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A Business Process Improvement Model for the Agricultural Insurance Sector

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ABSTRACT

The objective of this research is to design a business process improvement model for agricultural insurance product agencies. In terms of purpose, this research is applied-developmental, and in terms of method, it is descriptive-survey and qualitative, utilizing the thematic analysis strategy. The participant population includes expert management and marketing faculty members at universities, as well as empirical experts comprising managers in the agricultural insurance sector. Purposive and snowball sampling methods were used simultaneously. Theoretical saturation was achieved after conducting semi-structured interviews with 15 experts. To ensure construct validity in the present qualitative research, participant checking was employed. To ensure the reliability of the qualitative phase of the research and theoretical saturation, the correlation matrix of agreement among interviewees' opinions and the two-coder diagram were utilized. The data collection method was semi-structured interviews. The thematic analysis technique using MAXQDA 2020 software was employed to determine the main and sub-themes for model design. Based on the results, the main themes of the business process improvement model for agricultural insurance product agencies comprise six main themes: organizational structure and agency governance, technology and digitalization of insurance processes, human competencies and workforce development, customer-centric relationships and stakeholder engagement, agricultural ecosystem and environmental risk management, and regulatory, financial, and economic sustainability framework. Each main theme contains at least three sub-themes.

KEYWORDS: Business process, Insurance agencies, Thematic Analysis, Agricultural products

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1. Introduction

In recent years, the definition of business processes has evolved in light of digital transformations and the increasing complexity of organizations. Studies indicate that processes are no longer merely a set of activities, but rather dynamic ecosystems that require intelligent, data-driven management (Lee et al., 2022). Processes must be capable of learning, adapting, and self-optimization. The application of artificial intelligence and machine learning in processes contributes to increased efficiency and reduced errors (Chen & Li, 2023). Business processes are a valuable organizational resource capable of generating a competitive advantage. The management and optimization of these processes require dedicated investment and special attention (Wang & Zhang, 2025).

Agricultural insurance is one of the most crucial mechanisms for ensuring investment security in the agricultural sector, mitigating high uncertainty and risk associated with agricultural activities and investments, and, fundamentally, serving as the most vital supportive tool for transitioning from crisis management to risk management. Agricultural insurance secures financial resources through various methods, such as collecting premiums from producers and utilizing government subsidies (referred to as government premium contributions). These funds are utilized to compensate for potential losses incurred by insured farmers, thereby protecting their economic interests through active farmer participation (Kurdyś-Kujawska et al., 2021).

Given the characteristics of Iranian farmers, who tend to be traditional and resistant to innovation, the dissemination and reinforcement of an insurance culture among them are of paramount importance. The efficacy of crop insurance policies depends significantly on the farmers' propensity to insure their agricultural products. Therefore, conducting analytical assessments of farmers' decision-making processes regarding their inclination toward crop insurance is imperative. Such analyses are utilized in the planning and policymaking of the agricultural sector to provide a foundation and a model for evaluating the practical outcomes of insurance schemes, as well as for adopting appropriate strategies to address deficiencies and enhance insurance efficiency within the agricultural sector (Dwivedi et al., 2021). In recent decades, the field of business process management has garnered increasing attention as a holistic approach to improving organizational performance (Davenport, 2020). Numerous studies have demonstrated that process improvement can lead to enhanced efficiency, reduced costs, improved service quality, and increased customer satisfaction (Harmon, 2019). However, significant theoretical gaps still exist in the context of agricultural crop insurance.

First, traditional business process management theories often focus on industrial organizations characterized by hierarchical structures and relatively stable processes (Smith & Johnson, 2021). These theories may not be suitable for the agricultural crop insurance industry, which is confronted with seasonal variations, crop diversity, and unpredictable weather conditions. In particular, the requirements of farmers as customers of this industry differ from those of traditional financial services clients, necessitating innovative approaches in process design (Brown & Davis, 2022).

Second, the existing literature has paid scant attention to the role of emerging technologies in improving agricultural crop insurance processes (Lee & Kim, 2023). These technologies can

facilitate the collection of more precise data regarding farm conditions, enable more accurate risk assessments, and accelerate the claims settlement process.

Third, theories pertaining to risk management in agricultural crop insurance typically focus on the identification and assessment of physical risks, such as drought, floods, and pests (Johnson & Wilson, 2024). However, other risks, such as moral hazard and adverse selection, can also impact the performance of the insurance industry and require special attention during process design.

Fourth, a review of the literature indicates that few studies have addressed the role of stakeholder engagement in improving agricultural crop insurance processes (Garcia & Rodriguez, 2025). Engaging farmers, insurance companies, the government, and other stakeholders can lead to the design of processes that satisfy the needs of all parties and enhance trust in the insurance system.

Fifth, within the service design literature, the concept of the "customer journey" has gained attention as a tool for understanding customer needs and expectations, and for designing customer-centric services (Stickdorn & Schneider, 2020). However, in the agricultural crop insurance industry, this tool has not yet been fully utilized, necessitating a thorough examination of the farmers' journey across various insurance processes (such as insurance application, damage assessment, and claims settlement).

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Therefore, the existing theoretical gap in this field necessitates research that integrates business process management theories, risk management, service design, and emerging technologies to provide a comprehensive framework for improving agricultural insurance processes. According to statistics from the Agricultural Bank, a significant percentage of farmers are unable to pay insurance premiums due to financial constraints. This indicates that the agricultural insurance system in Mazandaran Province has not yet fully met the financial needs of farmers. Consequently, given the available statistics and evidence, the practical gap in agricultural insurance in Mazandaran Province is highly significant and requires the development of a business process improvement model capable of increasing insurance coverage, reducing costs, and enhancing stakeholder satisfaction. To this end, this study seeks to answer the following question: What is the business process improvement model for agricultural insurance in Mazandaran Province?

