

Futures Studies of the Key Drivers Influencing Extensible Business Reporting Language (XBRL) in Capital Market Companies

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ABSTRACT

Objective: This study aimed to identify and analyze the key future drivers influencing the implementation and development of Extensible Business Reporting Language (XBRL) within companies operating in the capital market.

Methods and Materials: This research was exploratory and developmental in terms of its purpose and intended outcomes and employed a qualitative futures-studies approach. In the first phase, thematic analysis was conducted to identify the principal functions and drivers associated with the implementation of XBRL. Data were collected through 12 semi-structured interviews with relevant experts and subsequently coded and categorized into basic, organizing, and global themes. The reliability and acceptability of the identified themes were then assessed using the Delphi technique. Following validation of the thematic structure, scenario planning was employed to develop alternative future perspectives concerning the implementation and expansion of XBRL in capital market companies. Two highly influential and uncertain drivers were selected as the principal axes for constructing the scenario matrix.

Findings: The thematic analysis initially identified 3 global themes, 6 organizing themes, and 33 basic themes relating to the implementation and future development of XBRL. The Delphi analysis resulted in the elimination of three basic themes, while the remaining themes achieved expert confirmation and were retained in the final framework. In the scenario-planning phase, two drivers—"information symmetry" (E1) and "information normativity" (E2)—were identified as the most decisive dimensions shaping future conditions. The interaction between these two critical drivers generated a four-quadrant scenario matrix representing four distinct prospective configurations for evaluating the future implementation and development of XBRL in capital market companies.

Conclusion: The findings demonstrate that the future effectiveness of XBRL implementation in capital markets depends substantially on improvements in information symmetry and the institutionalization of information norms, and the four developed scenarios can provide a strategic framework for policymakers, regulators, and market participants when planning future digital financial-reporting systems.

Keywords: Extensible Business Reporting Language (XBRL); Futures Studies; Scenario Planning; Key Drivers; Capital Market; Financial Reporting

1 Introduction

The rapid digitalization of financial markets has transformed the nature, speed, and structure of corporate reporting. Financial information that was once communicated primarily through static statements and periodic reports is increasingly expected to be available in standardized, machine-readable, interoperable, and rapidly analyzable formats. This transformation has intensified as capital markets have become more dependent on data-driven decision-making, algorithmic analysis, integrated information systems, and increasingly sophisticated financial technologies. In such an environment, conventional reporting formats may no longer be sufficient to satisfy the informational requirements of investors, analysts, regulators, creditors, and other stakeholders. The language of corporate reporting itself has consequently become an important component of financial-market infrastructure, because the usefulness of accounting information depends not only on its substantive content but also on how efficiently it can be transmitted, processed, compared, interpreted, and incorporated into decisions. Contemporary accounting and corporate reporting research has increasingly emphasized the necessity of developing reporting systems that serve both business organizations and broader societal information needs, particularly as technological transformation alters the meaning and function of corporate information (Fülbiér & Sellhorn, 2023). Within this context, Extensible Business Reporting Language (XBRL) has emerged as one of the most important technological mechanisms for moving corporate reporting from document-based disclosure toward structured digital reporting.

XBRL is designed to facilitate the standardized electronic exchange of financial and business information by attaching machine-readable tags to individual reporting elements. Rather than treating a financial report merely as a visual document, XBRL enables information to be identified, extracted, processed, compared, and reused through standardized taxonomies. Its significance therefore extends beyond digitizing traditional accounting statements; it potentially changes the architecture through which financial information is produced, disseminated, interpreted, and incorporated into financial decisions. Research has shown that adoption of XBRL can contribute to improvements in the quality of financial reporting and the usability of reported information, particularly through enhanced data processing, standardization, accessibility, and comparability (Abhishek,

2023). Evidence from the Indian context similarly indicates that XBRL technology can influence financial-reporting quality through reporting-related mechanisms that strengthen the usefulness and consistency of corporate information (Divyashree et al., 2024). From this perspective, XBRL should not be regarded simply as an accounting software innovation; rather, it represents a technological reporting infrastructure capable of modifying the informational relationships among companies, regulators, financial intermediaries, and market participants.

One of the most frequently emphasized potential consequences of XBRL implementation concerns information transparency and information asymmetry. Capital markets operate under conditions in which managers and internal corporate actors typically possess more detailed information about firms than external investors. This imbalance may increase uncertainty, create opportunities for selective disclosure, raise information-processing costs, and weaken the ability of market participants to evaluate investment alternatives effectively. Digital reporting technologies may reduce these problems when they improve the accessibility, standardization, timeliness, and interpretability of corporate disclosures. Recent evidence indicates that the adoption of digital disclosure languages such as XBRL can contribute to reducing financial information asymmetry while simultaneously increasing information quality (Al-Okaily et al., 2024). Moreover, movement from traditional to digitally structured reporting has been associated with greater transparency in financial statements, suggesting that XBRL can enhance stakeholders' capacity to observe, compare, and evaluate reported financial data (Al-Okaily, 2024). Earlier evidence from Iran also showed that XBRL implementation can contribute to improved financial-reporting quality, greater transparency, and lower information asymmetry (Mohammadi & Khozin, 2017). These findings position informational symmetry as a potentially central mechanism through which XBRL may influence the future functioning of capital markets.

The relevance of this mechanism becomes particularly important when reporting quality is considered from the perspective of financial decision-making. Investors rarely evaluate accounting information in isolation; instead, they compare firms, assess risk, evaluate trends, identify investment opportunities, and integrate accounting data with market and nonfinancial information. When financial reports are difficult to access or compare, the costs of information acquisition and interpretation increase. In contrast, structured digital reporting may reduce search costs,

facilitate automated comparisons, and allow financial information to be incorporated more efficiently into analytical models. International evidence has demonstrated that XBRL adoption is associated with improvements in financial-reporting quality across different institutional contexts (Tawiah & Borgi, 2022). Research on banking has also suggested that XBRL-based innovations can improve efficiency and reduce asymmetric information by strengthening the digital transmission and processing of reporting data (Wahyudi et al., 2022). Within the Tehran Stock Exchange, XBRL has likewise been associated with enhanced financial information transparency, reinforcing the proposition that digital reporting can improve the informational environment of listed companies (Zahmatkesh et al., 2019). Such findings indicate that the future value of XBRL may depend substantially on its capacity to make information not merely available, but more symmetrical, comparable, accessible, and decision-useful.

A second major dimension concerns the normalization and institutionalization of information disclosure. XBRL implementation requires more than the technical installation of a reporting platform. Effective adoption depends on the existence of compatible regulatory requirements, standardized taxonomies, organizational routines, reporting norms, technical infrastructure, and professional acceptance. From an institutional perspective, organizations may adopt XBRL because of regulatory pressures, normative expectations, competitive requirements, or broader processes of technological legitimacy (Borgi & Tawiah, 2022). Cross-country evidence further demonstrates that XBRL adoption is shaped by national and institutional conditions, indicating that differences in governance structures, regulatory environments, economic development, and reporting systems may influence the extent to which XBRL becomes embedded in corporate reporting practice (Sassi et al., 2024). Consequently, the effectiveness of XBRL cannot be understood solely in terms of technological capability; its benefits are also dependent on the degree to which digital reporting becomes normalized across the financial-reporting ecosystem.

The regulatory environment is particularly significant in emerging markets, where differences in enforcement capacity, market development, technological readiness, and corporate governance may condition the effects of XBRL adoption. Evidence from emerging-market settings indicates that regulation may act as a mediating mechanism through which XBRL becomes effective, emphasizing that digital reporting technologies require institutional support if their

informational benefits are to be realized consistently (Alghazzawi, 2025). This regulatory dimension is closely connected with the idea of information normativity: the extent to which reporting becomes governed by shared standards concerning disclosure, comparability, reliability, consistency, and data accessibility. When XBRL taxonomies and digital-reporting practices become embedded in accepted reporting norms, they may encourage more standardized voluntary disclosure, improve the comparability of financial statements, enhance reporting integration, and strengthen the overall quality of the information environment. Conversely, fragmented implementation, inconsistent tagging practices, inadequate enforcement, or weak organizational commitment may limit these outcomes. Thus, the future development of XBRL should be evaluated not only according to technological diffusion but also according to the emergence of institutionalized information norms surrounding its use.

