Table 7) and used to construct the Structural Self-Interaction Matrix (SSIM). Experts conducted pairwise comparisons to determine the direction and strength of relationships among components, with the mode index applied to select the most agreed-upon relationship for the final SSIM. This matrix served as the input for Interpretive Structural Modeling (ISM), which organized the relationships into a hierarchical structure and enabled the

identification of driving and dependent factors, thereby supporting the prioritization of strategies to enhance tax whistleblowing behavior.

This matrix is a matrix with the dimensions of the variables, in which the variables are specified in order by symbols in the first row and column. For the relationships, the following symbols are Symbol used: variable i affects j (2), variable j affects i (2-), bidirectional relationship (1), and no relationship (0).

Table 6: Components and Abbreviations of Model Factors

Factors	Sy ^{1*}	Factors	Sy	Factors	Sy	Factors	Sy
Technological advancements	A	Development of financial health	H	Explainable Artificial Intelligence	O	Employee motivation	V
Environmental factors	B	Mechanization of reporting processes	I	Trust in data	P	thical commitment	W
Cultural factors	C	Use of appropriate auditing methods	J	Technological changes	Q	Change management	X
Legal factors	D	Continuous training and updating	K	Support for control processes	R	Auditors' skills	Y
Increasing data reliability	E	Development of technological innovation	L	Ethical and environmental risks	S	-	-
Improving transparency and accountability	F	Understanding artificial intelligence algorithms	M	Machine learning technologies	T	-	-
Accountability to stakeholders	G	Risk management	N	Over-reliance on artificial intelligence	U	-	-

Matrix 7: Experts' Comparison Matrix

Y	X	W	V	U	T	S	...	...	I	H	G	F	E	D	C	B	A	
0	2	0	-1	1	2	0	...	...	-1	0	0	0	0	1	-1	-1	0	A
-1	1	0	-1	-1	0	1	...	...	0	2	-1	-1	1	0	0	0	1	B
1	0	0	-1	1	0	1	...	...	1	0	1	2	1	2	0	0	1	C
0	-1	0	-1	2	0	0	...	...	0	2	0	1	0	0	2	0	-1	D
1	0	0	0	-1	0	-1	...	...	1	0	-1	0	0	0	0	1	0	W
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0	0	0	0	2	0	2	...	...	2	0	0	0	0	1	0	0	2	X
0	0	-1	2	-1	0	0	...	...	-1	0	0	0	-1	0	-1	-1	0	Y

Self-Interaction Matrix

In the next step, the initial reachability matrix was formed. The self-interaction matrix is a tool used in systems analysis and management research to identify and analyze the interrelationships among key factors. This matrix is designed in a square form, such that the number of rows and columns is equal to the number of factors identified in the research. To complete this matrix, the effect of each factor on other factors is examined, and the intensity and type of this effect are recorded in each cell. Scales such as 0 for no effect, 1

for weak effect, 2 for moderate effect, and 3 for strong effect are usually used. This tool helps the researcher understand complex interactions among factors and identify stronger relationships. The results obtained from the self-interaction matrix can be used in Interpretive Structural Modeling (ISM) and systematic analysis of organizational, social, and environmental issues. This method is particularly applicable in identifying influential relationships in complex systems and strategic decision-making.

Matrix 8: Self-Interaction Matrix

Y	X	W	V	U	T	S	R	Q	P	...	...	F	E	D	C	B	A	
0	2	0	-1	1	2	0	0	0	-1	...	...	0	0	1	-1	-1		A
-1	1	0	-1	-1	0	1	1	-1	2	...	...	-1	1	0	0		1	B
1	0	0	-1	1	0	1	0	2	0	...	...	2	1	2		0	1	C
0	-1	0	-1	2	0	0	1	2	2	...	...	1	0		2	0	-1	D
1	0		0	-1	0	-1	0	-1	0	...	...	0	0	0	0	0	0	W
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0		0	0	2	0	2	1	0	0	...	...	0	0	1	0	-1	2	X
	0	-1	2	-1	0	0	2	0	0	...	...	0	-1	0	-1	1	0	Y

Initial Reachability Matrix

The initial reachability matrix is one of the important steps in structural analysis and Interpretive Structural Modeling (ISM), helping to identify the initial relationships among the key factors of a system. This matrix is derived from the self-interaction matrix and shows whether there is a direct influence between two specific factors. Typically, in this matrix, the symbol 1 is used for the presence of an influence and 0 for the absence of an influence. To construct it, the data in the self-interaction matrix (such as values from 0 to 3) are examined, and any value greater than zero is converted to 1. This matrix only represents the direct effects among factors and provides a foundation for deeper analyses, including identifying indirect relationships and the leveling of factors. The initial reachability matrix plays a significant role in simplifying the complexities of multi-factor systems and organizing the relationships among variables.

