

# Smart Claims Management in the Insurance Sector from a Digital Transformation Perspective

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**ABSTRACT** This study examines digital transformation in the insurance sector within the framework of smart claims management. The aim of the research is to systematically analyze claim-focused digitalization disclosures included in the most recent sustainability reports of insurance companies listed on Borsa Istanbul from the perspectives of production technologies and digital transformation. To this end, a content map and coding framework were developed using content analysis, encompassing five core components: digital claims management, risk and fraud analytics, image processing, scoring systems, and claim cycle time. The codes were graded to reflect the level of evidence intensity and operational concreteness in the reports, and the findings were comparatively evaluated on a company-by-company basis. The results indicate that the extent to which claim-focused digital transformation is represented in sustainability reports is not homogeneous across companies. While some firms provide higher levels of evidence by supporting operational components such as digital claims management and claim cycle time with metrics, analytically intensive and advanced technology-driven components are reported more limitedly and are generally expressed through broad or declarative statements. The study contributes to the literature by conceptualizing smart claims management as an integrated process technology ecosystem that combines operational digitalization, analytical decision support, and advanced automation, and by demonstrating that sustainability reports can serve as an analytical source for the comparative evaluation of digital transformation visibility.

## INTRODUCTION

Globalization, technological developments, and increasing competition are forcing businesses operating in the service sector to develop new management approaches that can respond to customer expectations more quickly, transparently, and with higher quality. The insurance sector, where abstractness, simultaneity, and trust are decisive factors, stands out as one of the areas where the impact of service quality perception on customer satisfaction and loyalty is most intensely felt. Considering that the quality of insurance services is largely evaluated based on the experience during the claim process, it is evident that claim management processes hold strategic importance for the sector (Yusuf *et al.* 2017).

In recent years, digital transformation has been viewed in the insurance sector not merely as a technological renewal process, but as a comprehensive change that fundamentally transforms business practices, process management, and customer interaction. Digitalization enables insurance companies to increase their operational efficiency, reduce error rates, and offer more personalized services through technologies such as automation, data analytics, artificial intelligence, and image processing. One of the areas of

this transformation process that has the most direct contact with customers and the most visible impact is claims management processes (Pauch and Bera 2022).

The traditional approach to claims management has been criticized for its long processing times, intensive manual processes, information asymmetry, and bureaucratic practices that negatively affect customer satisfaction. In this context, smart claims management applications, which have emerged as a result of digital transformation, offer innovative solutions such as digital claims reporting, automated file management, risk and fraud analytics, scoring systems, and image processing-supported damage detection. These applications shorten the claims cycle time, thereby increasing the speed of service delivery, strengthening the transparency of processes, and reinforcing the element of trust in customer perception (Wiktorsson 2024).

Providing rapid feedback through digital channels and effectively managing fraud risks through the use of objective and data-driven decision-making mechanisms are among the key factors that enhance the perceived quality of insurance services (Wells and Stafford 1995). In this context, digital transformation and smart claims management applications are considered critical tools for improving service quality. The aim of this study is to systematically examine claims-focused digitalization activities disclosed in the most recent sustainability reports of insurance companies listed on Borsa Istanbul, from the perspective of production technologies and digital transformation. To this end, the study develops a con-

## KEYWORDS

Production technologies  
Digital transformation  
Service quality  
Insurance industry  
Content analysis

**Manuscript received:** 24 November 2025,  
**Revised:** 30 December 2025,  
**Accepted:** 20 January 2026.

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tent map and coding framework encompassing key smart claims management components, namely Digital Claims Management, Risk and Fraud Analytics, Image Processing, Scoring Systems, and Claim Cycle Time. The disclosures contained in the reports are comparatively analyzed using a graded scoring approach (0–4) that captures differences in evidence intensity, operational concreteness, and the presence of metric-supported information.

Within this framework, the study seeks to answer the following research questions: (RQ1) How are smart claims management components represented in the most recent sustainability reports of insurance companies listed on Borsa Istanbul in terms of evidence intensity? (RQ2) Which smart claims management components are reported with higher levels of measurability and operational concreteness, particularly through metric-supported disclosures? (RQ3) To what extent do sustainability reports reflect claims-related digital transformation as an integrated process technology ecosystem, rather than as a set of isolated digital initiatives?

## CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Due to the abstract nature of the services it offers and its process-intensive structure, the insurance sector is one of the areas where digital technologies are heavily used in terms of operational efficiency and process management. The relative ease with which insurance products can be imitated has led companies to build their competitive advantage not so much on product diversity but rather on the efficiency, speed, and standardization of their processes. In this context, digitalization and digital transformation are seen by insurance companies not merely as technological renewal but as a strategic transformation area involving the redesign of production-like service processes.

Although studies on the insurance sector in the literature have long focused on customer satisfaction and service quality (Büyükkakaç and Diker 2025), in recent years there has been an increase in research focusing on the transformative effect of digital technologies on process structure. Studies emphasizing the beginning of the digital age in the insurance sector reveal that digital insurance is becoming increasingly widespread by examining the applications offered by companies through their websites and digital platforms (Yurdakul and Dalkılıç 2016). Research focusing on the marketing dimension of digitalization addresses the interaction of digital channels with insurance products through examples from different sectors; it discusses how insuring products purchased through digital marketing can contribute to marketing processes (Özcan and Demiral 2019). Studies focusing on specific branches reveal the effects of digital marketing applications on brand equity and agent satisfaction (Aydin and Kirazlı 2020).

Although the concepts of digitalization and digital transformation are frequently used together in the literature, there is an important distinction between the two. Digitalization essentially refers to the digitization of existing processes, while digital transformation refers to a comprehensive restructuring process that encompasses technology-based change in business models, process structures, and organizational decision-making mechanisms. It is emphasized that technological developments, which have gained momentum with Industry 4.0, are behind digital transformation; these developments have fundamentally transformed customer expectations, interaction patterns, and the way businesses operate (Bozkurt *et al.* 2021).

Digital transformation in the insurance sector enables access to services regardless of time and place, while allowing processes to be restructured through mobile applications, web-based platforms, and social media channels (Nicoletti 2016). Digital insurance is

defined as a broad field of activity that encompasses the execution of processes such as policy purchase, policy management, claims reporting, and access to personalized information through digital solutions (Nicoletti 2016). It is stated that this scope encompasses a comprehensive value chain extending from the pre-sales research phase to the examination and evaluation of claims processes over time (Gönen and Özüdoğru 2021).

Digital insurance applications are discussed in the literature around four key technology areas: social media interaction, mobile computing and sensor technologies, data analytics, and cloud computing infrastructures. Social media stands out as an important channel in reputation management due to the visibility of customer experiences, while mobile applications facilitate claims reporting, policy tracking, and communication processes. Data analytics is strategically important in terms of risk assessment and personalized pricing, while cloud-based information technology infrastructures enable new services to be developed more quickly (PricewaterhouseCoopers 2016).

In the post-pandemic period, digitalization has accelerated; it is emphasized that this process must be addressed not only in terms of technology but also in terms of its legal and regulatory dimensions (Kubilay 2020). Telematics insurance applications developed within the scope of digital insurance have been discussed in the literature in terms of their structures and potential effects; assessments have been made regarding their applicability in Turkey (Umut 2020). Furthermore, it is stated that digital sales channels should be considered a new opportunity rather than a threat for agents, and that clear and understandable information in the digital environment is of critical importance (Kotan 2020). These studies reveal that digital transformation is a multidimensional process in the insurance sector.

Claims management in the insurance sector is one of the most visible and process-intensive areas of digital transformation. This process, which consists of claims reporting, file management, assessment, and payment stages, is being restructured through digital technologies and addressed under the concept of "smart claims management." Smart claims management encompasses applications that aim to execute claims processes through digital channels, utilize data analytics-based decision support mechanisms, and shorten process times. In this context, risk and fraud analytics stand out as a complementary component of smart claims management. Insurance fraud not only puts pressure on companies' financial performance but also leads to increased costs across the industry. Fraud is defined as a set of actions intended to deliberately deceive the insurance company and can occur in various branches, particularly auto insurance. Fraud is said to result in decreased profitability, deterioration in loss/premium ratios, and liquidity pressure (Yıldırım 2013).