Beyond informational and regulatory outcomes, XBRL implementation may also transform organizational structures and professional competencies. Digital reporting systems alter the way accounting data are prepared, reviewed, transferred, verified, and analyzed. These changes may require accountants, auditors, financial managers, information-system professionals, and reporting specialists to develop skills that extend beyond traditional financial-reporting expertise. The transition to technology-intensive accounting environments requires stronger competencies in data architecture, digital taxonomies, information systems, analytical technologies, and interdisciplinary communication. Research concerning professional development in accounting-related environments has emphasized that successful professional performance increasingly depends on workplace conditions, learning processes, organizational support, and the development of appropriate technical and professional capabilities (Plant et al., 2017). Within the context of XBRL, this implies that implementation can create a need for professional skill enhancement and changes in recruitment, training, computational practices, and the technological orientation of corporate financial departments.

This structural transformation is especially relevant in emerging markets where organizations may differ substantially in technological preparedness. Evidence from Iranian holding companies indicates that the feasibility of XBRL adoption is strongly connected with the perceptions and readiness of financial employees, highlighting the role of organizational capacity and human resources in

successful implementation (Mehrabanpour et al., 2024). If employees lack knowledge of digital reporting structures or organizations fail to invest in compatible information systems, the potential benefits of XBRL may remain underutilized. Conversely, implementation may stimulate greater reliance on software-based financial calculations, stronger management-accounting information systems, improved transaction-processing systems, enhanced information-network security, and more effective decision-support capabilities. Such organizational effects are important because XBRL functions as part of an interconnected reporting ecosystem. Its ability to contribute to financial-market efficiency therefore depends partly on the extent to which corporate information infrastructures are capable of producing accurate, timely, and standardized digital information.

The consequences of XBRL may also extend beyond conventional financial reporting into nonfinancial, sustainability, and integrated reporting. Modern stakeholders increasingly demand information concerning environmental impacts, carbon emissions, energy consumption, resource utilization, innovation, research and development, and other aspects of corporate sustainability and long-term value creation. Structured digital reporting may provide a technological basis for increasing the accessibility and comparability of such information. XBRL has been recognized as having potential applications in nonfinancial disclosure and integrated reporting, particularly where organizations seek to connect financial and sustainability-related information within more structured reporting environments (Fradeani, 2022). This development is strategically significant because the future of capital-market reporting increasingly depends on companies' ability to communicate multiple dimensions of value creation rather than merely historical financial performance.

From this perspective, XBRL can potentially influence both social sustainability and business dynamism. At the sustainability level, digital reporting may facilitate more detailed and standardized disclosure of environmental pollution, carbon emissions, energy consumption, resource conservation, and waste-recycling activities. At the business level, XBRL may increase the visibility of corporate investments in financial start-ups, entrepreneurial ecosystems, research and development projects, ongoing strategic initiatives, and consortium-based activities. These forms of information are increasingly relevant to investors attempting to assess future-oriented corporate performance. The ability of XBRL to provide structured information could

therefore contribute to a broader transformation in the relationship between reporting and corporate legitimacy. Companies that can communicate their financial, technological, social, and strategic activities in accessible digital formats may be better positioned to satisfy stakeholder expectations and maintain legitimacy in competitive capital markets.

Nevertheless, implementation does not automatically guarantee favorable outcomes. The effects of XBRL may differ according to user behavior, institutional context, organizational preparedness, market sophistication, and the quality of implementation. Evidence from Iran has shown that XBRL can affect the behavior of financial analysts, suggesting that the technology may alter how external users search for, interpret, and respond to corporate information (Chavoshi et al., 2018). Other Iranian evidence has linked XBRL with firm performance, illustrating that the implications of digital reporting may extend beyond disclosure quality into broader organizational and economic outcomes (Nazemi Ardakani et al., 2016). Such findings underscore the need to move beyond a binary view of adoption versus non-adoption and instead consider the multiple future pathways through which XBRL may influence firms and financial markets.

This issue is particularly relevant for the Iranian capital market. The prospect of implementing XBRL in Iran has been examined for more than a decade, including early attempts to identify and prioritize possible implementation scenarios (Abdollahi & Monzavi, 2011). However, the financial-information environment has changed considerably since those early assessments. The expansion of financial technologies, digital disclosure platforms, data analytics, automated reporting, and new forms of investment has created conditions that differ substantially from those in which earlier XBRL scenarios were originally formulated. At the same time, Iranian studies have documented potential benefits in relation to transparency, information quality, analyst behavior, organizational performance, and feasibility of implementation (Chavoshi et al., 2018; Mehrabanpour et al., 2024; Mohammadi & Khozin, 2017; Nazemi Ardakani et al., 2016; Zahmatkesh et al., 2019). Yet these studies have generally examined specific effects or implementation dimensions rather than constructing an integrated futures-oriented framework of the principal drivers that may shape XBRL outcomes over time.

International studies similarly tend to focus on particular antecedents or consequences of adoption, such as reporting quality, transparency, regulatory conditions, institutional

determinants, or cross-country variation (Al-Okaily, 2024; Al-Okaily et al., 2024; Alghazzawi, 2025; Borgi & Tawiah, 2022; Sassi et al., 2024; Tawiah & Borgi, 2022). Although these contributions have considerably advanced understanding of XBRL, they provide a less developed account of how multiple informational, structural, professional, technological, social, and strategic forces may interact to produce alternative future configurations. This represents an important limitation because XBRL operates within a complex adaptive system. Improvements in information quality may influence investment decisions; regulatory normalization may affect organizational adoption; professional competencies may determine technological effectiveness; and digital reporting may simultaneously reshape corporate disclosure, stakeholder interaction, and market expectations. Assessing each dimension independently may therefore obscure the systemic relationships that determine which factors function as primary drivers and which represent dependent or secondary outcomes.

A futures-studies perspective provides an appropriate means of addressing this complexity because it does not assume that the development of XBRL will follow a single deterministic pathway. Instead, it seeks to identify influential drivers, examine dependencies among them, recognize uncertainty, and construct alternative scenarios representing plausible future states. Such an approach is particularly useful when technological, institutional, and behavioral factors interact and when historical evidence alone is insufficient to predict future outcomes. Expert-based qualitative inquiry is also valuable in this context because specialists can articulate practical and theoretical dimensions that may not yet be sufficiently represented in empirical datasets. Interpretive interviewing allows researchers to focus on participants' constructions of complex phenomena and thereby develop richer conceptual accounts of emerging processes (Scheibelhofer, 2023). By integrating expert interviews with thematic analysis, Delphi consensus, structural influence-dependence analysis, and scenario planning, it becomes possible to move from exploratory identification of XBRL-related dimensions toward systematic evaluation of their future strategic significance.

Accordingly, a key research need is to determine which among the numerous potential consequences of XBRL function as genuine driving forces capable of shaping the future trajectory of digital financial reporting in the Iranian capital market. Information symmetry may constitute one

such driver because it directly affects financial users' access to reliable and timely information. Information normativity may constitute another because standardized disclosure practices can determine whether XBRL becomes institutionally embedded and consistently applied. Professional capability, information-system quality, sustainability disclosure, and business dynamism may also matter, but their structural positions relative to the principal drivers require empirical determination. A futures-oriented investigation can therefore contribute by first generating an integrated thematic framework and then evaluating the influence and dependence of its dimensions to identify the drivers most capable of defining alternative future scenarios.

In this context, the aim of the present study was to identify and analyze the key drivers influencing the future implementation of Extensible Business Reporting Language (XBRL) in Iranian capital market companies and to develop plausible scenarios for its prospective informational and decision-making outcomes.

2 Methods and Materials

The present study adopted a mixed-methods, exploratory-developmental, and futures-oriented research design to investigate the key drivers shaping the future implementation of Extensible Business Reporting Language (XBRL) in companies operating in the Iranian capital market. Unlike conventional methodological approaches in accounting research that often rely on a single analytical paradigm, the study integrated qualitative thematic inquiry, expert consensus assessment, structural cross-impact analysis, and scenario planning. In terms of research outcome, the study was developmental because a sufficiently integrated framework for explaining the functional development of XBRL in the context of the Iranian capital market has not yet been established. Accordingly, the research sought to develop a multidimensional conceptual framework capable of providing a more coherent understanding of the technological, informational, institutional, and reporting-related forces affecting XBRL implementation. In terms of purpose, the study was exploratory because it aimed to uncover latent dimensions and drivers of XBRL functionality rather than test a predetermined causal model. In terms of data characteristics, the study followed a mixed qualitative-quantitative logic. The qualitative phase was used to identify and validate the principal themes associated with XBRL implementation, whereas the quantitative phase was designed to determine

the structural relationships among the validated drivers and construct plausible future scenarios. The overall design was therefore consistent with futures studies, in which the identification of driving forces, assessment of their influence and dependence, and systematic exploration of uncertainty constitute successive stages in scenario development.