The final reachability matrix, one of the key tools in

Interpretive Structural Modeling (ISM) analysis, illustrates all direct and indirect relationships among the factors of a system. This matrix is formed by refining the initial reachability matrix and, in addition to direct connections, also Final Reachability Matrix

incorporates indirect paths among factors. To construct it, matrix multiplication operations are applied to identify indirect influences through intermediary factors. This process continues until the matrix reaches a stable state with no further changes. In the final reachability matrix, it is assumed that each factor influences itself; therefore, the main diagonal of the matrix is filled with the value 1. This matrix serves as a valuable tool for identifying comprehensive relationships among factors, conducting structural analysis, and determining the hierarchical levels of factors within the system. It supports strategic decision-making and the identification of influential and dependent points in complex systems.

Matrix 9: Initial Reachability Matrix

Y	X	W	V	U	T	...	...	D	C	B	A	
0	1	0	0	1	1	...	...	1	0	0	0	A
0	1	0	0	0	0	...	...	0	0	0	1	B
1	0	0	0	1	0	...	...	1	0	0	1	C
0	0	0	0	1	0	...	...	0	1	0	0	D
1	0	0	0	1	0	...	...	1	1	1	1	V
:	:	:	:	:	:			:	:	:	:	:
:	:	:	:	:	:			:	:	:	:	:
1	0	0	0	0	0	...	...	0	0	0	0	W
0	0	0	0	1	0	...	...	1	0	0	1	X
0	0	0	1	0	0	...	...	0	0	1	0	Y

Matrix 10: Final Reachability Matrix

Influence	Y	X	W	V	U	T	...	...	E	D	C	B	A	
24	1	1	1	1	1	1	...	...	1	1	1	1	1	A
24	1	1	1	1	1	1	...	...	1	1	0	1	1	B
25	1	1	1	1	1	1	...	...	1	1	1	1	1	C
25	1	1	1	1	1	1	...	...	1	1	1	1	1	D
25	1	1	1	1	1	1	...	...	1	1	1	1	1	E
18	1	1	1	1	0	1	...	...	1	0	0	1	1	W
:	:	:	:	:	:	:			:	:	:	:	:	:
25	1	1	1	1	1	1	...	...	1	1	1	1	1	X
23	1	1	0	1	1	0	...	...	1	1	1	1	1	Y
	25	25	24	25	24	23			25	24	23	24	25	Dependency

Driving Power and Dependence

Determining driving power and dependence is one of the fundamental stages in Interpretive Structural Modeling (ISM) analysis, which clarifies the role of each factor in the system in terms of influence and being influenced. Driving power is calculated by summing the row values corresponding to each factor in the final reachability matrix, indicating the extent to which the factor influences other factors. On the other hand, dependence is obtained by summing the column values corresponding to each factor, showing the degree to which that factor is influenced by others. The identified factors can be classified into four categories: independent factors with high driving power and low dependence, dependent factors with high dependence and low driving power, linkage factors with both high driving power and high dependence, and autonomous factors with both low driving power and low dependence. This analysis provides an accurate perspective on the position and significance of factors within the system and helps identify the key factors for

intervention, improvement, or system management.

The next step involves leveling the elements of sustainable development in non-governmental organizations. Dividing the system into different levels helps clarify the role of each component and how they interact, reducing system complexity and increasing its analyzability. In this stage, using the final reachability matrix to determine the level of criteria, three sets are identified: 1) the antecedent (prerequisite) set, 2) the reachable (successor) set, and 3) the intersection set.

Antecedent set (A): Each criterion includes the criteria that lead to it or influence it.

Reachable set (R): Criteria for which the corresponding row in a criterion contains 1. The reachable set of a criterion's row shows the criteria influenced by that criterion or component of the system.