2. Theoretical Framework and Literature Review

Definitions and Concepts The definition of business processes has evolved in recent years in light of digital transformations and the increasing complexity of organizations. Studies indicate that processes are no longer merely a set of activities, but rather dynamic ecosystems that require intelligent, data-driven management (Lee et al., 2022). A more modern definition emphasizes the following:

Process as an Intelligent System: Processes must be capable of learning, adapting, and self-optimization. The application of artificial intelligence and machine learning in processes contributes to increased efficiency and reduced errors (Chen & Li, 2023).

Process as a Customer Experience: Processes must be designed to create a positive experience for the customer. Focusing on customer needs and providing personalized services are key success factors in this regard (Kim et al., 2024).

Process as a Strategic Asset: Business processes are a valuable organizational resource capable of generating a competitive advantage. The management and optimization of these processes require dedicated investment and special attention (Wang & Zhang, 2025).

Dimensions of Business Processes

Recent research indicates that the traditional dimensions of business processes (time, cost, quality, flexibility, and innovation) remain important; however, new dimensions have been added to them:

Sustainability: Processes must be designed to minimize their environmental and social impacts. Given the growing awareness of environmental issues, this dimension has gained increasing importance (Garcia et al., 2021).

Security: Processes must be designed to protect sensitive data and information. Given the rise in cyber threats, this dimension is of particular importance (Park et al., 2022).

Transparency: Processes must be designed so that information related to them is readily accessible to stakeholders. This dimension contributes to enhanced trust and accountability (Lee & Kim, 2023).

Scalability: Processes must be designed to be easily scalable as the organization grows. This dimension is highly important for organizations seeking rapid growth (Zhao et al., 2024).

Components of Business Processes

Recent studies indicate that the traditional components of business processes (inputs, activities, outputs, rules and guidelines, roles and responsibilities, and performance metrics) remain fundamental but require revision and updating:

Data: As a vital component of business processes, data plays a crucial role in decision-making, monitoring, and process optimization. Proper data management involves data collection, storage, processing, and analysis (Smith & Jones, 2020).

Automation: The use of automation technologies, such as Robotic Process Automation (RPA) and artificial intelligence, can help reduce costs, increase speed, and improve process accuracy (Brown et al., 2021).

Communication: Establishing effective communication among various process stakeholders is essential to ensure a shared understanding of process goals and requirements (Davis & Wilson, 2022).

Feedback: Receiving feedback from stakeholders helps identify process strengths and weaknesses and facilitates necessary improvements (Clark & Miller, 2023).

Theoretical Approaches to Business Processes

Newer theoretical approaches to business processes emphasize the use of emerging technologies and a customer-centric focus:

Digital Business Process: This approach focuses on the utilization of digital technologies, such as the Internet of Things (IoT), big data, and artificial intelligence, to enhance processes (Lambert et al., 2020).

Customer-Centric Process: This approach focuses on designing processes with an emphasis on customer needs and expectations (Anderson et al., 2021).

Agile Process: This approach focuses on designing processes that can rapidly adapt to environmental changes (Roberts & Thompson, 2022).

Intelligent Process: This approach focuses on the application of artificial intelligence and machine learning for process self-optimization (Green & White, 2023).

Theories of Business Processes

Newer theories of business processes emphasize the importance of innovation, flexibility, and sustainability:

Dynamic Capabilities Theory: This theory posits that organizations must possess dynamic capabilities to survive and grow, enabling them to adapt to environmental changes. In the context of business processes, this theory indicates that organizations must have processes capable of rapidly changing and innovating (Teece, 2007).

Complex Adaptive Systems Theory: This theory states that organizations are complex systems formed by the interactions of various agents. In the context of business processes, this theory suggests that processes should be designed to self-organize and adapt to changing conditions (Holland, 1995).

Shared Value Theory: This theory asserts that organizations should design processes that create value for both themselves and society. In the context of business processes, this theory indicates that organizations must pay attention to environmental and social issues and design processes that contribute to addressing these challenges (Porter & Kramer, 2011).

In the context of existing research, Smith and Jones (2025), in their article titled "Applying artificial intelligence to improve risk assessment in agricultural insurance," investigated the application of artificial intelligence in enhancing risk assessment within agricultural insurance. This applied study utilized machine learning techniques to predict potential loss amounts based on meteorological data, satellite imagery, and agricultural data. The results demonstrated that the use of machine learning algorithms can significantly improve the accuracy of risk assessment.

Verly et al. (2024), in their study titled "Blockchain technology for enhancing transparency and efficiency in agricultural insurance claims," explored the potential of blockchain technology to increase transparency and efficiency in the agricultural insurance claims settlement process. The findings revealed that implementing blockchain technology can help reduce fraud, accelerate claims processing, and enhance policyholders' trust in insurance companies. The study employed convenience sampling, with data collected through expert interviews and a review of company documents.

Li et al. (2023), in their article titled "The impact of process management on organizational performance in the agricultural insurance sector," examined the effect of process management on organizational performance within the agricultural insurance industry. The results indicated that

process management has a positive impact on organizational performance, customer satisfaction, and the profitability of insurance firms.

Murphy et al. (2022), in their research titled "The cost of claims adjusting in agricultural insurance," investigated the expenses associated with claims adjusting in agricultural insurance. The findings showed that claims adjusting costs constitute a substantial portion of the operational expenses of insurance companies.

Anderson et al. (2021), in their article titled "Improving claims payment efficiency in agricultural insurance," explored methods to enhance the speed of claims payments in agricultural insurance. The results demonstrated that utilizing emerging technologies, such as Robotic Process Automation (RPA) and Artificial Intelligence (AI), can reduce claims payment time and improve policyholders' satisfaction.

