

# Reviewing and evaluating the customer validation system in risk management with the approach of Fee income research in Melli Bank of Iran

Hassan Zolfaghari<sup>a</sup>, Alireza Farokhbakht Foomani<sup>b</sup>, Nima Ranji Jafroudi<sup>b</sup>

<sup>a</sup>Department of Management, Astara Branch, Islamic Azad University, Astara, Iran

<sup>b</sup>Department of Management, Bandar Anzali Branch, Islamic Azad University, Bandar Anzali, Iran

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## Abstract

This research was done with the aim of designing a customer validation system model based on risk management with the approach of realizing fee income in the National Bank of Iran. The current research is applied in terms of purpose and in terms of method, it is a mixed (mixed)-exploratory design, which is based on grounded theory in the qualitative stage and descriptive-survey method in the quantitative stage. Based on the theme analysis method, after the interviews with the experts, which were conducted after the theoretical saturation of 15 interviews, all the text of the interviews was entered into the Max QDA software, and then the primary codes and sub- and main categories were extracted. Then, based on the Strauss and Corbin model, the central, causal, strategic, consequences, interventionists and contextual factors categories were identified. Finally, the research model was designed. In order to ensure the coordination of the data with the factor structure, and the quality indicators of the model, a questionnaire consisting of 95 items was distributed to a quantitatively wide population including 384 employees of National Bank. The data were analyzed using the structural equation modelling approach. The results of the qualitative part showed that the central phenomenon includes a customer validation system, causal conditions including risk management, background conditions including customer orientation, strategies and measures including banking facilities, and intervening conditions including cultural factors. The consequences include fee income and profitability. According to the results presented in the research model review, it can be stated that causal conditions (risk management) have a positive and significant effect on the central category of the customer validation system. The central category of the customer validation system is on strategies (banking facilities) which have a positive and significant effect. Background conditions (customer-oriented) have a positive and significant effect on strategies. Intervening conditions (cultural factors) have a positive and significant effect on strategies. Strategies have a positive and significant impact on outcomes (fee income and profitability).

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*Email addresses:* [zolhassan142@gmail.com](mailto:zolhassan142@gmail.com) (Hassan Zolfaghari), [alirezafoomani@gmail.com](mailto:alirezafoomani@gmail.com) (Alireza Farokhbakht Foomani), [gilan.technology@gmail.com](mailto:gilan.technology@gmail.com) (Nima Ranji Jafroudi)

## Introduction

Equipping and allocating investment resources to economic activities is done through the financial market, of which the banking credit market is an integral part. The primary role of banks in the financial market is to provide credit to customers. In this regard, one of the crucial issues is customer credit risk assessment, which refers to the likelihood of defaulting on loans provided by customers. Measuring this risk among various risks that banks deal with holds a special place, and reducing and controlling it is one of the key factors affecting the improvement of the credit granting process and, consequently, the performance of banks and financial institutions [3].

The consequences of such risks could lead to severe financial difficulties or even bankruptcy for the lending institution. Therefore, the continuous and long-term success of a financial institution relies on the implementation of optimal risk management within the institution. The philosophy of banking risk management is related to the objective pursued by the bank, which is to increase shareholders' return within the general framework of risk probability. Risk management focuses on identifying, measuring, and controlling risks, enabling appropriate risk ranking and optimal allocation of resources. Given the rapid growth of overdue receivables in recent years, it seems that proactive measures should be taken to reduce the losses resulting from non-repayment of facilities.

One of the main solutions in this area is the use of common patterns for customer credit assessment before granting facilities. This approach has been repeatedly emphasized in the recommendations of the Basel Committee, especially in the Basel II statement. The use of credit scoring models requires access to sufficient and accurate information on financial statements and the status of applicant businesses, enabling sound judgment in granting or denying facilities to them [27].