The fundamental challenge in combating fraud lies in striking a balance between swiftly resolving legitimate claims and effectively investigating suspicious ones. In this regard, data analytics, early warning systems, and industry-wide information-sharing mechanisms are considered crucial tools (Kerim and Cula 2023). Databases developed within the Insurance Information and Supervision Center (SBM) in Turkey play a critical role in monitoring and analyzing fraud reports. Furthermore, insurance fraud is treated as aggravated fraud under the Turkish Penal Code; discussions regarding its effectiveness in practice are found in the literature (Yıldırım 2013). On the other hand, moral hazard is considered a type of risk that is difficult to detect and may arise due to changes in the insured's behavior after the insurance contract is signed. It is stated that moral hazard can lead to efficiency losses in insurance

markets and complicate risk management processes (Yıldırım 2013; Müslümov and Aras 2003). In this context, smart claims management applications are positioned as a strategic outcome of digital transformation not only in terms of operational efficiency but also in terms of risk control and combating fraud.

## MATERIAL AND METHODS

In this study, content analysis was employed to systematically examine the digitalization and smart claims management practices disclosed in insurance companies' sustainability reports. Among the six insurance companies listed on Borsa İstanbul, two operate exclusively in the life insurance segment; therefore, the scope of the research was limited to the non-life insurance sector. Accordingly, the analysis focused on Aksigorta, Anadolu Sigorta, Türkiye Sigorta, and Ray Sigorta, which operate across multiple branches of non-life insurance. The study examined the most recent and comprehensive sustainability reports for the year 2025 published on the official websites of these companies.

According to data from the Insurance Association of Turkey, these four companies collectively account for approximately 33% of total premium production in the non-life insurance segment, indicating their substantial representativeness within the market (Diker 2025). The study adopts a purposive sampling strategy, concentrating on insurance companies that disclose detailed and up-to-date sustainability information relevant to claims management and digital transformation. Accordingly, the findings of this study should not be interpreted as a sector-wide generalization, but rather as an exploratory and comparative analysis that provides analytical insights into how leading insurance companies reflect claims-related digital transformation and sustainability practices in their corporate reporting. Content analysis is a well-established research method that aims to classify meaningful units in written, spoken, or visual communication content within specific categories and to reveal thematic patterns in the content through this classification. The method is widely used in the social sciences, particularly in the analysis of corporate texts, policy documents, and reports.

Early applications of content analysis focused on propaganda and mass communication studies; Lasswell used content analysis as a fundamental tool in the analysis of communication processes (Lasswell 1968). In the classical approach, content analysis focused on the systematic and quantitative description of the explicit and observable characteristics of communication content; Berelson (1952) approached content analysis as the objective and systematic quantitative definition of communication content. However, methodological transformations in the social sciences over time revealed that content analysis could not be limited to frequency measurements alone; the method expanded to encompass the contextual meanings and implicit discourses of texts.

In this context, content analysis is considered a method positioned at the intersection of quantitative and qualitative research approaches. The positivist approach considers content analysis based on the principles of measurability and objectivity, while the interpretive approach evaluates texts not as passive reflections of social reality but as fields of meaning where this reality is actively constructed (Kümbetoglu 2008). Therefore, despite producing quantitative outputs, content analysis is considered a qualitative research method, especially in the analysis of contextual texts such as corporate reports. Krippendorff (2013) defines content analysis as a method that aims to make context-sensitive, valid, and repeatable inferences from texts, emphasizing that the institutional, social, and historical context in which the text was produced must

be taken into account during the analysis process.

The scientific nature of content analysis is based on the principles of objectivity, systematicity, and generalizability (Hepkul 2002). Objectivity means that the coding process is based on clear definitions and that researcher subjectivity is limited; systematicity means that all data are analyzed within the same category and coding rules; generalizability means that the findings obtained allow for comparative inferences to be made for similar texts. To ensure these principles are met, the unit of analysis, the category system, and the coding rules must be clearly and consistently defined. In content analysis, the unit of analysis can be determined at the level of a word, sentence, paragraph, theme, or document integrity. In this study, the unit of analysis was considered to be the thematic explanations found in corporate reports (Neuendorf 2017).