Intersection set: Obtained by finding the intersection of the antecedent and reachable sets, which completes the next column in the table (Intersection).

Table 11: Classification of Driving and Dependent Forces

Component	Dependency rate	Influence rate
Legal and regulatory framework	25	24
Favorable organizational and cultural conditions	24	24
Technological and informational infrastructures	23	25
Bureaucratic structure of the tax organization	24	25
Education and awareness-raising	25	25
Financial reward programs	25	25
Severity and magnitude of the violation	25	24
Fear of retaliation and reprisal	25	24
Trust in supervisory institutions	25	25
Social and cultural support	24	23
Individual characteristics of the whistleblower	24	24
Narcissism	24	25
Organizational factors	22	25
Machiavellianism	25	25
Justice-seeking motivations	25	25
Existence of official and secure reporting channels	23	25
Organizational support for whistleblowers	25	25
Preservation of personal identity and security	25	25
Accurate collection and documentation of evidence	25	25
Persistence in pursuing violations	23	25
Strengthening tax justice and reducing the burden on compliant taxpayers	24	25
Increasing transparency and public trust	25	25
Increasing government revenues and improving resource allocation	24	18
Deterrence and prevention of future violations	25	25
Protection of citizens and investors	25	23

Table 12: Leveling of the model elements

Level	Criteria Name		Input	Output	Subscription
1	Legal and regulatory framework	A	ABCDEFGF	HIJLMNOP	ABCDEFGF
4	Favorable organizational and cultural conditions	B	ABCDEFGF	HIJLMNOP	ABCDEFGF
5	Technological and informational infrastructures	C	ABCDEFGF	HIJLMNOP	ABCDEFGF
3	Bureaucratic structure of the tax organization	D	ABCEFGH	IJLMNOP	ABCDEFGF
1	Education and awareness-raising	E	ABCEFGH	IJLMNOP	ABCEFGH
1	Financial reward programs	F	ABCDEF	HIJLMNP	ABCDFGH
1	Severity and magnitude of the violation	G	ABCDEF	HIJLMNP	ABCDFH
1	Fear of retaliation and reprisal	H	ABCDEFGF	HIJKLMNPO	ACDEFHIP
1	Trust in supervisory institutions	I	ABDEFGHI	JKLMNPO	ABCDEFGF
3	Social and cultural support	J	ABCDEFGF	HIJLMNOP	ABDEFGH
2	Individual characteristics of the whistleblower	K	ABCDEFGF	JKLMNPO	ABCDEF
3	Narcissism	L	ABCEFGH	IJLMNOP	ABDEFGH
4	Organizational factors	M	ABCDEFGF	HIJLMNOP	ABCDEGH
1	Machiavellianism	N	ABCDEGH	IJLMNOP	ABCDEGH
1	Justice-seeking motivations	O	ABCDEGH	IJLMNOP	ABCDEG
3	Existence of official and secure reporting channels	P	ABCEGH	IJLMNOP	ABCDEFGF
1	Organizational support for whistleblowers	Q	K	DEFK	K
1	Preservation of personal identity and security	R	ABCEFGH	IJLMNOP	ABCDEFGF
1	Accurate collection and documentation of evidence	S	ABCEFGH	IJLMNOP	ABCEFGHI
2	Persistence in pursuing violations	T	ABCEFGH	IJLMNOP	ABCDEFGF
3	Strengthening tax justice and reducing the burden on compliant taxpayers	U	ABCEFG	HIJLMNOP	ACEGHI
1	Increasing transparency and public trust	V	ACEGHI	JLMNOP	ABCDEFGF
2	Increasing government revenues and improving resource allocation	W	ACEGHI	JLMNOP	ACEGHI
1	Deterrence and prevention of future violations	X	ABCDEFGF	HIJLMNOP	ACEGHI
1	Protection of citizens and investors	Y	ABCDEFGF	HIJLMNOP	ACEGHI

At this stage, the final reachability matrix was used to determine the input and output sets of each variable. The output set includes the variable itself and all other variables it influences, while the input set consists of the variable itself and those that influence it. The intersection of these two sets identifies variables that do not lead to the formation of other variables and therefore represent higher-level components in the interpretive structural model. Variables whose output and intersection sets are identical were assigned to the first level of the hierarchy. After identifying each level, the corresponding variables were removed, and the same procedure was repeated to determine subsequent levels. This iterative process continued until all variables were classified into hierarchical levels, and the final structure is presented in Figure 1.