The results of the research by Al-Oun [2] showed that credit risk is periodic, and default risk depends on structural characteristics. Based on this, bank policymakers can formulate policies to enhance financial stability and efficiency and reduce fluctuations in output. The study by Benouna [5] demonstrated a positive relationship between "credit margin" and "gross domestic product" in normal business cycles (six years). In the article by Balbal [6], two different statistical scoring techniques, GP and PA, were discussed and compared for predicting the quality of borrowers. Groenen et al. [29] found that a major bank is highly motivated to enter into risk reduction policies by increasing the margin, which was previously very high. The results of Hu et al. [9] showed that the proposed model can improve the prediction accuracy of the logistic regression model with fixed coefficients without sacrificing its desirable features. In the research by Bafandeh et al. [4], a credit scoring model based on fuzzy expert system using factor analysis was designed, with input stages including financial, support, reliability, repayment history, and output stages being classified and the credit level of customers obtained, followed by fuzzy numbers and inference rules, and finally designing the credit scoring model. The results of Shariat Panahi et al. [22] indicated that out of 17 selected ratios, 5 ratios have the most significant power in distinguishing companies with and without default, and the return on assets ratio has an inverse relationship with the probability of default. Furthermore, companies with higher net profits are more successful in repaying their loans and obtaining credit. In the study by Khaleghifar [13], the estimated logistic model predicted 84.7% of observations correctly, indicating a good fit of the model. Therefore, by using this model, approximately 84.7% of facilities can be allocated to creditworthy customers. In the research by Dehmordi et al. [8], the amount of received facilities from the bank, the spouse's employment status, returned check status, repayment term, marital status, current assets and properties of the borrower, and current housing status had the highest shares in distinguishing customers into two groups with high and low credit risk. The results of Arabmazar et al. [3] showed that the factors affecting the credit risk of agricultural customers have a lot in common with those affecting the credit risk of customers of other banks (including Bank Melli and Export Development Bank). In the study by Raea et al. [19], the models used in such systems provide the possibility of quantitatively predicting the credit risk of borrowers. The results indicated the significance of the model with an error rate of less than 5 percent. The results of Mirzaei et al. [18] demonstrated that based on statistical indicators, these functions have significant coefficients and good discrimination power. On the other hand, variables such as age and education had no significant effect on credit status and were removed from the model. Furthermore, the logistic model had good predictive power. In the research by Alborzi et al. [1], the classification accuracy of the proposed classification model was approximately higher than all the compared decision tree models in this paper. Moreover, the number of nodes and the size of the decision tree were less than all other models.

The use of credit scoring systems has numerous advantages, including increased accuracy, speed, and cost reduction in banks, credit risk management, reduced overdue and non-performing loans, ease of loan application and customer handling process [28, 30]. Furthermore, the use of credit scoring systems helps banks determine the interest rate of bank loans in proportion to the credit risk of customers [19]. Therefore, considering the importance of designing a customer credit scoring model for risk management in banks with the aim of achieving fee-based income in Bank Melli Iran, we address this issue.

## Customer credit

Customer credit scoring is a critical aspect of the continuously developing and dynamic credit industry, playing an increasingly important role in the economies of countries. Credit providers are compelled to utilize new methods, advanced tools, and modern technologies to enhance their credit management processes [10]. Credit scoring and credit risk assessment of customers using advanced and innovative statistical techniques are among the efforts made in this field [7].

Credit scoring is a system through which banks and credit institutions evaluate the probability of loan repayment by applicants based on their current and past information and assign them a credit score. In other words, credit scoring aims to reduce the future default probability. This method impartially ranks creditworthy customers based on quantitative statistics and information, as opposed to traditional methods that heavily rely on the judgment of loan officers or managers. Alongside credit scoring, there is the credit ranking method, which identifies and approves loan applicants with low credit risk and avoids granting loans to high-risk applicants through their classification [12].

In the newly designed comprehensive credit scoring model, by entering the national identification number for individuals and the ID code for legal entities, all inquiries, loan repayment history, obtained rankings, and collateral information are thoroughly examined, resulting in a clear credit rating. The old credit scoring system did not possess these features. The credit ranking in the new model is categorized into five classes from creditworthy to bad credit, denoted by symbols *E*, *D*, *C*, *B*, and *A*.