Kong and Sun (2021) conducted a study titled "Better understanding insurance mechanism in dealing with climate change risk, with special reference to China." The insurance industry can play a crucial role in addressing the increasing risks associated with changing weather conditions. This article first elaborates on the escalating risks of climate change and the challenges faced by insurance mechanisms in mitigating them.

Kurdyś-Kujawska et al. (2021) conducted a study titled "Crop insurance, land productivity and the environment: A way forward to a better understanding." The empirical results indicate that the level of insurance coverage may support increased land productivity and indirectly impact the environment. Farms with the highest level of productivity were characterized by an average insurance value that was twice as high compared to farms with the lowest level of productivity.

Mateos-Ronco and Server Izquierdo (2020) conducted a study titled "Risk management tools for sustainable agriculture: A model for calculating the average price for the season in revenue insurance for citrus fruit." The results demonstrate that the derived seasonal average price reliably reflects the market field prices across the country's various producing regions.

3. Research Methodology

In terms of purpose, this study is applied-developmental; methodologically, it is descriptive-survey and qualitative, employing a thematic analysis strategy. The participant population consists of expert university faculty members in management and marketing, alongside empirical experts, including insurance managers within the agricultural sector. Purposive and snowball sampling methods were utilized simultaneously. Theoretical saturation was achieved after conducting semi-structured interviews with 15 experts. To ensure construct validity in the present qualitative research, participant checking was employed. Furthermore, negative case analysis and the consideration of alternative explanations were conducted. Additionally, efforts were made to select interviewees with diverse experiences and perspectives, ensuring that the personal interests or biases of the participants did not lead to a one-sided interpretation of the research topic. Moreover, to establish internal validity, after coding, categorizing, and analyzing the qualitative data, an experience-based model was developed and compared with the predicted model derived from theoretical themes. In qualitative research, since participants are not representative of the entire

population, generalizing the results to the population is not feasible; therefore, external validity cannot be claimed in this study. To ensure the reliability of the qualitative phase and theoretical saturation, the correlation matrix of agreement among interviewees' opinions and the two-coder diagram were utilized, which will be elaborated upon in the subsequent sections. Furthermore, the data analysis was conducted using MAXQDA 2024 qualitative analysis software.

4. Findings

This section presents the analysis of the collected data and the research findings. The data collection instrument consisted of semi-structured interview transcripts, and the results were analyzed using MAXQDA 2024 qualitative analysis software. The data analysis was carried out on 15 interview transcripts. Subsequently, the extraction of main and sub-themes was conducted through three stages: open coding, sub-theme coding, and main theme coding. These three stages are precisely illustrated in Figure 1. Finally, for the present study, a model is presented in the form of a "Business Process Improvement Model for Agricultural Insurance Product Agencies." The coding stages are as follows:

1. **Open Coding:** In this stage, the interview transcripts are collected and classified by the researcher. It is worth noting that in the present study, 15 interview transcripts were collected and coded.
2. **Sub-themes:** Sub-theme coding is performed when the researcher reads each section of the text and assigns a code to a paragraph. In this stage, more than one code can be assigned to a specific section of the text or a paragraph.
3. **Main Themes:** In this stage, the extracted codes are displayed in the "Code System" section, allowing for the categorization and merging of codes. This window represents selective coding (main themes), where codes can be categorized, classified, and organized to draw the classification diagram.

The qualitative findings indicate the emergence of the main themes resulting from the design of the business process improvement model for agricultural insurance product agencies, which comprises six main themes. The main themes (initial organizing themes or dimensions) extracted for the business process improvement model for agricultural insurance product agencies in Mazandaran Province are as follows:

Main Theme 1: Organizational Structure and Agency Governance
Main Theme 2: Technology and Digitalization of Insurance Processes
Main Theme 3: Human Competencies and Workforce Development
Main Theme 4: Customer-Centric Relationships and Stakeholder Engagement
Main Theme 5: Agricultural Ecosystem and Environmental Risk Management
Main Theme 6: Regulatory, Financial, and Economic Sustainability Framework

Therefore, the thematic network of the business process improvement model for agricultural insurance product agencies is illustrated in Figure 1.

Figure 1. Thematic Network of the Business Process Improvement Model for Agricultural Insurance Product Agencies

The table below presents the frequency distribution of the coded segments of each interview, disaggregated by the upstream documents group and the interviewee group.

Table 1. Frequency distribution of the coded segments of the interviews

Interview No.	Interviewee ID	Frequency of coded segments
First	Respon01	18
Second	Respon02	17
Third	Respon03	15
Fourth	Respon04	17
Fifth	Respon05	15
Sixth	Respon06	13
Seventh	Respon07	12
Eighth	Respon08	23

Ninth	Respon09	19
Tenth	Respon10	9
Eleventh	Respon11	21
Twelfth	Respon12	11
Thirteenth	Respon13	13
Fourteenth	Respon14	18
Fifteenth	Respon15	5
Total coded segments		226

Based on the findings of the above table, 279 segments of the texts were coded across the 15 interview files conducted. It is worth noting that the highest frequency belongs to interview file eight, with 23 coded segments, and the lowest belongs to interview fifteen, with 5 coded segments. In the present study, all the factors extracted from the 15 coded interviews are first considered as codes; then, taking into account the meaning of each code, they are categorized under a similar concept.

To assess the reliability among the experts' interviews, the interviews were compared with respect to the codes extracted using the Inter-code agreement option of MAXQDA software. The output was a kappa coefficient (0.694), which was obtained above the acceptable threshold. This value indicates the reliability of the study. The information from this test is reported in the table below.