Based on Figure 1, the technological and informational infrastructure emerges as the most influential component in the model, exerting the strongest impact on other variables. In contrast, factors

such as the legal and regulatory framework, training and awareness, financial incentive programs, severity and magnitude of violations, fear of retaliation, trust in oversight institutions, Machiavellianism, justice-oriented motivations, organizational support for whistleblowers, protection of identity and personal security, accurate evidence documentation, increased transparency and public trust, deterrence of future violations, and protection of citizens and investors are identified as the most dependent variables. Changes in these factors are largely driven by shifts in underlying structural and infrastructural conditions, particularly technological capacity. The remaining variables function as intermediate factors, linking foundational drivers to outcome-oriented constructs.

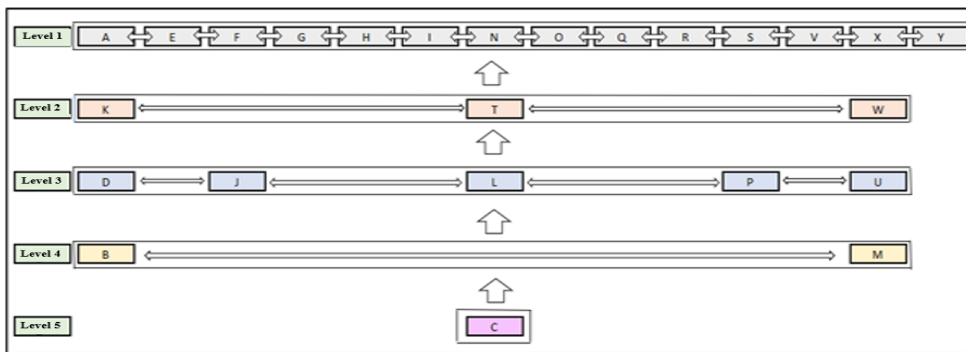


Figure 1: Model component leveling pattern

To further identify key components and develop potential scenarios for tax whistleblowing behavior, a MICMAC analysis was conducted based on expert judgments. As illustrated in Figure 5-4, the analysis classifies variables into four distinct regions according to their levels of influence and dependence, providing a clearer understanding of their structural roles within the whistleblowing system:

Autonomous region: Dimensions that have weak influence and weak dependence. These variables are almost isolated from the model due to their weak connections (Karbasian et al., 2012). In the framework examined in this study, the sub-component of bureaucratic structure of the tax organization falls into this group. This indicates a weak relationship between the bureaucratic structure of the tax organization and whistleblowing behavior in tax violations from the experts' perspective.

Dependent region: Dimensions with weak influence but strong dependence. These dimensions are primarily outcomes of the model, where many factors

contribute to their creation, and they themselves have limited capacity to influence other variables. In the framework examined, the sub-components of trust in oversight institutions, social and cultural support, and protection of citizens and investors fall into this region, which was also predictable based on the research objective.

Linkage region: Variables with both high influence and high dependence are placed in this region. Variables in this region are unstable; any change affecting them will impact both themselves and other variables. Most sub-components of the model fall into this category.

Independent region: Variables with high influence but low dependence are placed in this region. These variables are key drivers that form the foundation of the model and should be prioritized for system functioning. In the examined framework, the variables of favorable organizational and cultural conditions, technological and informational infrastructure, and organizational factors fall into this region.