Participants differed across the qualitative and quantitative phases. The qualitative phase involved academic experts with relevant scholarly and professional expertise in accounting, information technology, financial reporting, disclosure, and technology-based reporting systems. Eligibility was determined using two principal criteria. First, participants were required to demonstrate familiarity with the implementation or conceptual foundations of XBRL, as evidenced by their research, publications, or professional activities. Second, participants were expected to have substantial educational or academic experience in financial reporting, accounting theory, disclosure, empirical accounting research, or information-technology-related accounting topics. Particular attention was given to academics who had taught advanced accounting theory, management accounting theory, empirical research, or related doctoral-level subjects, as such backgrounds were considered conducive to the interpretation of the theoretical and practical implications of XBRL. Sampling combined purposive theoretical sampling with snowball sampling. Initially, three experts who clearly met the eligibility criteria were selected purposively. These participants subsequently introduced other knowledgeable individuals who were potentially suitable for participation. Recruitment and interviewing continued until theoretical saturation was achieved. Repetition of codes became increasingly apparent from approximately the seventh interview onward, and by the twelfth interview no substantively new conceptual categories were emerging. The qualitative sample therefore consisted of 12 experts. In the quantitative phase, 23 participants were recruited from among financial managers and heads of accounting departments in companies listed on the Tehran Stock Exchange. These participants were selected because the scenario-building stage required practical familiarity with web-based financial reporting, corporate disclosure processes, accounting information systems, and the operational implications of XBRL. A relatively small expert sample was considered appropriate because the quantitative component was not intended for population-level statistical inference; rather, it involved structured judgments and

systemic pairwise assessments requiring specialized experience and domain-specific knowledge.

Data collection was conducted through several complementary instruments corresponding to the sequential phases of the study. In the qualitative phase, the primary instrument was an expert interview protocol designed to elicit participants' perceptions regarding the drivers, functions, opportunities, constraints, and prospective consequences of XBRL implementation. Interviews initially followed an in-depth and relatively open structure in order to maximize conceptual discovery and allow unexpected themes to emerge from the participants' experiences and interpretations. As preliminary concepts became identifiable, subsequent interviews gradually assumed a semi-structured format so that emerging issues could be examined more systematically while sufficient flexibility was retained to pursue novel insights. The interview questions were continuously adjusted in response to the content of preceding interviews and the expertise of individual participants. This iterative process helped maintain alignment with the central research phenomenon while facilitating theoretical saturation. The interview process was organized in a flexible recursive sequence in which broad questions were followed by more focused probes and, when necessary, returned to broader conceptual issues. This approach allowed the researchers to clarify ambiguities, explore relationships among emerging concepts, and maintain coherence throughout the interview process.

Following thematic extraction, a classical Delphi checklist was developed to assess the content adequacy and expert acceptability of the identified themes. The Delphi instrument used a seven-point Likert-type response format and included the basic and organizing themes generated during thematic analysis. Experts rated the relevance and adequacy of each theme in representing the focal phenomenon. Mean scores and agreement coefficients were used as the principal criteria for retaining or eliminating themes. A mean score of at least 5.00 and an agreement coefficient of at least 0.50 were considered indicative of acceptable expert consensus. The purpose of the Delphi stage was to reduce dispersion in expert judgments, strengthen the content validity of the thematic framework, and ensure that only sufficiently supported dimensions progressed to the subsequent quantitative phase.

For the futures-oriented quantitative phase, a structured cross-impact matrix checklist was developed using the organizing themes confirmed through the Delphi process.

Each organizing theme was positioned both as a row and as a column, allowing participants to assess the directional relationship between every pair of themes. Ordinal codes of 1, 2, and 3 were used to represent the nature of these relationships. The coding procedure differentiated themes primarily functioning as sources of influence, themes primarily reflecting dependence or output effects, and relationships considered neutral or without meaningful structural effect. The completed matrices generated the input and output values required for construction of the MICMAC influence-dependence matrix. Once the most influential drivers were identified, an uncertainty questionnaire was developed for scenario construction. Each critical driver was evaluated under three prospective states: positive, neutral or stable, and negative or critical. These states were represented using +3, 0, and -3, respectively, and provided the basis for constructing the cross-scenario matrix and distinguishing desirable, stable, and critical future configurations of XBRL implementation.

Qualitative data were analyzed using thematic network analysis based on the approach developed by Attride-Stirling. The analytical process proceeded through three successive levels of abstraction: basic themes, organizing themes, and global themes. Interview transcripts were first examined through initial coding to identify meaningful units related to the implementation, functionality, governance, information quality, technological integration, disclosure, and future development of XBRL. Conceptually similar codes were then grouped into basic themes. At the second level, related basic themes were clustered into broader organizing themes representing coherent dimensions of the phenomenon. At the final interpretive level, organizing themes were integrated into global themes capable of representing the overarching conceptual structure of the findings. Coding and categorization continued concurrently with data collection, allowing emerging categories to inform later interviews. Saturation was determined when new interviews generated repetition rather than substantively new concepts. By the twelfth interview, the recurrence and distribution of the basic themes across the organizing themes indicated sufficient theoretical saturation, after which the thematic structure was finalized.

The resulting themes were subsequently subjected to Delphi analysis. For each theme, the mean expert rating and coefficient of agreement were calculated and compared with the predetermined acceptance thresholds. Themes failing to achieve adequate consensus were removed, while those reaching the required levels were retained as components of

the final conceptual framework. This stage served as a methodological bridge between qualitative theme generation and quantitative structural analysis.

In the quantitative phase, the validated organizing themes were entered into a cross-impact matrix and assessed through pairwise comparisons. The resulting input and output scores were used to determine the relative influence and dependence of each theme. These scores were then plotted within a four-quadrant MICMAC matrix. Themes located in the independent or driver quadrant, characterized by high influence and comparatively lower dependence, were interpreted as the most consequential driving forces shaping the future of XBRL implementation. The two dominant drivers identified through this procedure were subsequently selected as the principal axes of scenario development. Each driver was defined under positive, neutral, and negative states, and a cross-impact uncertainty matrix was constructed to examine plausible combinations of these states. Through this procedure, alternative futures were differentiated according to their strategic implications and interpreted as desirable, stable, or critical configurations. The final scenario framework therefore integrated qualitative expert knowledge, Delphi-based validation, structural influence-dependence analysis, and uncertainty-based scenario construction to produce a systematic account of the potential future trajectories of XBRL implementation in Iranian capital market companies.

3 Findings and Results

Because the study employed a mixed-methods design involving sequential qualitative and quantitative phases, the findings are presented according to the analytical sequence used to identify, validate, prioritize, and project the key drivers of Extensible Business Reporting Language (XBRL) implementation in the Iranian capital market. The qualitative phase involved thematic analysis and Delphi validation, whereas the quantitative phase incorporated pairwise cross-impact assessment, MICMAC analysis, uncertainty analysis, cross-impact scenario construction, and mathematical evaluation of the resulting prospective scenarios.

The first stage of the qualitative analysis focused on establishing a conceptual basis for the expert interviews. Because technological developments in XBRL, particularly in the context of fourth-generation financial technologies, have not yet produced a fully integrated conceptual framework, the thematic analysis was intended to identify a more coherent structure for understanding the prospective

consequences of XBRL implementation. Following the Attride-Stirling thematic network approach, the literature was initially reviewed to identify broad conceptual domains capable of guiding the interviews without imposing a predetermined thematic structure. Three preliminary

domains were identified: informational transformation, structural transformation, and social transformation through XBRL. These domains served as sensitizing concepts for the interview process and facilitated the formulation of recurring interview questions.