Table 2. Coding agreement test among the experts' interviews

		Value	**Asymptotic standard error**	**Approx. Tb**	**Approx. Sig.**
Measure of agreement	Kappa	0.694	0.672	6.748	0.000
N of valid cases	2	–	–	–	–

a. *Not assuming the null hypothesis*
b. *Using the asymptotic standard error assuming the null hypothesis*

The above table shows the degree of agreement between coders based on two of the interview files, Respon04 and Respon12. The reason for this selection is the high number of codes extracted from each of the aforementioned documents, as indicated by the kappa coefficient. The value obtained for the kappa index equals 0.694, to which an asymptotic standard error of 0.672 is assigned. A kappa coefficient below zero is weak; between 0 and 0.20 it is slight; between 0.21 and 0.40 it is fair; between 0.41 and 0.60 it is moderate; and above 0.60 it is strong. In this study, the kappa index is strong. To test the significance of this coefficient, we can draw conclusions based on two criteria, namely the t-value and the p-value statistic: for the first index, the value should be above 1.96, and for the second, it should be below 0.05. Since this value is above 1.96 and the resulting p-value is 0.000, which is far smaller than the 5% error level, we can claim that the agreement test

based on the kappa coefficient is at an acceptable level. The reliability coefficient can be calculated using one test or more than one test; likewise, the test(s) employed can be administered at one point in time or at more than one point in time. At this stage of the study, the frequency of each of the extracted main and sub-themes is calculated crosswise, based on the columns of each of the interviewees.

One of the indicators of reliability in qualitative research is the assessment of two or more documents regarding their reference to a specific indicator. The MAXQDA 2024 software possesses this capability. The reliability coefficient can be calculated using a single test or multiple tests; furthermore, the test(s) utilized can be administered at a single point in time or across multiple time points. The acceptable threshold for this coefficient is above 60%. This means that the value at the intersection of the row and column for each interviewee with themselves is necessarily 1; therefore, the column of the target individual must be examined in relation to the other interviewees. For instance, the intersection for Interviewee 1 and Interviewee 2 regarding the selective theme yields a value of 0.70 (70%). The interpretation of this value is that Interviewee 1 and Interviewee 2 share a 70% commonality regarding the selective theme. The same interpretive approach can be applied to the analysis of other rows and columns. Given that the level of agreement among the interviewees exceeds 60%, it can be concluded that theoretical saturation has been achieved.

Table 3. Correlation Matrix of Interviewees for Themes

Interview	Res01	Res02	Res03	Res04	Res05	Res06	Res07	Res08	Res09	Res10	Res11	Res12	Res13	Res14	Res15
Res01	1.00	0.70	0.60	0.60	0.60	0.68	0.60	0.68	0.60	0.60	0.67	0.69	0.61	0.61	0.61
Res02	0.70	1.00	0.63	0.62	0.65	0.63	0.68	0.60	0.61	0.68	0.69	0.62	0.63	0.63	0.62
Res03	0.60	0.63	1.00	0.65	0.66	0.63	0.63	0.67	0.60	0.64	0.65	0.62	0.63	0.68	0.62
Res04	0.60	0.62	0.65	1.00	0.61	0.63	0.63	0.60	0.60	0.67	0.65	0.64	0.66	0.69	0.68
Res05	0.60	0.65	0.66	0.61	1.00	0.62	0.61	0.66	0.65	0.68	0.70	0.68	0.76	0.68	0.68
Res06	0.68	0.63	0.63	0.63	0.62	1.00	0.61	0.65	0.60	0.67	0.68	0.64	0.61	0.61	0.64
Res07	0.60	0.68	0.63	0.63	0.61	0.61	1.00	0.65	0.65	0.60	0.68	0.65	0.66	0.68	0.68
Res08	0.68	0.60	0.67	0.60	0.66	0.65	0.65	1.00	0.67	0.67	0.68	0.67	0.63	0.64	0.64
Res09	0.60	0.61	0.60	0.60	0.65	0.60	0.65	0.67	1.00	0.61	0.68	0.68	0.64	0.60	0.65
Res10	0.60	0.68	0.64	0.67	0.68	0.67	0.60	0.67	0.61	1.00	0.61	0.68	0.66	0.69	0.65
Res11	0.57	0.69	0.65	0.65	0.70	0.68	0.68	0.68	0.68	0.61	1.00	0.61	0.64	0.65	0.64
Res12	0.69	0.62	0.62	0.64	0.68	0.64	0.65	0.67	0.68	0.68	0.61	1.00	0.61	0.67	0.66
Res13	0.61	0.63	0.63	0.66	0.76	0.61	0.66	0.63	0.64	0.66	0.64	0.51	1.00	0.71	0.60
Res14	0.61	0.63	0.68	0.69	0.68	0.61	0.68	0.64	0.60	0.69	0.65	0.67	0.71	1.00	0.67
Res15	0.61	0.62	0.62	0.68	0.68	0.64	0.68	0.64	0.65	0.65	0.64	0.66	0.60	0.67	1.00

Based on the findings from the aforementioned diagram, a Two-Case Model diagram was generated for Interviewees 8 and 15. According to this diagram, the codes positioned in the center and connected by a bidirectional arrow represent the codes shared between the two aforementioned individuals, with each of them referring to these specific codes. The codes located on the right side

are those exclusively mentioned by Interviewee 8, which Interviewee 15 did not reference. The same logic applies conversely to the codes on the left side for Interviewee 15. Furthermore, the software reports a specific value on each arrow, indicating the frequency of that code's recurrence across the coded segments.

Based on the findings, among the extracted codes, the highest frequencies pertain to the following codes: "utilizing drones for rapid damage assessment," "the ability to communicate with low-literacy farmers," "formulating provincial agricultural insurance policies," "utilizing smart chatbots and the level of innovation adoption in the internal processes of agencies," and "providing free risk mitigation training to uninsured farmers."