The development of the new credit scoring model is crucial due to its advantages and importance in the research. By entering the national identification number for individuals and the ID code for legal entities, all inquiries, loan repayment history, collateral obtained, and the number of guarantors are determined, which were not present in the old credit scoring system. Therefore, implementing the new model in Bank Melli Iran is imperative.

The credit scores enable banks to measure credit risk and manage it according to their credit portfolio [15].

## Credit Risk Management

Credit risk is one of the most important factors contributing to risk in banks and financial institutions. Credit risk is defined as the change in value due to unexpected changes in credit quality. In another definition, credit risk refers to the risk that borrowers may not be able to repay the principal and interest of loans or debts according to the terms stated in the contract. In other words, repayments may be delayed or not received at all. This situation can create problems in the cash flow of the bank, and the impact of credit risk is measured through calculating the cost of cash flow replacement in case of default by the counterparty.

Credit risk is one of the oldest forms of risk in financial markets. If we define credit as the expectation of receiving the principal and interest of loans, then credit risk is defined as the probability of this expectation not being met. Credit risk arises from the fact that borrowers may be unable or unwilling to fulfill their obligations.

Banks and financial institutions, like any other economic entity, face their own risks. The nature of financial activities and dealing with concepts such as credit, payment systems, and different rates put these institutions at risk. On the other hand, the rapid development of financial activities, technological innovations, and the increasing complexity of financial systems have made risk management an indispensable part of any financial institution [20].

Considering that banks act as intermediaries for funds, lending activities are one of the important functions of banks. This segment of bank activities is exposed to credit risk and requires banks to assess the creditworthiness of borrowers. In order to reduce this type of risk and the costs associated with an increase in delinquent claims, banks and credit institutions have paid significant attention to credit risk management in recent years, following the recommendations of the Basel Committee [14].

The occurrence of banking crises in recent decades in industrialized countries and especially in developing countries, due to reasons such as deposit flight, an increase in delinquent claims by banks, economic recession, etc., has disrupted the order of financial markets and created a background for the bankruptcy of many banks. Through conducted investigations, the primary cause of these crises has been identified as insufficient capital of banks. Therefore, the importance of risk and its management has been recognized more than ever before [20].

## Research Methodology

The present research is applied in terms of its objective and exploratory-descriptive in terms of its method. It is a mixed-method study that combines qualitative (based on grounded theory) and quantitative (based on descriptive-

survey) approaches. The target population for the qualitative part includes all professors and experts of Bank Melli Iran who are familiar with the subject of credit risks of customers, and their opinions will be collected and used to formulate effective factors. Experienced members of Bank Melli Iran will be selected based on the snowball sampling method after conducting interviews with experts, with a total of 15 interviews conducted after theoretical saturation.

The target population for the quantitative part includes all managers, supervisors, and employees of Bank Melli Iran. Due to the unlimited size of the population and the inability to access each member, sampling will be used. Since neither the population variance nor the probability of success or failure of the information variable is available and statistical formulas cannot be used to estimate the sample size, the Morgan table will be used. Based on the higher bound of the Morgan table, a sample size of 384 individuals will be selected for this research.

In the qualitative section, MAXQDA software version 2020 will be used for coding interviews and conducting sub- and main-categorization. Finally, in the quantitative section, structural equation modeling and partial least squares method will be used for model validation.

## Findings

Among the 15 participants in the qualitative part, 87% are male and 13% are female. 93% of the participants are married, and 7% are single. 40% of the participants have 15 to 20 years of work experience, 33% have 21 to 25 years of work experience, and 26% have over 26 years of work experience. 73% of the participants have a doctoral degree, and 26% have a master's degree.