Table 1

Preliminary Conceptual Domains Guiding the Expert Interviews

Preliminary domain	Operational interpretation and principal interview focus
Informational transformation through XBRL	This domain concerned the capacity of XBRL to reduce the limitations of traditional financial disclosure and strengthen interactions between companies and financial decision-makers. The interviews explored the manifestations of informational transformation in the capital market, the mechanisms through which XBRL could enhance the reliability of financial information, and the ways in which XBRL-enabled reporting could increase decision-makers' awareness of underlying corporate realities.
Structural transformation through XBRL	Structural transformation referred to systematic changes in organizational processes, professional accounting competencies, information-processing capacity, and corporate information infrastructures. The interviews examined the structural consequences of XBRL implementation, hidden organizational capacities arising from greater reporting transparency, and the technological capabilities through which firms could respond more efficiently to external information requirements.
Social transformation through XBRL	This domain addressed the contribution of XBRL to sustainability-oriented disclosure and the capacity of digital reporting to make corporate investment horizons and sustainability performance more visible to stakeholders. The interviews examined the social consequences of XBRL, its implications for sustainability disclosure, and its capacity to make future investment and business outcomes more transparent to financial decision-makers.

The interview data were coded progressively after each interview. Initial coding generated open codes, which were subsequently reviewed for redundancy, conceptual overlap, and semantic similarity. Repetitive or substantively equivalent codes were merged, while codes that did not contribute meaningfully to the focal phenomenon were removed. Across the 12 expert interviews, 282 open codes were identified. Repetition became increasingly evident from approximately the seventh interview, and theoretical saturation was reached by the twelfth interview, at which

point additional data no longer generated substantively new concepts.

The 282 open codes were reduced to 33 basic themes. These basic themes were subsequently grouped into six organizing themes according to conceptual similarity and explanatory function. At the highest level of abstraction, the six organizing themes were classified under three global themes. Each global theme therefore contained two organizing themes. The coding distribution is presented in Table 2.

Table 2

Summary of the Thematic Coding Process

Global theme	Organizing theme	Open codes, n	Basic themes, n	Share of open codes, %	Share of basic themes, %
Informational transformation through XBRL	Information symmetry	40	7	14.18	21.21
Informational transformation through XBRL	Information normativity	47	6	16.66	18.18
Structural transformation through XBRL	Professional skill enhancement	48	5	17.02	15.15
Structural transformation through XBRL	Information-system improvement	50	5	17.73	15.15
Social transformation through XBRL	Social sustainability	44	5	15.60	15.15
Social transformation through XBRL	Business dynamism	53	5	18.79	15.15
Total	Six organizing themes	282	33	100.00	100.00

The coding results demonstrated a relatively balanced distribution of concepts across the emerging dimensions. The 33 basic themes represented approximately 11.70% of the 282 open codes when expressed as the ratio of basic

themes to initial codes. At the next analytical level, the six organizing themes represented approximately 18.18% of the 33 basic themes, and each of the three global themes incorporated two organizing themes. This relatively

balanced allocation supported the conceptual coherence of the resulting framework and provided additional evidence that theoretical saturation had been achieved.

The substantive content of the three global themes, six organizing themes, and 33 basic themes is presented in Table 3.

Table 3

Thematic Dimensions of XBRL-Related Transformations

Global theme	Organizing theme	Basic themes
Informational transformation through XBRL	Information symmetry	Reduction in potential computational errors in financial information; reduction in disruptions affecting the speed of access to financial information; reduction in lost investment opportunities; reduction in financing constraints; reduction in opportunistic behavior in information disclosure; reduction in investors' financial risk exposure; reduction in the likelihood of manipulation in the disclosure of financial items
Informational transformation through XBRL	Information normativity	Increased voluntary disclosure; increased comparability of corporate financial statements; increased integration of corporate financial reporting; improved quality of the information environment; increased monitoring of information reliability; increased efficiency of corporate investments
Structural transformation through XBRL	Professional skill enhancement	Transformation of traditional professional approaches toward more comprehensive information disclosure; movement toward technocratic professional practices in disclosure implementation; changes in the recruitment of professional personnel in corporate financial units; changes in professional training for working with financial technologies; changes in professional approaches to financial computation and processing
Structural transformation through XBRL	Information-system improvement	Greater reliance on scientific and software-based computations rather than traditional calculations in stakeholder disclosure; improvement of management accounting information systems for timely stakeholder reporting; improvement in information-network security for accessible financial information; improvement in operational transaction-processing systems for more technically sophisticated stakeholder interaction; improvement in information-system decision support for timely stakeholder reporting
Social transformation through XBRL	Social sustainability	Greater sustainability in reporting environmental pollution details; greater disclosure of carbon-related information; greater disclosure of energy consumption; greater disclosure concerning natural-resource protection; greater disclosure concerning waste recycling
Social transformation through XBRL	Business dynamism	Disclosure of returns from corporate investment in financial start-ups; disclosure of returns from investment in entrepreneurial ecosystems; disclosure of returns from research and development investment; disclosure of returns from investments in ongoing plans and projects; disclosure of returns from consortium and joint-investment activities

The thematic framework indicated that XBRL could potentially influence capital-market companies through three interconnected layers. At the informational level, XBRL was associated with greater symmetry and stronger reporting norms. At the structural level, it was associated with changes in professional competencies and information infrastructures. At the social and strategic level, it was related to sustainability disclosure and the visibility of emerging investment activities.

Following thematic analysis, the 33 basic themes were subjected to two rounds of classical Delphi analysis. A seven-point Likert-type checklist was distributed among the expert panel, and each theme was evaluated using its mean score and coefficient of agreement. The predetermined retention criteria were a mean of at least 5.00 and an agreement coefficient of at least 0.50. Themes failing to satisfy these requirements were eliminated before progression to the quantitative phase.

Table 4

Results of the Two-Round Delphi Analysis

Organizing theme	Basic theme	Round 1 mean	Round 1 agreement	Round 2 mean	Round 2 agreement	Result
Information symmetry	Reduction in potential computational errors in financial information	6.00	0.80	6.20	0.84	Retained
	Reduction in disruptions affecting speed of access to financial information	6.10	0.82	6.30	0.85	Retained
	Reduction in lost investment opportunities	5.45	0.68	6.00	0.80	Retained
	Reduction in manipulation of the timing of financial-item disclosure	5.40	0.68	5.70	0.77	Retained
	Reduction in opportunistic behavior in information disclosure	3.50	0.35	—	—	Eliminated
	Reduction in investors' financial risk exposure	5.10	0.55	5.30	0.65	Retained

Information normativity	Reduction in financing constraints	4.00	0.40	—	—	Eliminated
	Increased voluntary disclosure	5.20	0.62	5.45	0.68	Retained
	Increased comparability of corporate financial statements	5.30	0.65	5.50	0.70	Retained
	Increased integration of corporate financial reporting	5.25	0.62	5.45	0.68	Retained
	Improved quality of the information environment	6.10	0.82	6.30	0.85	Retained
Professional skill enhancement	Increased monitoring of information reliability	3.00	0.30	—	—	Eliminated
	Increased efficiency of corporate investments	6.10	0.82	6.30	0.85	Retained
	Transformation of traditional professional approaches toward broader disclosure	5.15	0.58	5.35	0.68	Retained
	Movement toward technocratic professional practices in disclosure implementation	6.10	0.82	6.30	0.85	Retained
	Changes in recruitment of professional personnel in financial units	5.25	0.65	5.50	0.70	Retained
	Changes in professional training for financial technologies	5.45	0.68	6.00	0.80	Retained
	Changes in professional approaches to financial computation	5.50	0.70	6.10	0.82	Retained
	Improvement in scientific and software-based calculations	5.30	0.65	5.35	0.68	Retained
	Improvement in management accounting information systems	6.10	0.82	6.30	0.85	Retained
Information-system improvement	Improvement in information-network security	5.15	0.58	5.35	0.68	Retained
	Improvement in operational transaction-processing systems	5.15	0.58	5.35	0.68	Retained
	Improvement in information-system decision support	5.25	0.65	5.50	0.70	Retained
	Greater disclosure of environmental pollution details	6.00	0.80	6.20	0.84	Retained
	Greater carbon-related disclosure	5.50	0.70	6.00	0.80	Retained
Social sustainability	Greater disclosure of energy consumption	5.30	0.65	5.45	0.68	Retained
	Greater disclosure concerning natural-resource protection	5.25	0.65	5.50	0.70	Retained
	Greater disclosure concerning waste recycling	6.00	0.80	6.20	0.84	Retained
	Disclosure of returns from investment in financial start-ups	5.45	0.68	6.00	0.80	Retained
	Disclosure of returns from investment in entrepreneurial ecosystems	6.10	0.82	6.30	0.85	Retained
	Disclosure of returns from research and development investment	5.25	0.65	5.50	0.70	Retained
	Disclosure of returns from ongoing projects	5.00	0.60	5.20	0.62	Retained
	Disclosure of returns from consortium or joint-investment activities	5.50	0.70	6.00	0.80	Retained

The Delphi results indicated that only three of the 33 basic themes failed to reach the required thresholds: reduction in opportunistic behavior in information disclosure, reduction in financing constraints, and increased monitoring of information reliability. Consequently, 30 basic themes were retained for the validated thematic framework. All six organizing themes remained represented after the Delphi process and were therefore transferred to the quantitative cross-impact stage.