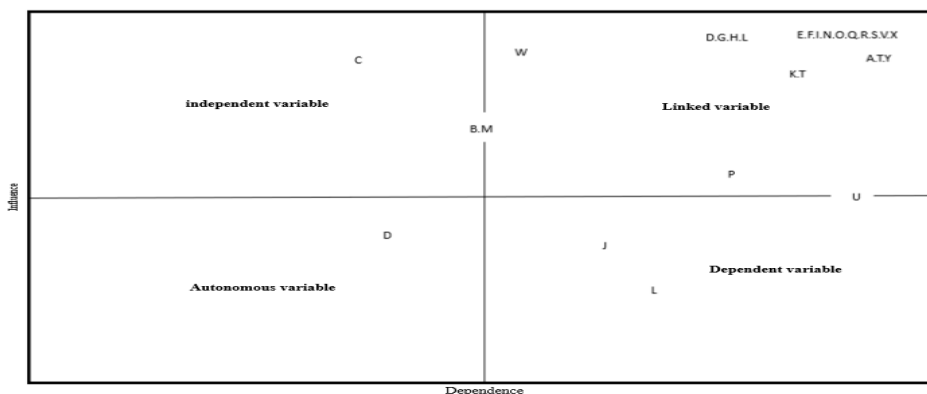


Figure 2: Mic Mac diagram

Interpreting ISM Results

Technological and information infrastructure is often considered an enabling factor for whistleblowing, but the results of the ISM model in this study show that this variable is at the basic and driving level. This finding can be explained in terms of the structural role of technology. In fact, technology is not only a supporting tool, but also a prerequisite for the operationalization of other institutional and behavioral mechanisms. The existence of secure, encrypted and anonymous reporting systems is a necessary condition for the realization of institutional trust, reducing fear of retaliation, increasing organizational support and even the effectiveness of legal frameworks. In the absence of efficient technological infrastructure, protective laws and incentive policies are practically not enforceable and effective. Therefore, the placement of this variable at the lowest level of the ISM indicates its underlying and driving role, not its dependence or consequence. In relation to the similar influence ratings of psychological traits (such as Machiavellianism or narcissism) and institutional policies, the alignment of some individual traits with institutional variables in the ISM model reflects the multilevel nature of whistleblowing behavior. Tax whistleblowing behavior is not simply a product of formal policies and legal structures, nor is it simply the result of personality traits; rather, it is the result of the interaction of these two levels. Traits such as Machiavellianism or narcissism can significantly alter an individual's perception of risk, reward, justice, and consequences of whistleblowing. For example, an individual with high levels of Machiavellianism may only blow the whistle when his or her personal interests or security are guaranteed, which is directly related to the effectiveness of institutional policies. Therefore, the alignment of these variables in the ISM model indicates that institutional policies alone are unable to predict or guide whistleblowing behavior without considering individual psychological differences. Regarding the positioning of organizational support and legal frameworks as highly dependent variables, it should be noted that at first glance, one might expect legal frameworks and organizational support to be among the driving variables. However, the ISM results show that these variables are in practice highly dependent on other contextual conditions. In other words, the effectiveness of supportive laws and organizational policies does not

depend on their nominal existence, but on factors such as trust in regulatory institutions, transparency of processes, the existence of secure technological infrastructure, organizational culture, and the perceived severity of violations. Therefore, organizational laws and supports find their true meaning and function when employees believe that these mechanisms are enforceable, reliable, and non-selective. Therefore, the dependence of these variables in the ISM model reflects the fact that they are more "the result of the interaction of structural, technological, and cultural factors" than independent drivers. Overall, the ISM results show that tax whistleblowing behavior is not a linear, unidimensional phenomenon, but rather a complex system of interactions between technological infrastructures, institutional mechanisms, and individuals' psychological characteristics. Technological infrastructures play a fundamental role in enabling other variables; individual and psychological characteristics shape how individuals respond to policies; and legal frameworks and organizational supports, as the outputs of these interactions, can only lead to the promotion of effective whistleblowing if the necessary conditions are in place. This interpretation takes the findings of the ISM model beyond the level of descriptive reporting and makes them understandable in a conceptual and practical framework for tax policymaking.

Conclusion

The present study aimed to identify and analyze the influential components affecting tax whistleblowing behavior by employing an integrated qualitative-quantitative approach. Initially, the researcher extracted key concepts and categories through qualitative coding and subsequently identified critical components via expert interviews and Fuzzy Delphi analysis. Finally, the ISM technique was used to determine the priority and interdependence of these components within the tax whistleblowing behavioral model.

Analysis and Elaboration of Findings

The findings indicate that tax whistleblowing behavior is influenced by a combination of behavioral, organizational, legal, and technological factors, and the interaction among these factors can significantly

enhance its effectiveness. On the behavioral dimension, individual characteristics of whistleblowers, justice-oriented motivations, fear of retaliation, and trust in supervisory institutions emerged as critical determinants. These results align with established behavioral and psychological models; particularly, the Theory of Planned Behavior (Ajzen, 1991) emphasizes that attitudes, subjective norms, and perceived behavioral control shape ethical behaviors such as whistleblowing. Additionally, Prosocial Organizational Behavior (Brief & Motowidlo, 1986) and the Moral Intensity Model (Jones, 1991) elucidate individual motivations for whistleblowing and the ethical evaluation of consequences. These insights suggest that understanding individual traits and motivational drivers is crucial for designing effective protective policies and mechanisms.