Table 1: Participants in in-depth interviews (qualitative method)

Row	Bank Name	Organizational Position	Industry Experience	Education
M1(A)	MELI	Vice President of Credits	25	PhD in financial management
M2(B)	MELI	Legal Department of Tehran Branches	26	Master of Accounting
M3(C)	MELI	Director of Public Relations	20	PhD in economics
M4(D)	MELI	Department of credit affairs of Tehran branches	15	PhD in business management
M5(E)	MELI	Member of the board of directors	28	PhD in accounting
M6(F)	MELI	district manager	26	Master of Economics
M7(G)	MELI	Operational assistant	17	PhD in business management
M8(H)	MELI	Financial assistant	24	PhD in business management
M9(I)	MELI	Economic deputy	24	PhD in public administration
M10(J)	MELI	Member of the board of directors	28	PhD in economics
M11(K)	MELI	Head of Foreign Exchange Unit	19	PhD in business management
M12(L)	MELI	Deputy Director of Investment Development Department	23	PhD in human resource management
M13(M)	MELI	Deputy Banking Guild	15	Master of Economics
M14(N)	MELI	Head of Gibran Department	24	Master of Accounting
M15(O)	MELI	Center for research and planning	16	PhD in business management

In the analysis of the data collected from the research participants, the first step is open coding. After all initial codes are extracted, the codes that are common and aligned are grouped into subcategories, and then the common subcategories that are aligned are placed into main categories.

Following the coding, concept mapping, and categorization, a total of 7 main categories and 16 important and influential subcategories were identified for designing the model of customer credit scoring system in the context of achieving revenue-based incentives and their impact on risk management. These categories are presented in Table 2:

Table 2: Main Categorization

Main Categories	Subcategories
Customer Credit Scoring System	Software Aspects
	Hardware Aspects
Risk Management	Risk Management Strategy
	Managerial Decision Making
Revenue-based Incentives	Facility Commissions
	Deposit Commissions
	Commitment Commissions
Banking Facilities	Commitments
Customer Satisfaction	Overdue Collection
	Valid Guarantees
	Customer Loyalty
Profitability	Based on Facility Commissions
	Based on Deposit Commissions
	Information Provision
	Advertisement
Main Categories	

Note: Some subcategories do not have corresponding main categories due to their nature and context in the research.

The extracted themes from the raw interview data are organized into a pattern called the "Core Coding Pattern." Therefore, using all the indicators obtained from the open coding phase, the identification of the themes is addressed in this stage, resulting in 7 main themes and 16 sub-themes. (Table 3)

Table 3: Paradigm, main and subcategories of the research

Subcategory	Main article	Paradigm
software	Customer validation system	A central phenomenon
hardware		
Risk management strategy	risk management	Causal conditions
Decision making by managers		
Customer satisfaction	Customer Orientation	Background conditions
Customer loyalty		
Obligations	Bank facilities	Strategies and actions
Collection of arrears		
Valid warranty		
Notices	cultural factors	Intervening conditions
Advertising		
Facility fees	Fee income	Consequences
Deposit fees		
Commitment fee		
Based on the facility fee	profitability	
Based on the deposit fee		

After collecting the data, the process of research proceeds to the analysis and interpretation stage. In the first step, by examining the current situation, the data obtained are categorized into 7 main themes. Based on the opinions of experts and professionals, all the indicators derived from the qualitative analysis of 15 interviews, including 7 main themes, 16 sub-themes, and 103 codes, have been employed to design the model of the customer credit scoring system on risk management with a focus on achieving commission revenues. Figure 1 represents the model of the customer credit scoring system on risk management with a focus on achieving commission revenues.