The quantitative phase was designed to determine which organizing themes had the greatest driving power in shaping the future consequences of XBRL implementation. To

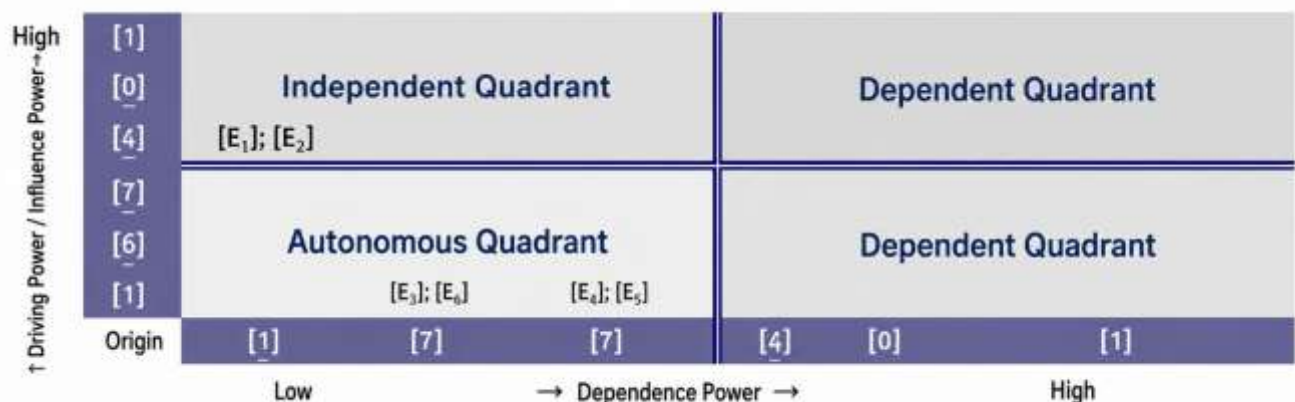
achieve this objective, the six validated organizing themes were coded as information symmetry (E1), information normativity (E2), professional skill enhancement (E3), information-system improvement (E4), social sustainability (E5), and business dynamism (E6). Pairwise comparisons were then conducted to determine whether the relationship between each pair primarily represented directional influence from one theme to another or a neutral relationship. Sixteen experts participated in this cross-impact assessment, and the modal response was used to identify the dominant direction for each comparison.

Table 5*Pairwise Cross-Impact Assessment of the Six Organizing Themes*

Row theme	Column theme	Dominant relationship	Modal frequency
E1 Information symmetry	E2 Information normativity	E1 → E2	18
E1 Information symmetry	E3 Professional skill enhancement	E1 → E3	19
E1 Information symmetry	E4 Information-system improvement	E4 → E1	17
E1 Information symmetry	E5 Social sustainability	E1 → E5	18
E1 Information symmetry	E6 Business dynamism	E1 → E6	16
E2 Information normativity	E3 Professional skill enhancement	E2 → E3	20
E2 Information normativity	E4 Information-system improvement	E2 → E4	19
E2 Information normativity	E5 Social sustainability	E2 → E5	21
E2 Information normativity	E6 Business dynamism	E2 → E6	20
E3 Professional skill enhancement	E4 Information-system improvement	E3 → E4	19
E3 Professional skill enhancement	E5 Social sustainability	Neutral	20
E3 Professional skill enhancement	E6 Business dynamism	E6 → E3	17
E4 Information-system improvement	E5 Social sustainability	Neutral	16
E4 Information-system improvement	E6 Business dynamism	Neutral	18
E5 Social sustainability	E6 Business dynamism	E5 → E6	19

The pairwise evaluations were transformed into input and output scores reflecting dependence and influence, respectively. Information symmetry (E1) had an output score of 4 and an input score of 1, while information normativity (E2) likewise had an output score of 4 and an input score of 1. Professional skill enhancement (E3) had an output score of 1 and an input score of 3; information-system

improvement (E4) had an output score of 1 and an input score of 2; social sustainability (E5) had an output score of 1 and an input score of 2; and business dynamism (E6) had an output score of 1 and an input score of 3. These influence-dependence values were subsequently positioned within the four quadrants of the MICMAC matrix.

Figure 1*MICMAC Matrix of the Pairwise Influence–Dependence Scores of the Organizing Themes*

The MICMAC configuration showed that the six organizing themes were concentrated in the autonomous and independent quadrants. Professional skill enhancement (E3), information-system improvement (E4), social sustainability (E5), and business dynamism (E6) demonstrated relatively limited driving power under the existing conditions of the Iranian capital market. By contrast, information symmetry

(E1) and information normativity (E2) were located in the independent-driver quadrant. Their combination of high influence and low dependence demonstrated that these two dimensions constituted the principal drivers capable of shaping the remaining consequences of XBRL implementation. They were therefore selected as the two primary axes for the scenario-building stage.

Following the Delphi eliminations, each of these two key organizing themes consisted of five validated basic themes.

These ten themes constituted the propositions subsequently used to construct the uncertainty matrix.

Table 6

Key Drivers and Their Validated Basic Themes Used in Scenario Construction

Key driver	Code	Validated basic theme	Theme code
Information symmetry	E1	Reduction in potential computational errors in financial information	E1 ¹
		Reduction in disruptions affecting speed of access to financial information	E1 ²
		Reduction in lost investment opportunities	E1 ³
		Reduction in manipulation of the timing of financial-item disclosure	E1 ⁴
		Reduction in investors' financial risk exposure	E1 ⁵
Information normativity	E2	Increased voluntary disclosure	E2 ¹
		Increased comparability of corporate financial statements	E2 ²
		Increased integration of corporate financial reporting	E2 ³
		Improved quality of the information environment	E2 ⁴
		Increased efficiency of corporate investments	E2 ⁵

For each of the ten basic themes, three alternative future states were defined, producing 30 prospective states. The states represented positive, neutral or contingent, and negative or critical futures. For reduction in computational errors, the three states represented a substantial reduction in computational bias following XBRL implementation, a conditional reduction in computational bias, and no meaningful effect of XBRL on computational errors. For speed of information access, the states represented reduced disruption, unchanged disruption, and increased disruption. For lost investment opportunities, the alternatives represented a substantial reduction, a conditional reduction, and no reduction. For manipulation of disclosure timing, the alternatives represented reduced manipulation, an unchanged probability of manipulation, and increased manipulation. For investors' financial risk, the states represented declining financial risk, a conditional decline, and no material change.

Equivalent three-state structures were developed for information normativity. Voluntary disclosure could expand, remain unchanged, or decline following XBRL implementation. Financial-statement comparability could improve, improve only conditionally, or remain unaffected. Integration of financial reporting could expand, occur only contingently, or remain unchanged. The quality of the information environment could improve, remain stable, or deteriorate. Finally, investment efficiency could become

more effectively assessed, improve only conditionally, or remain unaffected by XBRL implementation. These 30 states were reviewed with additional academic experts to ensure that they represented plausible future conditions in the Iranian capital market.

A cross-impact uncertainty checklist was subsequently constructed by comparing the alternative states associated with the ten propositions. Because 10 conceptual propositions were examined under three alternative conditions, the resulting analytical structure consisted of 30 states and a 30×30 cross-impact matrix, producing 900 potential pairwise cells. Respondents evaluated the relationships using a seven-point directional scale ranging from +3 to -3, including +3, +2, +1, 0, -1, -2, and -3. Positive scores indicated mutually reinforcing future states, zero represented neutrality, and negative scores represented conflicting or inhibiting relationships. The modal score across participants was used as the representative value for each relationship.

The cross-impact procedure allowed the extraction of scenarios characterized by strong probability, possible probability, and high internal consistency. Four overall scenarios emerged. The first, second, and fourth scenarios predominantly represented desirable or favorable states, whereas the third scenario incorporated the static and critical conditions. Table 7 presents the allocation of the ten propositions across the four scenarios.