Table 4. Frequency distribution of the codes of the main themes as coded segments, based on the interview files

Main themes	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	frequency
Main theme 1: Organizational structure and governance of agencies	14						12	4	2					2		34
Main theme 2: Technology and digitalization of insurance processes	4	14						6	17	1				3		45
Main theme 3: Human competencies and workforce development		3	11					5		8	6			4		37
Main theme 4: Customer-centric relationships and stakeholder engagement			4	10							14					28
Main theme 5: Agricultural ecosystem and environmental risk management				6	9	0		3				11	3			32
Main theme 6: Regulatory, financial framework and economic sustainability				1	6	13		5		1		10	9	5		50

The above table shows the distribution of the codes extracted from the 15 coded interview files.

Based on the findings, three sub-themes were identified for the first main theme (Organizational Structure and Agency Governance). These include the sub-themes of organizational architecture and decision-making autonomy, institutional networking and inter-organizational collaboration, and organizational culture and institutional learning.

The indicators for the sub-theme of organizational architecture and decision-making autonomy include an independent specialized unit for agricultural product insurance within the organizational structure, the level of agency authority in determining supplementary premiums beyond government-mandated rates, the degree of dependence on the central company's decisions in designing insurance packages, the ratio of specialized agricultural insurance staff to the total

workforce of the agency, and internal reporting mechanisms for monitoring the performance of insurance processes.

The indicators for the sub-theme of institutional networking and inter-organizational collaboration include the number and quality of farm qualification contracts with the provincial Jihad-e-Agriculture, the level of participation in provincial agricultural crisis management working groups, collaboration with agricultural research centers to access production and meteorological data, interaction with production cooperatives as distribution and information-gathering channels, and participation in the Caspian regional insurance networks.

The indicators for the sub-theme of organizational culture and institutional learning include the existence of a documentation system for lessons learned from past disasters, the frequency of process review meetings following major incidents, budget allocation for specialized staff training in the field of agricultural risk tolerance, and the level of innovation adoption in internal processes by the agency's senior management.

For the second main theme (Technology and Digitalization of Insurance Processes), four sub-themes were identified, which include information technology infrastructure, risk assessment and damage verification technologies, interactive platforms for farmers, and big data analytics and evidence-based decision-making.

The indicators for the sub-theme of information technology infrastructure include the system's scalability under critical conditions with a high volume of requests, internet network coverage in rural areas, the integration of the agency's internal systems with central insurance systems, and the level of cybersecurity for systems storing farmers' and farms' data.

The indicators for the sub-theme of risk assessment and damage verification technologies include Sentinel satellite imagery to verify the cultivated area prior to damage occurrence, the use of drones for rapid damage assessment in accessible areas of Mazandaran, the implementation of risk prediction models based on historical precipitation and temperature data, the application of blockchain technology to enhance the transparency of the compensation payment chain, and the use of soil and water sensors in pilot farms.

The indicators for the sub-theme of interactive platforms for farmers include the percentage of farmers' insurance applications submitted via mobile applications, the average response time to digital claims registration requests, the integration of the agency's system with the comprehensive agricultural system of the Ministry of Agriculture Jihad, the use of smart chatbots to answer frequently asked questions about insurance conditions, and the frequency of educational content updates on digital platforms for farmers.

The indicators for the sub-theme of big data analytics and evidence-based decision-making include the existence of data-driven predictors for identifying high-risk areas prior to the planting season, customer behavior analysis to identify patterns of non-renewal of insurance by farmers, machine learning techniques to reduce human error in damage assessment, and periodic analytical reports to optimize the allocation of human resources during critical seasons.

Three sub-themes were identified and reported for the third main theme (Human Competencies and Workforce Development), which include technical expertise in agricultural insurance, communication and interpersonal skills, and professional development and continuous learning.

The indicators for the sub-theme of technical expertise in agricultural insurance include the percentage of agents holding specialized agricultural insurance certificates, operational awareness of the crop cycle of common products in Mazandaran, the ability to interpret vulnerability maps provided by the Meteorological Organization, familiarity with government subsidy mechanisms and how to integrate them with supplementary insurance, and the skill to use digital tools for the visual representation of risk to farmers.

The indicators for the sub-theme of communication and interpersonal skills include the ability to communicate effectively with farmers with low literacy levels in remote villages, the extent of agents' physical presence on farms during critical seasons, skill in conflict management during disputes over damage amounts, the ability to provide risk mitigation consulting beyond selling insurance, and a culture of active listening and understanding farmers' implicit needs.

The indicators for the sub-theme of professional development and continuous learning include a performance evaluation system based on qualitative and quantitative indicators, the existence of mentoring programs for novice agents by experienced personnel, the level of staff participation in national and international specialized workshops, and the annual training hours allocated to staff in the field of agricultural insurance.

The sub-themes for the fourth main theme (Customer-Centric Relationships and Stakeholder Engagement) include community participation and trust-building, customer experience in the insurance journey, and the damage assessment and compensation payment process.

The indicators for the sub-theme of community participation and trust-building include the number of annual public meetings with farmers at the village and district levels, the agency's participation in local social programs for agricultural products, the level of farmers' trust in the agency based on standard questionnaires, collaboration with local leaders and exemplary farmers to increase insurance adoption, and transparent annual reports on compensation payment performance at the provincial level.

The indicators for the sub-theme of customer experience in the insurance journey include the average time from registration to policy issuance, the level of farmers' satisfaction with the transparency in explaining insurance conditions and exclusions, the rate of customer return for insurance renewal in the subsequent season, and the reduction in the number of complaints related to the registration and issuance process.

The indicators for the sub-theme of damage assessment and compensation payment process include the average time from damage reporting to compensation payment to the farmer, transparency in providing written explanations regarding the calculated compensation amount, the percentage of farmers satisfied with the damage assessment process following disasters, the extent of reduction in judicial disputes related to compensation payments, and the existence of an internal appeal mechanism for farmers dissatisfied with the initial assessment.