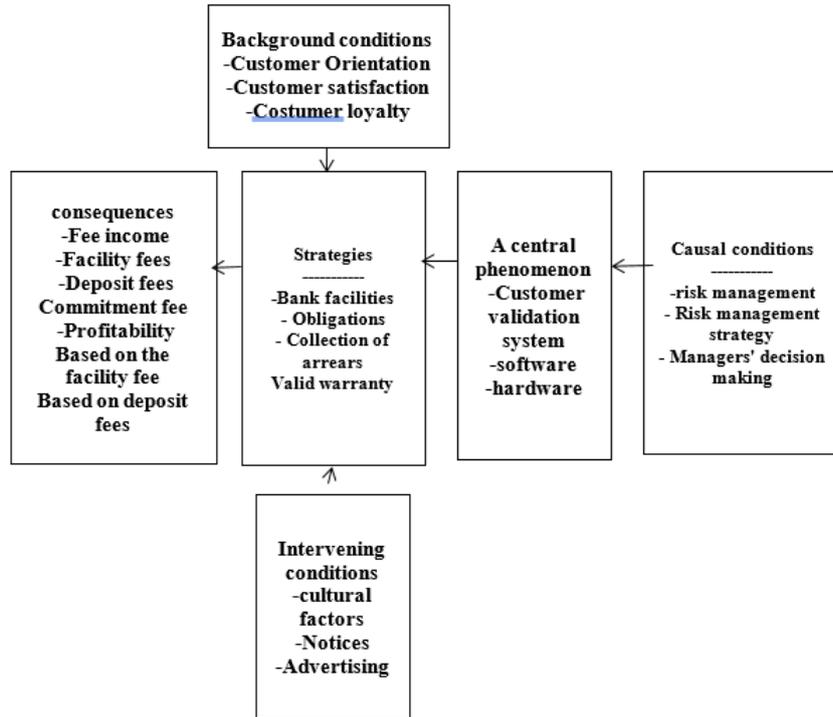


Figure 1: The paradigm model of customer validation system on risk management with the approach of realizing fee income

Also, the final output of MAXQDA20 software is presented in Figure 2:

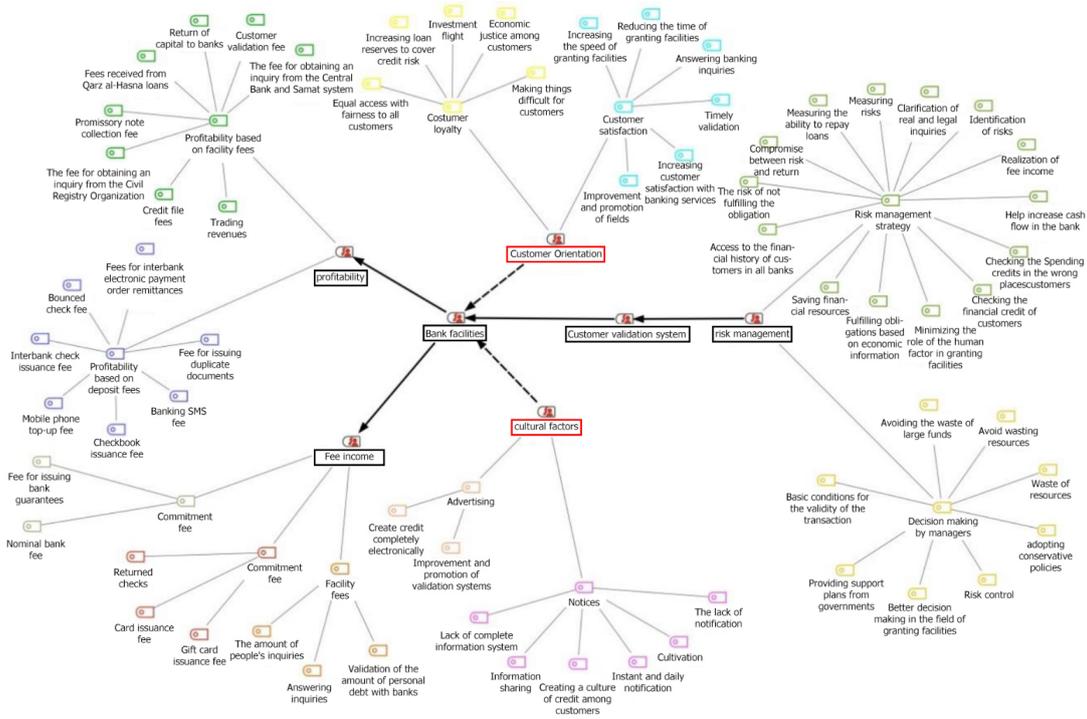


Figure 2: Strauss and Corbin model tree diagram



composite reliability. The shared reliability of all variables in this research is greater than 0.5. Therefore, the variable has the necessary shared reliability.