The category and coding process is central to content analysis and directly affects the success of the method. Categories are expected to be clear, distinguishable, mutually exclusive, and directly related to the research problem. Category systems enable systematic comparisons by providing analytical organization of complex text structures (Gökçe 2006). In this study, the coding process was carried out using a code book created in line with predefined themes. The code book clearly specified the definition, scope, and example statements of each code, thereby increasing the transparency and repeatability of the coding process (Neuendorf 2017).

In content analysis, reliability is assessed based on the extent to which different coders can code the same text in a similar manner; validity, on the other hand, is evaluated based on how well the coded content aligns with the conceptual framework of the research. Clear reporting of the coding process and the clarity of code definitions are among the key elements that strengthen the scientific quality of the method (Krippendorff 2013). Content analysis enables the systematic examination of structured but discursively rich texts, such as corporate reports, and offers a suitable method for descriptive and comparative research. The choice of content analysis in this study allows for a comprehensive, comparable, and repeatable framework for evaluating insurance companies' statements regarding digital transformation and smart claims management.

The content map developed within the scope of this study was designed to systematically analyze claims management-oriented digital transformation applications disclosed in the sustainability reports of insurance companies traded on Borsa İstanbul from a production technologies perspective. The content map is structured around five sub-themes: Digital Claims Management (DCM), Risk and Fraud Analytics (RFA), Image Processing (IP), Scoring Systems (SS), and Claim Cycle Time (CCT). Each sub-theme is operationalized through a clear definition, illustrative key phrases, and types of evidence.

This structure enables the digitalization statements included in the report texts to be evaluated comparatively not only at a conceptual level but also in terms of concrete applications and measurable outputs. The content map reveals that digital transformation is presented in the reports not as a set of isolated initiatives, but rather as an integrated "process technology ecosystem" in which operational digitalization, analytical decision-support capacity, and advanced technology-based automation dimensions are jointly articulated. In this context, the Digital Claims Management (DCM) code covers explanations related to the execution of claims reporting, file management, expertise, and payment processes through digital channels. Key phrases such as "digital damage," "online damage reporting," "remote/video expertise," "damage portal,"

and “automatic payment” were evaluated as examples representing applications for the digitization of damage processes in the reports. DCM is one of the fundamental themes indicating the restructuring of damage processes, which constitute “service production” in insurance companies, through digital infrastructure, automation, and process standardization.

Risk and Fraud Analytics (RFA) code; contains explanations regarding the detection of risk, anomaly, and fraud elements in claims and policy processes through data analytics and artificial intelligence-based approaches. Terms such as “fraud detection,” “fraud analytics,” “early warning systems,” “claim prediction,” and “risk analytics” demonstrate how analytical capacity and control mechanisms are represented in reports within the context of digital transformation. RFA represents a critical dimension not only in terms of digitizing claims processes but also in terms of supporting them with a data-driven control/audit architecture.

Image Processing (IP) code covers explanations related to the analysis of visual data using AI-supported methods for the purpose of damage detection and fraud prevention. Key phrases such as “damage detection from photographs,” “image processing,” “computer vision,” and “photomontage detection” indicate situations where advanced technology-based automation applications are used in reports. The IP code highlights digital transformation trends toward partially or fully replacing manual stages based on expert assessment in damage processes with algorithmic assessment systems. The Scoring Systems (SS) code contains explanations regarding the use of scoring systems and decision support/decision engines in risk acceptance, pricing, and loss assessment processes. Terms such as “risk score,” “underwriting score,” “location-based scoring,” and “decision engine” indicate how decision-making processes are represented in reports using algorithmic models and automation mechanisms. SS is one of the fundamental elements representing the “decision support infrastructure” and “process standardization” dimensions from a production technology perspective.

Claim Cycle Time (CCT) code covers explanations that include targets, applications, or metrics aimed at shortening the time from the opening to the closing of a claim file. Terms such as “file closing time” and “time-to-settlement” indicate the level of representation in the report text for measuring or monitoring process performance. In this respect, CCT serves as a complementary code that provides “output/performance visibility” to the extent that other themes are reported.

As shown in Table 1, the content map indicates that digital transformation statements related to claims management in sustainability reports are represented across three complementary dimensions: (i) operational digitalization (DCM, CCT), (ii) analytical decision support capacity (RFA, SS), and (iii) advanced technology-based automation (IP). This holistic structure suggests that digital transformation in the report texts is presented not as isolated projects, but rather as an interrelated “process technology ecosystem” in which different digital applications mutually reinforce one another.