Table 7*Status of the Ten Key Propositions Across the Four Prospective Scenarios*

Key proposition	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Reduction in computational errors	Desirable: conditional reduction	Desirable: substantial reduction	Static: no material effect	Desirable: substantial reduction
Reduction in disruptions to rapid information access	Static	Desirable: reduced disruption	Critical: increased disruption	Desirable: reduced disruption
Reduction in lost investment opportunities	Desirable: conditional reduction	Desirable: substantial reduction	Static	Desirable: substantial reduction
Reduction in manipulation of disclosure timing	Static	Desirable: reduced manipulation	Critical: increased manipulation	Desirable: reduced manipulation
Reduction in investors' financial risk	Desirable: conditional decline	Desirable: substantial decline	Static	Desirable: substantial decline
Increase in voluntary disclosure	Static	Desirable: expanded disclosure	Critical: reduced disclosure	Desirable: expanded disclosure
Increase in financial-statement comparability	Desirable: conditional improvement	Desirable: stronger comparability	Static	Desirable: stronger comparability
Increase in financial-reporting integration	Desirable: conditional integration	Desirable: expanded integration	Static	Desirable: expanded integration
Improvement in information-environment quality	Static	Desirable: improved quality	Critical: deteriorating quality	Desirable: improved quality
Increase in corporate investment efficiency	Desirable: conditional improvement	Desirable: improved assessment/efficiency	Static	Desirable: improved assessment/efficiency
Total desirable states	6	10	0	10
Total static states	4	0	6	0
Total critical states	0	0	4	0

Across the four scenarios, 40 proposition-scenario combinations were evaluated. Twenty-six combinations, equivalent to 65% of all states, were classified as desirable; 10 combinations, or 25%, were static; and four combinations, or 10%, were critical. Scenario 1 contained six desirable and four static states. Scenario 2 contained ten desirable states and no static or critical states. Scenario 3 contained six static and four critical states and no desirable states. Scenario 4, similar to Scenario 2, contained ten desirable states and no static or critical states. Thus, the dominant prospective pattern was favorable, although the third scenario demonstrated that a failure to convert XBRL infrastructure into effective informational practices could generate stagnant or adverse outcomes.

Because Scenarios 2 and 4 produced the same general distribution of desirable states, further discrimination was required to determine which prospective configuration represented the most influential and plausible strategic future. Accordingly, the nonredundant favorable states were incorporated into a two-axis mathematical scenario framework based on information symmetry and information normativity. Sixteen favorable conceptual states were retained for this stage. They included substantial or conditional reductions in computational bias, reduced disruption in rapid information access, substantial or

conditional reductions in lost investment opportunities, reduced manipulation of financial disclosure, substantial or conditional declines in investors' financial risk, expansion of voluntary disclosure norms, substantial or conditional improvement in financial-statement comparability, substantial or conditional integration of financial reporting, improvement in the information environment, and substantial or conditional improvement in the assessment of corporate investment efficiency.

The 23 participants in the quantitative scenario phase assigned importance scores ranging from 0 to 10 to these favorable states. The modal value was used to represent the dominant assessment of each state. Four mathematical scenario functions were then constructed within a two-dimensional scenario matrix: the identity scenario located in the northeastern quadrant, the sinusoidal scenario located in the northwestern quadrant, the bracket scenario located in the southeastern quadrant, and the logarithmic scenario located in the southwestern quadrant. Considering the 23 participants and the 0–10 assessment scale, the reference mean expected value was calculated as 4.11. Consequently, scenario functions with expected values exceeding this benchmark were interpreted as receiving sufficient quantitative support.

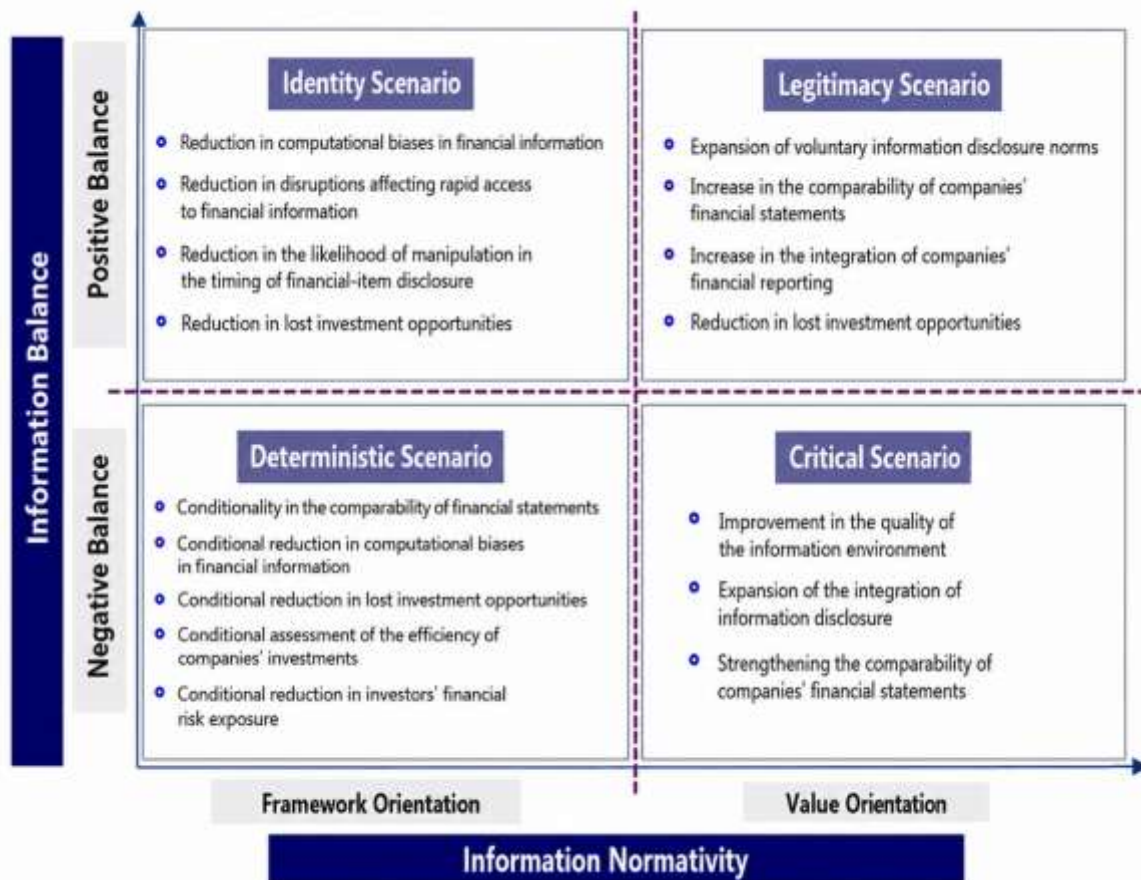
Table 8*Ranking of the Four Mathematical Scenario Functions*

Scenario function	Matrix quadrant	Total score	Expected value	Priority
Bracket scenario	Southeast	66.89	6.31	1st
Sinusoidal scenario	Northwest	60.11	5.78	2nd
Identity scenario	Northeast	53.76	4.81	3rd
Logarithmic scenario	Southwest	49.19	4.04	4th

The bracket scenario achieved the highest overall score of 66.89 and the highest expected value of 6.31, placing it first among the four alternatives. The sinusoidal scenario ranked second with a score of 60.11 and an expected value of 5.78. The identity scenario ranked third with a score of 53.76 and an expected value of 4.81. The logarithmic scenario obtained the lowest score of 49.19 and an expected value of 4.04, falling slightly below the reference expected value of 4.11.

The results therefore identified the bracket scenario, positioned in the southeastern quadrant of the two-axis

matrix, as the dominant prospective configuration for the future consequences of XBRL implementation. In conceptual terms, this scenario represents an asymmetrical configuration in which one of the two key driving dimensions attains a comparatively high level while the other remains relatively lower. Nevertheless, the interaction between information symmetry and information normativity under this configuration was quantitatively evaluated as producing the strongest prospective effect on the quality of financial decision-making in the Iranian capital market.