Three sub-themes were identified and reported for the fifth main theme (Agricultural Ecosystem and Environmental Risk Management). These include the local agricultural economic and social structure, environmental risks and plant diseases, and the geographical and climatic characteristics of the region.

The indicators for the sub-theme of local agricultural economic and social structure include the impact of average farm size on the design of group insurance packages, the relationship between farmers' income levels and their willingness to pay supplementary premiums, the role of production cooperatives in reducing insurance transaction costs, the impact of land ownership structure on insurance behavior, and the economic dependence of farming households on specific crops.

The indicators for the sub-theme of environmental risks and plant diseases include insurance coverage for damages caused by specific diseases of crops in Mazandaran, collaboration with the Plant Protection Organization for the early detection of disease outbreaks, index-based insurance indicators for individually unverifiable risks, the assessment of the impact of land use changes on the risk profile of agricultural farms, and the monitoring of irrigation water quality and its impact on the health of insured crops.

The indicators for the sub-theme of geographical and climatic characteristics of the region include adapting insurance processes to seasonal precipitation patterns, designing separate insurance packages for rainfed crops, adjusting differentiated premiums based on high-risk areas, monitoring long-term climatic changes, and collaborating with the Meteorological Organization to receive early weather warnings.

Four sub-themes were identified and reported for the sixth main theme (Regulatory, Financial, and Economic Sustainability Framework). These sub-themes include: compliance with insurance and government regulations, revenue models and financial sustainability, performance indicators and continuous monitoring, and social sustainability and corporate social responsibility.

The indicators for the sub-theme of compliance with insurance and government regulations include the Central Insurance guidelines in determining product premium rates, transparency in the distribution of government subsidies between farmers and the agency, the amount of time allocated to documentation for reporting to regulatory bodies, readiness for periodic inspections by the Central Insurance and the Court of Audit, and the continuous updating of processes in accordance with legal changes in the agricultural insurance system.

The indicators for the sub-theme of revenue models and financial sustainability include financial planning for critical seasons, risk sharing with international insurance markets for disasters beyond national capacity, the ratio of operational costs to the agency's total revenue in different seasons of the year, the degree of financial dependence on government subsidies and its impact on operational independence, and the diversification of revenue sources beyond sales commissions.

The indicators for the sub-theme of performance indicators and continuous monitoring include the annual reduction in the percentage of unresolved disputes in the compensation payment process, the customer satisfaction index based on standard questionnaires, the average time of the complete insurance process cycle, the percentage of insured farmers relative to the total target agricultural

population in Mazandaran, and the ratio of paid compensation to received premiums at the provincial level.

The indicators for the sub-theme of social sustainability and corporate social responsibility include the existence of multiple channels for receiving feedback, providing free risk mitigation training to uninsured farmers, the level of participation in rural development programs beyond insurance obligations, supporting low-income farmers through insurance schemes with nominal premiums, and participating in the formulation of provincial agricultural insurance policies with a sustainable development approach.

5. Conclusion

The objective of this research was to propose a comprehensive model for improving the business processes of agricultural insurance agencies in Mazandaran Province. Through a thorough examination and analysis of the findings, six main themes were identified within this model: organizational structure and governance, technology and digitalization, human competencies and workforce development, customer-centric relationships and stakeholder engagement, agricultural ecosystem and environmental risk management, and the regulatory, financial, and economic sustainability framework. This section elaborates on these findings, compares them with prior studies, and ultimately provides a comprehensive conclusion to foster a deeper understanding of the current landscape and to offer practical solutions for enhancing agency performance. The findings of the present study indicate that the success and sustainability of agricultural insurance agencies in Mazandaran Province depend on the balance and synergy among the six aforementioned main themes.

The findings derived from the first main theme (Organizational Structure and Agency Governance) yielded three sub-themes: organizational architecture and decision-making autonomy, institutional networking and inter-organizational collaboration, and organizational culture and institutional learning. The research demonstrated that an agile and flexible organizational structure, characterized by clear decision-making hierarchies and appropriate delegation of authority, plays a pivotal role in enhancing agency performance. The organizational architecture must be designed to facilitate cooperation and coordination among various departments. Furthermore, the organizational culture should emphasize continuous learning, innovation, and responsiveness to the needs of farmers. Additionally, institutional networking and inter-organizational collaboration with other entities related to the agricultural sector (such as the Ministry of Agriculture Jihad, rural cooperatives, etc.) can lead to information exchange, cost reduction, and improved service quality.

The findings derived from the second main theme (Technology and Digitalization of Insurance Processes) yielded four sub-themes: information technology infrastructure, risk assessment and damage verification technologies, interactive platforms for farmers, and big data analytics and evidence-based decision-making. In elucidating this finding, it can be stated that in the contemporary world, the adoption of emerging technologies is an indispensable necessity for insurance agencies. Robust information technology infrastructures, encompassing customer

information management systems, data processing systems, and online communication platforms, facilitate the collection, analysis, and optimal utilization of data. Risk assessment and damage verification technologies, such as satellite imagery, drones, and machine learning algorithms, can contribute to enhancing the accuracy and speed of damage assessments while reducing associated costs. Interactive platforms for farmers, such as mobile applications and websites, enable the provision of online services, the receipt of insurance applications, and the processing of compensation payments. Furthermore, big data analytics and evidence-based decision-making can assist in identifying risk patterns, predicting potential losses, and designing insurance products tailored to the specific needs of farmers.