In this study, a 0–4 level scoring scale was employed to assess the intensity of representation and the level of evidence of digital transformation and smart claims management components disclosed in sustainability reports. The scale is based on a gradual and ordinal rating logic, ranging from the absence of any statement related to the relevant theme (0) to detailed disclosures supported by concrete and measurable metrics (4) (Craggs and McGee Wood 2004).

As presented in Table 2, this scoring scale was applied to systematically evaluate the extent to which digital transformation and smart claims management statements are represented in report texts. The scale is consistent with a category-based annotation approach, enabling the structured and comparative analysis of textual content.

## FINDINGS

The coding process was carried out by two independent coders with domain expertise. Following a pre-established codebook, the coders independently reviewed the sustainability reports of each company and assigned scores ranging from 0 to 4 for each sub-theme. The total scores derived from the coders’ evaluations are presented in Table 3.

The findings presented in Table 3 provide a comparative assessment of the representation and level of evidence of digital transformation statements related to smart claims management components in companies’ sustainability reports, based on the evaluations of two independent coders. The scores assigned by the coders demonstrate a generally high level of consistency, and no meaningful differences are observed in the relative ranking of the companies.

Aksigorta emerges as the company with the highest level of representation according to both coders. Aksigorta received a total score of 17 from the first coder and 16 from the second coder, with particularly high scores observed in the Digital Claims Management (DCM) and Claim Cycle Time (CCT) dimensions. The fact that both coders assigned a score of 4 to the DCM dimension indicates that statements related to the digitalization of claims processes in the report texts go beyond merely indicating the existence of applications and are supported by measurable indicators or quantitative expressions. Scores of 3 in the Risk and Fraud Analytics (RFA), Image Processing (IP), and Scoring Systems (SS) dimensions suggest that these components are represented in the reports through multiple elements and concrete content. These findings indicate that Aksigorta is able to present claims-focused digital transformation in its reporting texts as a holistic “set of process technologies.”

Anadolu Sigorta and Türkiye Sigorta exhibit moderate and closely comparable total scores according to both coders. Anadolu Sigorta received a total score of 13 in both evaluations, while Türkiye Sigorta obtained a total score of 12 from each coder. In these companies, scores of 3 in the DCM and SS dimensions indicate that explanations regarding the digitalization of claims processes and decision-support mechanisms are clearly and concretely represented in the reports. In contrast, scores remaining largely at the level of 2 in the IP and CCT dimensions suggest that these components are addressed with a more limited scope or a lower level of evidence. Similarly, the RFA dimension remaining at a score of 2 for Türkiye Sigorta implies that disclosures related to risk and fraud analytics are comparatively limited at the reporting level.

Ray Sigorta appears as the company with the lowest level of representation according to both coders. Ray Sigorta received a total score of 7 from the first coder and 8 from the second coder, with particularly low scores observed in the RFA, IP, and CCT dimensions. Scores of 1 in these dimensions indicate that the relevant components are included in the report texts mainly through general or indirect statements, with limited evidence of concrete applications. Scores of 2 in the DCM and SS dimensions suggest that while certain applications are mentioned, the scope and level

**Table 1** Content Map: Codes, Definitions, Key Phrases, and Types of Evidence

Sub-Theme	Code	Definition	Key Phrases (Examples)	Type of Evidence
Digital Claims Management	DCM	Execution of claims reporting, file management, expertise, and payment processes through digital channels	Digital damage, online damage reporting, remote/video expertise, damage portal, automatic payment	General statement / Project name / Metric
Risk and Fraud Analytics	RFA	Analysis of fraud, anomaly, and risk elements in claims and policy processes through data analytics and artificial intelligence	Fraud detection, claim prediction, early warning systems, risk analytics	General statement / Project name / Metric
Image Processing	IP	Analysis of visual data using artificial intelligence for damage detection and fraud prevention	Damage detection from photographs, image processing, computer vision (CV), photomontage detection	General statement / Project name / Metric
Scoring Systems	SS	Use of scoring systems and decision engines for risk acceptance, pricing, and claims assessment	Risk score, underwriting score, location-based scoring, decision engine	General statement / Project name / Metric
Claim Cycle Time	CCT	Applications aimed at reducing the time from claim file opening to closure	File closing time, time-to-settlement	General statement / Project name / Metric

**Table 2** Scoring Scale

Score	Meaning	Description
0	Absent	No statement related to the relevant theme/code is found in the text
1	Indirect	A general statement exists; implementation or project details are unclear
2	Present (Limited)	An application or project is mentioned; the scope is narrow or at a pilot level
3	Strong	Multiple applications or components are indicated; the content is concrete
4	Very Strong	Metrics or measurable indicators are provided (time, rate, quantity, monetary value, etc.)