Regarding the examination of the priority of influence and dependence of the model variables, based on expert consensus, the ISM technique was used. In this process, these factors were provided to the experts for comparison. As indicated in the previous chapter, the model variables were categorized into five levels as follows:

- The first category, which includes the most influential variables at the first level of impact, comprises the variables of legal and regulatory framework; training and awareness; financial reward programs; severity and magnitude of the violation; fear of retaliation; trust in supervisory institutions;

Machiavellianism; justice-oriented motivations; organizational support for whistleblowers; protection of identity and personal security; accurate collection and documentation of evidence; increasing transparency and public trust; deterrence and prevention of future violations; and protection of citizens and investors. This indicates that the above variables are the primary and most important influential factors in tax whistleblowing behavior, which policymakers and stakeholders should pay special attention to.

- Levels two to four represent the intermediate level of influence, indicating moderate impact.
- Level two includes the variables of individual characteristics of the whistleblower; persistence in pursuing violations; and increasing government revenues and improving resource allocation. These variables have less influence than those in level

one but exert greater influence on tax whistleblowing than the other variables in the study.

- Level three comprises the variables of bureaucratic structure of the tax organization; social and cultural support; narcissism; existence of formal and secure reporting channels; and strengthening tax justice and reducing the burden on compliant taxpayers. These variables are less influential than those in levels one and two and are more dependent.
- Level four includes the variables of favorable organizational and cultural conditions and organizational factors, which were considered less influential than the other variables from the experts' perspective.

Finally, the bottom or fifth level contains the most dependent variables, which in the present study includes the variable of technological and informational infrastructure

At the organizational and managerial level, the study revealed that active participation of the board of directors, CEOs, and departmental managers in designing and implementing supportive mechanisms, establishing monitoring and feedback evaluation systems, and innovating methods to detect and address tax violations play a pivotal role. Furthermore, empowering employees, fostering a culture of trust and safety for reporters, and reinforcing motivational and supportive systems are essential for enhancing whistleblowing effectiveness. These results highlight that the success of whistleblowing extends beyond formal policies and legal frameworks to include organizational culture, managerial attitudes, and employee trust in oversight mechanisms.

From the legal and regulatory perspective, the research identified that robust legal frameworks, training and awareness programs, financial incentives, identity and security protection, and enforcement guarantees are primary drivers of tax whistleblowing. The ISM analysis indicated that these factors occupy the highest level of influence, underscoring the importance of prioritizing them in policy-making. These findings are consistent with recent studies such as Lee et al. (2025) and Park & Blenkinsopp (2021), which emphasize the significance of legal protection and ethical training in promoting whistleblowing behavior.

One of the study's most notable contributions is

the emphasis on the role of information technology and modern infrastructures in supporting tax whistleblowing. The results demonstrate that developing IT infrastructures and employing artificial intelligence and big data analytics enable faster detection of patterns and anomalies in tax behavior while mitigating the risks associated with incomplete or inaccurate reports. Machine learning algorithms, by analyzing vast volumes of financial data and economic transactions, can rapidly identify suspicious cases, thereby enhancing the effectiveness of whistleblowing. This underscores that technology is not merely a supportive tool but serves as a key driver for reinforcing trust in institutions, public transparency, and the interplay of behavioral and organizational variables.

Prioritization and Interdependence of Components

ISM analysis categorized the components into five hierarchical levels based on influence and dependence. Level one included the most influential variables: legal frameworks, training programs, financial rewards, severity of violations, fear of retaliation, and trust in supervisory institutions. Intermediate levels encompassed whistleblower characteristics, persistence in pursuing violations, bureaucratic structures, and social and cultural support. The lowest levels included favorable organizational and cultural conditions, with technological and informational infrastructure positioned as a highly dependent yet strategic variable. This hierarchical structure illustrates that effective whistleblowing requires an integrated approach combining legal, cultural, and technological interventions.