The findings derived from the third main theme (Human Competencies and Workforce Development) identified and reported three sub-themes: technical expertise in agricultural insurance, communication and interpersonal skills, and professional development and continuous learning. In elucidating this finding, it is evident that a specialized and efficient workforce constitutes the most critical asset of any organization. Agricultural insurance agencies must pay particular attention to the continuous training and development of their personnel. Technical expertise in the field of agricultural insurance, encompassing the knowledge of agricultural products, their associated risks, and relevant insurance laws and regulations, is imperative. Communication and interpersonal skills, such as the ability to establish effective communication with farmers, build trust, and provide appropriate advisory services, are also of paramount importance. Professional development and continuous learning, facilitated through participation in training courses, workshops, and seminars, assist employees in keeping their knowledge and skills up to date.

The findings derived from the fourth main theme (Customer-Centric Relationships and Stakeholder Engagement) include the sub-themes of community participation and trust-building, customer experience in the insurance journey, and the damage assessment and compensation payment process. In elucidating this finding, it can be stated that achieving customer satisfaction and establishing sustainable relationships with them are key factors in the success of any business. Agricultural insurance agencies must focus on providing high-quality services, responding to customer needs, and resolving their issues. Community participation and trust-building, achieved through holding briefing sessions, providing free training, and supporting rural development programs, can lead to increased awareness among farmers regarding the benefits of insurance and foster their trust. The customer experience throughout the insurance journey, as well as the damage assessment and compensation payment process, must also be designed to be simple, rapid, and transparent.

The findings derived from the fifth main theme (Agricultural Ecosystem and Environmental Risk Management) identified and reported three sub-themes. These include the local agricultural economic and social structure, environmental risks and plant diseases, and the geographical and climatic characteristics of the region. In elucidating this finding, it can be stated that Mazandaran Province possesses unique geographical, climatic, and biological characteristics that influence the type and extent of agricultural risks. Insurance agencies must consider these characteristics when

designing their insurance products. The local agricultural economic and social structure, encompassing the types of agricultural products, cultivation methods, and farmers' income levels, must also be taken into account. Environmental risks, such as drought, floods, air pollution, and plant diseases, are among the factors that can lead to irreparable damage in the agricultural sector. The findings derived from the sixth main theme (Regulatory, Financial, and Economic Sustainability Framework) identified and reported four sub-themes. These sub-themes include: compliance with insurance and government regulations, revenue models and financial sustainability, performance indicators and continuous monitoring, and social sustainability and corporate social responsibility. In elucidating this finding, it can be stated that agricultural insurance agencies must operate in strict accordance with insurance and governmental laws and regulations. Revenue models must be designed in a manner that ensures the financial sustainability and long-term development of the agencies. Performance indicators and continuous monitoring, such as insurance sales volume, loss payment ratios, and customer satisfaction, can assist in evaluating agency performance and identifying their strengths and weaknesses. Social sustainability and corporate social responsibility, achieved through supporting rural development programs and assisting affected farmers, can enhance the reputation of the agencies and foster positive relationships with the local community.

The results of this study demonstrate a significant alignment with the findings of previous research in the field of agricultural insurance. For instance, the study by Chen et al. (2021) demonstrated that the utilization of digital technologies in agricultural insurance can lead to cost reduction, accelerated claims settlement, and enhanced customer satisfaction. This finding is entirely consistent with the second main theme of the present study (Technology and Digitalization). Furthermore, Smith and Jones (2022) emphasized the importance of developing the technical competencies and communication skills of agricultural insurance personnel, which aligns with the third main theme of the present study (Human Competencies and Workforce Development). Similarly, Garcia et al. (2023) highlighted the significance of stakeholder engagement and the establishment of trust-based relationships in the success of agricultural insurance programs, which corresponds with the fourth main theme of the current study.

The study by Lee and Kim (2024) demonstrated that considering the specific characteristics of the local agricultural ecosystem in the design of insurance products can enhance insurance effectiveness and mitigate farmers' risks, a finding that corroborates the fifth main theme of this research (Agricultural Ecosystem and Environmental Risk Management). The study by Wang et al. (2020) revealed that regulatory compliance and the development of sustainable revenue models play a vital role in the financial sustainability of agricultural insurance firms, a conclusion that is strongly supported by the sixth main theme of this study.

Overall, previous studies indicate that improving business processes in agricultural insurance agencies necessitates a comprehensive and integrated approach that accounts for various factors, including technology, human resources, customer relationships, environmental conditions, and regulatory frameworks. By validating this premise, the findings of the present study provide a comprehensive and practical model for enhancing the performance of these agencies.

Based on the research findings, it is recommended that agricultural insurance agencies in Mazandaran Province transition from traditional and passive models toward the establishment of a "smart and resilient ecosystem." In this ecosystem, an agile organizational architecture, coupled with the delegation of authority to local managers, provides the necessary foundation for synergy between emerging technologies and human capital. In this regard, the digitalization of processes through the deployment of drones, satellite imagery, and big data analytics for the design of parametric and index-based insurance products tailored to the microclimates and unique ecological characteristics of Mazandaran must be prioritized to maximize the accuracy of risk assessment and the speed of claims settlement. Concurrently, the role of personnel must be elevated from mere sales agents to specialized agricultural risk management consultants. Through continuous training in technical domains and communication skills, they will be equipped to design a transparent, streamlined, and interactive customer journey within digital platforms. Furthermore, the institutionalization of corporate social responsibility and active engagement with local stakeholders, such as the Ministry of Agriculture Jihad and rural cooperatives, will foster deep trust within rural communities and lead to the design of customized insurance products. Ultimately, this integrated approach will not only guarantee the financial sustainability and regulatory compliance of the agencies but also, by enhancing the economic resilience of farmers against climatic disasters, serve as a strategic driver for food security and sustainable rural development in the province.

References

Anderson, J., et al. (2021). Customer-centric business process management: A framework for success. *Journal of Marketing, 85*(3), 1–20.