Figure 2*Matrix of Prospective Scenarios for the Outcomes of XBRL Implementation*

Overall, the findings demonstrate that the future consequences of XBRL implementation are primarily driven by information symmetry and information normativity rather than by professional, technological, sustainability, or business-development dimensions considered independently. Although professional skill enhancement, information-system improvement, social sustainability, and business dynamism remain relevant consequences of XBRL adoption, their positions in the MICMAC analysis indicate that they function more as secondary or downstream outcomes under current capital-market conditions. The two dominant drivers collectively determine whether XBRL implementation will improve the accessibility, comparability, integration, accuracy, and usefulness of financial information and thereby enhance the quality of financial decision-making. The scenario analysis further showed that 65% of the evaluated future states were desirable, compared with 25% static and 10% critical states, while the final mathematical assessment identified the bracket scenario as the highest-priority future configuration.

4 Discussion

The present study sought to identify the principal drivers shaping the future implementation and functional development of Extensible Business Reporting Language (XBRL) in companies operating in the Iranian capital market and to translate those drivers into plausible future scenarios. The findings demonstrated that the phenomenon is multidimensional and extends beyond the technical adoption of a digital reporting standard. The qualitative phase identified three global themes—informational transformation, structural transformation, and social transformation—which were represented through six organizing themes: information symmetry, information normativity, professional skill enhancement, information-system improvement, social sustainability, and business dynamism. Across the expert interviews, 282 open codes were initially identified and subsequently condensed into 33 basic themes. Following two rounds of Delphi analysis, three basic themes were eliminated because they did not reach the predetermined thresholds for mean expert rating and agreement, leaving 30 validated basic themes. The quantitative phase then demonstrated that information symmetry and information normativity possessed the greatest driving power within the MICMAC structure, whereas professional skill enhancement, information-system improvement, social sustainability, and business dynamism

occupied less influential positions. Scenario analysis further showed that desirable future states accounted for 65% of the evaluated proposition-scenario combinations, compared with 25% static and 10% critical states. Finally, among the four mathematical scenario configurations, the bracket scenario obtained the highest expected value and was therefore identified as the dominant prospective configuration for the future development of XBRL in the Iranian capital market.

The emergence of informational transformation as a central global theme is consistent with the fundamental rationale underlying XBRL adoption. The most immediate promise of XBRL is to transform financial reporting from a primarily document-oriented communication process into a structured, machine-readable information environment. In the present study, this transformation was reflected particularly in the themes of information symmetry and information normativity. The prominence of information symmetry suggests that the future effectiveness of XBRL will depend heavily on whether it can reduce computational errors, improve the speed of access to financial information, reduce lost investment opportunities, limit manipulation in the timing of disclosure, and reduce financial risk for investors. This result is aligned with international findings indicating that XBRL adoption improves the quality, accessibility, and usefulness of financial data and enhances the capacity of users to process and interpret financial information more efficiently ([Abhishek, 2023](#); [Divyashree et al., 2024](#)). The findings also support the proposition that XBRL should be interpreted as an informational infrastructure rather than merely a reporting format because its value derives from its ability to reduce the frictions associated with obtaining, processing, and comparing corporate information.

The identification of information symmetry as one of the two strongest drivers is particularly important in the context of capital-market decision-making. Information asymmetry represents a persistent challenge in financial markets because managers typically possess more detailed information about corporate conditions than outside investors and other stakeholders. When information is costly to obtain, difficult to compare, or delayed, the informational advantage held by insiders may become more consequential. The present results suggest that the expansion of XBRL can reduce these disparities through standardized digital disclosure and more efficient information transmission. This interpretation is strongly supported by evidence showing that digital disclosure language adoption can reduce

financial information asymmetry while improving information quality (Al-Okaily et al., 2024). Similarly, research has shown that movement from traditional reporting formats toward XBRL-based digital reporting is associated with greater financial-statement transparency (Al-Okaily, 2024). In the Iranian context, previous studies have likewise reported that XBRL can improve financial-reporting quality, enhance transparency, and reduce information asymmetry (Mohammadi & Khozin, 2017), while evidence from companies listed on the Tehran Stock Exchange indicates that XBRL implementation strengthens financial information transparency (Zahmatkesh et al., 2019). The convergence between these previous findings and the present MICMAC results reinforces the argument that information symmetry is not merely one consequence of XBRL adoption but may operate as a primary driver influencing several other organizational and market outcomes.

The second dominant driver, information normativity, represents a complementary dimension of the same transformation. The present study conceptualized information normativity through increased voluntary disclosure, greater comparability of financial statements, stronger integration of corporate reporting, improved quality of the information environment, and greater efficiency in corporate investment. The emergence of this construct as an independent driver suggests that the benefits of XBRL depend not only on technological capability but also on the institutionalization of shared disclosure norms. In other words, a digital reporting system becomes strategically important only when the information produced through that system is governed by consistent standards regarding classification, comparability, reliability, and accessibility. This finding is compatible with the institutional perspective on XBRL adoption, which emphasizes that adoption decisions are influenced by regulatory pressure, normative expectations, and institutional environments (Borgi & Tawiah, 2022). Cross-country evidence likewise indicates that XBRL adoption varies systematically according to institutional and national conditions, suggesting that the benefits of digital reporting cannot be separated from the broader reporting environment in which the technology is implemented (Sassi et al., 2024).

The importance of information normativity is also reinforced by evidence concerning the regulatory foundations of XBRL effectiveness. In emerging markets, technological adoption may not produce its anticipated benefits unless it is accompanied by clear regulatory

structures, consistent enforcement mechanisms, and organizational adherence to reporting standards. Recent evidence from Jordan demonstrates that regulation plays a mediating role in the effectiveness of XBRL, indicating that institutional support is critical to converting technological adoption into substantive reporting outcomes (Alghazzawi, 2025). The present study extends this logic by suggesting that information normativity itself may act as a future-oriented driver. As voluntary disclosure becomes more standardized, financial statements become more comparable, reporting systems become more integrated, and the quality of the information environment improves, the capacity of XBRL to influence market behavior may increase substantially. This finding is also consistent with broader arguments that the language of accounting and corporate reporting must evolve in ways that enhance the usefulness of business information for both organizations and society (Fülbier & Sellhorn, 2023).

A further important finding was that professional skill enhancement and information-system improvement were identified as meaningful organizing themes but did not demonstrate the same structural driving power as information symmetry and information normativity. This does not imply that these factors are unimportant. Rather, their position in the MICMAC analysis suggests that they may operate more as facilitating or downstream dimensions whose development is influenced by the dominant informational drivers. XBRL implementation requires professionals who can work with digital taxonomies, structured financial data, software-based reporting processes, and technology-enabled decision systems. Previous research has emphasized the importance of workplace learning, organizational support, and professional competency development in accounting-related professions (Plant et al., 2017). Similarly, evidence from Iranian holding companies suggests that the feasibility of XBRL adoption depends partly on the readiness and perceptions of financial employees (Mehrabanpour et al., 2024). The current findings are therefore consistent with the view that professional adaptation is necessary for effective implementation, although the scenario structure indicates that professional development alone may not determine the broader direction of XBRL outcomes unless accompanied by improvements in information symmetry and normative reporting practices.

The same reasoning applies to information-system improvement. The qualitative findings associated XBRL with the modernization of software-based financial calculations, management accounting information systems,

information-network security, transaction-processing systems, and decision-support mechanisms. These structural developments represent important organizational consequences of digital reporting because XBRL cannot operate effectively in isolation from the broader accounting information infrastructure. However, their relatively weaker driving position suggests that technological modernization may function as an enabling condition rather than as the principal determinant of future reporting outcomes. This interpretation is compatible with research showing that XBRL improves the quality of financial data through multiple reporting mechanisms rather than through technological implementation alone (Abhishek, 2023). Likewise, evidence concerning financial-reporting quality suggests that XBRL generates its strongest benefits when technological capabilities become integrated with reporting practices and user-oriented information processes (Divyashree et al., 2024). Accordingly, investment in information systems is likely to be most effective when it simultaneously strengthens the quality, comparability, and accessibility of reported information.

The identification of social sustainability and business dynamism as additional organizing themes broadens the interpretation of XBRL beyond conventional financial statements. Participants associated XBRL with more systematic disclosure of environmental pollution, carbon information, energy consumption, natural-resource protection, waste recycling, investments in financial start-ups, entrepreneurial ecosystems, research and development, ongoing projects, and consortium-based activities. These findings indicate that experts perceive XBRL as having potential relevance for integrated and nonfinancial reporting. This interpretation is consistent with the argument that XBRL can contribute to nonfinancial disclosure and integrated reporting by enabling structured communication of information that extends beyond traditional financial measures (Fradeani, 2022). The present findings therefore suggest that the future development of XBRL may increasingly intersect with sustainability reporting and disclosure of forward-looking strategic activities. Nevertheless, the MICMAC findings show that these areas are currently less structurally influential than informational symmetry and normativity, implying that broader sustainability and business applications may depend on the successful institutionalization of XBRL as a reliable financial-information infrastructure.