Practical Applications and Policy Implications

The findings have broad applications for tax authorities and supervisory institutions. Prioritizing influential components enables policymakers to allocate limited resources efficiently and design targeted support mechanisms for whistleblowers. Additionally, leveraging modern technologies such as artificial intelligence, machine learning algorithms, and big data analytics can make the detection and follow-up of violations faster, more accurate, and secure. These technological interventions not only reduce reporting errors but also foster transparency, enhance public trust, and support behavioral and

organizational constructs.

Alignment with Prior Research and Novelty

This study builds on existing behavioral and legal frameworks (Rostami & Rezaei, 1403; Sedighi et al., 1403; Karimi & Mousavi, 1402; Lee et al., 2025; Park & Blenkinsopp, 2021) and advances the field by integrating hierarchical analysis and technological dimensions into the tax whistleblowing model. By combining qualitative and quantitative data, the research provides a comprehensive basis for developing strategies to combat violations and support whistleblowers effectively.

Final

Overall, the findings indicate that an effective tax whistleblowing system requires the integration of three key dimensions:

- ✓ Behavioral and motivational factors, including whistleblower characteristics, justice-oriented motivations, trust in supervisory institutions, and psychological safety.
- ✓ Organizational and managerial factors, encompassing managerial participation, organizational culture, monitoring and feedback systems, and innovation in detecting violations.
- ✓ Technological and infrastructural factors, such as artificial intelligence, machine learning algorithms, and robust information systems.

This integrated approach can establish a solid foundation for promoting a culture of tax whistleblowing, enhancing tax justice, and increasing public trust in the tax system. The study recommends that policymakers and managers simultaneously strengthen legal frameworks, organizational culture, and technological infrastructures to ensure that whistleblowing serves as an effective mechanism for transparency and combating tax violations. Therefore, it is recommended that to achieve the objectives of transparency and tax integrity, modern technologies, including artificial intelligence systems and big data analytics, be seriously utilized. The use of these tools in the whistleblowing process can help identify patterns and tax anomalies more quickly while simultaneously reducing the risks associated with incomplete or inaccurate reports. However, to optimally leverage modern technologies in supporting tax whistleblowing, a comprehensive approach and structural changes are required; in such a way that, in addition to strengthening organizational culture and

creating security for whistleblowers, technological infrastructures are also enhanced. In this regard, the implementation of advanced machine learning algorithms can serve as a key tool for identifying, analyzing, and mitigating tax violations. These algorithms, by analyzing vast volumes of financial data and economic transactions, enable the faster detection of suspicious cases and enhance the effectiveness of whistleblowing reports. Ultimately, the present study demonstrates that the combination of behavioral, organizational, and technological factors can create an effective foundation for expanding the culture of tax whistleblowing and represents an important step toward enhancing tax justice and increasing public trust in the country's tax system.

Limitations and Future Research

Despite the methodological rigor of the mixed-method approach adopted in this study, several limitations should be acknowledged. First, the structural relationships identified through the Interpretive Structural Modeling (ISM) technique are inherently based on expert judgment. Although expert consensus was strengthened through multiple rounds of the Fuzzy Delphi method and high agreement levels were achieved, the resulting hierarchical structure reflects an expert-based conceptual model rather than a statistically generalizable empirical framework. Consequently, the external validity of the findings remains limited. Second, the absence of large-scale survey data or behavioral observations restricts the ability to empirically test the causal relationships suggested by the ISM hierarchy. While the identified structure is theoretically consistent with prior studies on whistleblowing, institutional trust, and governance mechanisms, future research could enhance validation by employing quantitative techniques such as structural equation modeling (SEM), regression-based analysis, or experimental designs. Third, the study focuses primarily on the perspectives of experts within the tax and regulatory domain. Comparative analyses incorporating the views of frontline employees, taxpayers, and external stakeholders may yield additional insights into behavioral heterogeneity and contextual differences in whistleblowing intentions. Based on the findings of this research, future studies are encouraged to extend the proposed framework by integrating longitudinal data, cross-country comparisons, and observable whistleblowing outcomes.

In particular, empirical testing of the enabling role of technological and informational infrastructure—such as digital reporting platforms, artificial intelligence-based anomaly detection, and secure data governance systems—could further clarify how structural drivers translate into increased trust, transparency, and reporting behavior in practice. Such extensions would not only strengthen the generalizability of the model but also contribute to the development of evidence-based policies for enhancing tax compliance and integrity.

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