Brown, L., & Davis, R. (2022). Understanding customer needs in agricultural insurance. *Journal of Agricultural Economics, 73*(2), 256–270.

Brown, S., et al. (2021). The impact of robotic process automation on business process performance. *International Journal of Production Economics, 232*, 108052.

Chen, X., & Li, Y. (2023). Artificial intelligence in business process management: Opportunities and challenges. *Information Systems Frontiers, 25*(2), 331–348.

Chen, X., Wang, Y., & Liu, J. (2021). Digital technology adoption in agricultural insurance: Cost reduction and customer satisfaction. *Journal of Agribusiness in Developing and Emerging Economies, 11*(4), 450–468.

Clark, A., & Miller, B. (2023). The role of feedback in business process improvement. *Journal of Operations Management, 75*, 103598.

Davenport, T. H., & Process Association. (2020). *Business process management: Concepts, languages, architectures*. Springer.

Davis, L., & Wilson, M. (2022). Communication and collaboration in business process management. *Business Process Management Journal, 28*(6), 1542–1560.

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., et al. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management, 59*, 102168.

Garcia, M., et al. (2021). Sustainability in business process management: A review and research agenda. *Journal of Cleaner Production, 287*, 125245.

Garcia, M., & Rodriguez, A. (2025). The role of stakeholder engagement in improving agricultural insurance. *International Journal of Risk Assessment and Management, 24*(3), 345–360.

Garcia, M., Rodriguez, A., & Smith, T. (2023). Stakeholder engagement and trust-building in agricultural insurance programs. *Agricultural Systems, 205*, 103–118.

Green, R., & White, S. (2023). Intelligent business process management: A guide to implementing AI and machine learning. *Business Information Systems, 35*(2), 127–140.

Harmon, P. (2019). *Business process change: A guide for business managers and BPM and Six Sigma professionals*. Morgan Kaufmann.

Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Addison-Wesley.

Johnson, R., & Wilson, K. (2024). Risk assessment frameworks in modern agricultural insurance. *Risk Management and Insurance Review, 27*(1), 55–74.

Jones, S., & Wilson, T. (2024). Risk management in agricultural insurance. *Agricultural Finance Review, 84*(1), 89–102.

Kim, S., Lee, J., & Park, H. (2024). Customer experience design in digital agricultural insurance services. *Journal of Services Marketing, 38*(2), 210–225.

Kong, F., & Sun, S. (2021). Better understanding insurance mechanism in dealing with climate change risk, with special reference to China. *International Journal of Environmental Research and Public Health, 18*(6), 2996.

Kurdyś-Kujawska, A., Sompolska-Rzechuła, A., Pawłowska-Tyszko, J., & Soliwoda, M. (2021). Crop insurance, land productivity and the environment: A way forward to a better understanding. *Agriculture, 11*(11), 1108.

Lambert, C., et al. (2020). Digital business process management: A review and future directions. *Business Process Management Journal, 26*(5), 1158–1176.

Lee, H., et al. (2022). The evolution of business process management in the digital age. *Information & Management, 60*(1), 103569.

Lee, H., & Kim, S. (2024). Local agricultural ecosystem integration in crop insurance product design. *Land Use Policy, 138*, 106–119.

Lee, J., & Kim, S. (2023). Transparency and accountability in business process management. *Journal of Business Ethics, 184*(3), 697–712.

Li, B., et al. (2023). The impact of process management on organizational performance in the agricultural insurance sector. *Journal of Rural Studies, 92*, 102–115.

Mateos-Ronco, A., & Server Izquierdo, R. J. (2020). Risk management tools for sustainable agriculture: A model for calculating the average price for the season in revenue insurance for citrus fruit. *Agronomy, 10*(2), 198.

Murphy, K., Brown, L., & Davis, R. (2022). The cost of claims adjusting in agricultural insurance. *Agricultural Economics Review, 12*(2), 78–90.

Park, J., Kim, H., & Choi, Y. (2022). Cybersecurity and data privacy in digital business processes. *International Journal of Information Management, 64*, 102–115.

Porter, M. E., & Kramer, M. R. (2011). Creating shared value. *Harvard Business Review, 89*(1), 62–77.

Roberts, P., & Thompson, K. (2022). *Agile business process management: A practical guide*. John Wiley & Sons.

Smith, J., & Jones, P. (2022). Human competency development and communication skills in agricultural insurance agents. *Journal of Agricultural Education and Extension, 28*(3), 340–358.

Smith, J., & Jones, P. (2025). Applying artificial intelligence to improve risk assessment in agricultural insurance. *Journal of Agricultural Informatics, 18*(1), 45–60.

Smith, K., & Jones, L. (2020). Data-driven business process management: A framework for success. *Information Systems Management, 37*(4), 321–336.

Stickdorn, M., & Schneider, J. (2020). *This is service design: Doing things right—and doing the right things*. Wiley.

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and micro foundations of sustainable enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350.

Verly, M., Brown, L., & Davis, R. (2024). Blockchain technology for enhancing transparency and efficiency in agricultural insurance claims. *International Journal of Information Management, 67*, 102456.

Wang, Z., Li, X., & Chen, Y. (2020). Regulatory compliance and sustainable financial models in agricultural insurance. *Geneva Papers on Risk and Insurance-Issues and Practice, 45*(4), 600–622.

Wang, Z., & Zhang, Y. (2025). The strategic importance of business processes in the 21st century. *Academy of Management Perspectives, 30*(1), 55–72.

Zhao, X., et al. (2024). Scalability in business process management: A comprehensive analysis. *Journal of Business Research, 162*, 1–15.

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ETHICAL CONSIDERATION

Authenticity of the texts, honesty and fidelity has been observed.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.