**Table 3** Representation of Smart Damage Management Components in Companies' Sustainability Reports (0–4)

Coder	Company	DCM	RFA	IP	SS	CCT	Total
1. Coder	Aksigorta	4	3	3	3	4	17
	Anadolu Sigorta	3	3	2	3	2	13
	Türkiye Sigorta	3	2	2	3	2	12
	Ray Sigorta	2	1	1	2	1	7
2. Coder	Aksigorta	4	3	3	3	3	16
	Anadolu Sigorta	3	3	2	3	2	13
	Türkiye Sigorta	3	2	2	3	2	12
	Ray Sigorta	2	2	1	2	1	8

of detail remain limited, resulting in a relatively weak representation profile.

Inter-coder reliability in the content analysis was tested using the quadratic weighted Cohen's Kappa coefficient, taking into account the ordinal nature of the 0–4 scoring scale. The analysis yielded a kappa value of 0.92, which, according to classifications

commonly accepted in the literature, indicates an almost perfect level of agreement between coders. This result demonstrates that the coding process is objective, consistent, and replicable, and it supports the methodological reliability of the content map and scoring approach developed in this study.

The findings indicate that the degree to which sustainability

reports represent digital transformation with a focus on claims management is not homogeneous across companies. While some companies present digital transformation practices through concrete disclosures supported by metrics, others rely more heavily on general statements with limited substantiation. In this respect, the content map and the 0–4 graded scoring approach developed in this study provide a functional and reliable analytical framework for comparatively revealing the visibility and evidence intensity of digital transformation components in corporate reporting texts.

## CONCLUSION

This study examined how claims-related digital transformation is reflected in the most recent sustainability reports of insurance companies listed on Borsa İstanbul, using a production technologies perspective. By classifying smart claims management into five components Digital Claims Management, Risk and Fraud Analytics, Image Processing, Scoring Systems, and Claim Cycle Time the study developed a content map and applied a 0–4 graded scoring approach to assess the level of representation and evidential strength of corporate disclosures. The findings reveal that sustainability reports differ substantially in how concretely and measurably they represent claims-focused digital transformation. While some companies support disclosures on digital claims management and claim cycle time with metrics and performance indicators, others rely primarily on general or declarative statements, particularly regarding analytics- and technology-intensive components such as fraud analytics and image processing. This indicates that digital transformation is not reported homogeneously across firms and that sustainability reports vary considerably in terms of evidence intensity and performance visibility.

The study makes three main contributions. First, it provides a holistic conceptual framework that structures smart claims management as an integrated process technology ecosystem spanning operational, analytical, and advanced automation dimensions. Second, it introduces a replicable content analysis and grading mechanism that moves beyond presence/absence evaluations and enables comparative assessment based on concreteness and measurability. Third, it demonstrates that sustainability reporting can serve as a meaningful analytical source for evaluating claims-related digital transformation when disclosures are supported by applications and metrics. Despite these contributions, the findings are inherently limited by the scope and transparency of the reports analyzed; therefore, lower scores may reflect reporting limitations rather than the absence of underlying practices. Future research should extend this approach by triangulating report-based analyses with in-depth interviews, expert evaluations, or process-level performance data, and by applying the framework to larger samples or cross-country contexts to enhance generalizability.

### Ethical standard

The authors have no relevant financial or non-financial interests to disclose.

### Availability of data and material

Not applicable.

### Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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**How to cite this article:** Diker, F., Islam, Y. and Diab, S. Smart Claims Management in the Insurance Sector from a Digital Transformation Perspective. *Information Technology in Economics and Business*, 3(1), 9-15, 2026.

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