The results also have implications for understanding user behavior. The anticipated reduction in information-access

barriers and improvement in reporting comparability imply that XBRL can influence how analysts and investors engage with financial information. Previous Iranian research has shown that implementation of XBRL affects financial analysts' behavior, indicating that changes in reporting technology can alter information-search and interpretive processes (Chavoshi et al., 2018). This finding is consistent with the current identification of improved information symmetry as a key driver. When analysts can access standardized and machine-readable data more efficiently, their dependence on manually processed disclosures may decline, and the speed and scope of financial analysis may increase. The possible reduction in investors' risk exposure identified in the present thematic framework may therefore be understood as one downstream consequence of improved information accessibility and analytical efficiency.

The finding that XBRL-related developments may ultimately influence investment efficiency and corporate outcomes also corresponds with prior evidence linking digital reporting with firm performance. Research in Iran has found that XBRL can affect firm performance, suggesting that the consequences of implementation are not limited to the reporting process itself (Nazemi Ardakani et al., 2016). Similarly, studies of banking contexts have shown that XBRL-related innovation can improve efficiency and reduce asymmetric information (Wahyudi et al., 2022). These findings help explain why corporate investment efficiency emerged as part of information normativity in the present study. More standardized and comparable information can improve capital allocation by helping investors distinguish more effectively among firms and investment opportunities, while companies may also benefit from more efficient communication with the capital market. Thus, enhanced information quality can potentially produce organizational and market consequences extending beyond the immediate reporting function.

The Delphi results also provide an important qualification to the broader thematic framework. Three initially identified themes—reduction in opportunistic behavior in information disclosure, reduction in financing constraints, and increased monitoring of information reliability—were not supported strongly enough by the expert panel to remain in the validated model. Their elimination suggests that experts did not consider these consequences sufficiently direct, consistent, or certain outcomes of XBRL implementation. This distinction is theoretically important because digital reporting technology may improve the informational conditions under which opportunistic behavior, financing

constraints, or monitoring occur without necessarily eliminating these problems directly. For example, improved disclosure may reduce opportunities for some forms of informational manipulation, but managerial incentives and corporate governance structures continue to influence opportunistic behavior independently of reporting technology. Similarly, financing constraints are shaped by numerous factors including firm risk, market conditions, credit access, and macroeconomic circumstances. The Delphi findings therefore helped distinguish between plausible secondary effects and those outcomes regarded as sufficiently robust to form part of the central XBRL framework.

The scenario findings provide a particularly important contribution because they demonstrate that the future of XBRL is not uniformly positive or deterministic. Although 65% of the evaluated scenario states were desirable, 25% were static and 10% were critical. Scenario 2 and Scenario 4 generated entirely desirable configurations, whereas Scenario 3 contained only static and critical outcomes. This result suggests that XBRL has considerable potential to improve financial decision-making, but the realization of these benefits depends on the conditions under which implementation occurs. This conclusion is consistent with previous research showing that XBRL adoption and effectiveness differ across institutional environments and countries (Borgi & Tawiah, 2022; Sassi et al., 2024). It also aligns with early Iranian scenario-oriented work emphasizing that alternative implementation pathways should be identified and prioritized rather than assuming a single inevitable trajectory for XBRL adoption (Abdollahi & Monzavi, 2011). The present study updates and extends that futures-oriented perspective by placing information symmetry and information normativity at the center of the scenario structure.

The selection of the bracket scenario as the highest-priority mathematical configuration further indicates that the most plausible high-impact future may not require equally strong development across both principal drivers. The bracket scenario occupied a configuration characterized by a comparatively high position on one scenario axis and a lower position on the other, yet it achieved the highest overall score and expected value. This suggests that the interaction between information symmetry and information normativity may be nonlinear. In practical terms, significant improvements in one dimension may initially create strong market benefits even when the other develops more gradually, provided that the weaker dimension does not

deteriorate to a critical level. At the same time, the superiority of this scenario should not be interpreted as implying that balanced development is unnecessary. Rather, it indicates that the sequence and intensity of institutional and informational changes may differ during XBRL diffusion. Such a conclusion is compatible with evidence that regulatory support, technological capability, organizational readiness, and reporting quality operate through interconnected rather than uniform pathways (Alghazzawi, 2025; Mehrabanpour et al., 2024).

5 Conclusion

Taken together, the findings support a systemic interpretation of XBRL implementation in which informational outcomes represent the primary engines of future development, while technological, professional, sustainability-related, and business consequences operate within the broader informational environment generated by those drivers. This interpretation is consistent with global evidence that XBRL adoption is associated with improved financial-reporting quality (Tawiah & Borgi, 2022), enhanced financial-data quality (Abhishek, 2023), stronger transparency (Al-Okaily, 2024), and lower information asymmetry (Al-Okaily et al., 2024). It is also consistent with the broader need for corporate reporting systems to become more useful, interoperable, and socially relevant in an increasingly digital business environment (Fülbiér & Sellhorn, 2023). The present study adds to this literature by showing that, within the Iranian capital market, information symmetry and information normativity are likely to constitute the two principal axes around which alternative future XBRL outcomes will develop.

The present study has several limitations that should be considered when interpreting the findings. First, both phases relied on relatively small expert samples, which was appropriate for thematic saturation, Delphi analysis, cross-impact assessment, and scenario planning but limits statistical generalizability to the entire population of Iranian listed companies. Second, the qualitative findings were dependent on expert perceptions and therefore may reflect professional judgments shaped by participants' experiences, institutional positions, and familiarity with XBRL. Third, scenario planning does not provide deterministic forecasts; rather, it identifies structured and plausible future configurations based on current judgments and assumptions. The relative importance of the identified drivers may therefore change as reporting technologies, capital-market

regulations, cybersecurity conditions, artificial intelligence, sustainability reporting standards, and financial-market structures evolve. Finally, the study concentrated primarily on financial managers, accounting heads, and academic experts and did not directly incorporate the perspectives of retail investors, institutional investors, auditors, regulators, software developers, data vendors, and other users of structured financial information.

Future studies could validate the identified thematic framework using larger samples of listed companies and employ quantitative techniques such as structural equation modeling, network analysis, or longitudinal panel analysis to examine the relationships among information symmetry, information normativity, professional competencies, information-system quality, sustainability reporting, and business dynamism. Comparative studies between Iran and other emerging or developed capital markets could determine whether the two dominant drivers identified in the present research are context-specific or represent more universal characteristics of XBRL implementation. Future research should also examine the perspectives of investors, financial analysts, auditors, regulators, technology providers, and data intermediaries to obtain a broader stakeholder-based understanding of XBRL. Longitudinal futures studies could periodically reassess the cross-impact matrix and scenario probabilities as reporting regulations and technologies change. In addition, subsequent research could explore the interaction of XBRL with artificial intelligence, automated financial analysis, blockchain-based reporting, sustainability taxonomies, integrated reporting, and real-time assurance to determine how these emerging technologies may reshape the future scenarios identified in this study.

Capital-market regulators and listed companies should treat XBRL implementation as an information-governance transformation rather than merely a technical reporting project. Priority should be given to improving the accuracy, timeliness, comparability, integration, and accessibility of corporate information because these areas appear to provide the strongest foundation for future benefits. Regulators should develop clear and stable taxonomies, implementation guidance, quality-control procedures, and mechanisms for identifying tagging errors and inconsistencies. Listed companies should invest in compatible accounting information systems, cybersecurity, transaction-processing infrastructure, and automated validation mechanisms while simultaneously developing the digital competencies of financial and accounting personnel. Training programs

should focus on practical use of XBRL taxonomies, structured-data validation, digital disclosure, data analytics, and interpretation of machine-readable financial reports. Companies should also gradually extend structured reporting beyond conventional financial statements to sustainability, environmental, innovation, and strategic investment information where appropriate. Finally, implementation strategies should be periodically evaluated against alternative future scenarios so that regulators and companies can identify emerging risks, revise implementation priorities, and prevent XBRL adoption from becoming a formal compliance exercise without corresponding improvements in financial decision-making.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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