Table 5: Mean extracted variance

Extracted variance	average	Variable
0.686		Risk management strategy
0.681		Notices
0.828		Advertisements
0.661		Bank facilities
0.717		Decision making by managers
0.804		Obligations
0.687		Fee income
0.746		Customer satisfaction
0.759		hardware
0.528		profitability
0.722		Customer validation system
0.827		Valid warranty
0.675		cultural factors
0.913		Facility fee basis
0.759		Fee basis of deposits
0.606		risk management
0.564		Customer Orientation
0.766		software
0.708		Collection of arrears
0.764		Customer loyalty
0.700		Commitment fee
0.747		Facility fees
0.786		Deposit fees

According to the table 5 of average extracted variance, all the variables in this research are more than 0.5. Therefore, the variable has the required average variance

To check the fit of the structural model of the research, several criteria are used, the first and most basic criterion being the significance coefficients or the T-value values [17]. The fit of the structural model using T coefficients is such that these coefficients must be greater than 1.96 to be able to confirm their significance at the 95% confidence level. (Figures 4 and 5)

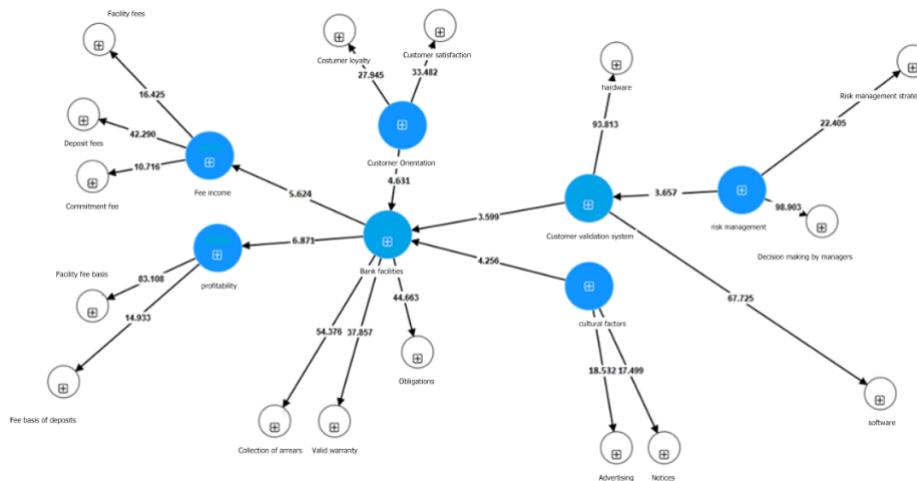


Figure 4: Internal structural model in the significance mode of coefficients



(cultural factors) have a positive and significant effect on strategies. Strategies have a positive and significant impact on outcomes (fee income and profitability).

One of the most important risks that banking systems face is the credit risk, which is mainly created from the facilities paid to customers or bonds issued in the market due to the occurrence of a credit phenomenon. Credit risk assessment is one of the essential and challenging issues in the field of financial analysis. Because with such analysis it is possible to avoid heavy losses caused by wrong decisions in the field of credit. Due to the importance of bank credit risk, unfortunately, no procedure has been done to create a credit risk model in Iran. Wu [31] defines validation as evaluating and testing the repayment ability of credit customers and giving the possibility of non-repayment of loans from their side. The results of Zaho's research [32] showed that leasing is a low-risk activity and it is necessary to pay attention to this fact in the plan of the Wing Committee in order to calculate capital adequacy and identify physical documents. Sivabalakrishnan et al. [25] showed in their research that one of the main sources of income for banks is from credit cards. Banks make a lot of profit from the profit from the customer's credit card loan interest. Also, there are many non-current loans from the same area. Shi et al. [23] showed that ranking respectively. It includes customer income, credit in the market, customer occupation, duration, relationship with the bank, collateral type, collateral value, average account balance for facilitation, credit risk of real customers, and using hyperbolic regression of artificial intelligence, prioritization in order of credit in the market, customer income, collateral value, credit period, relationship with the bank, collateral type, and customer occupation. Singh et al. [24], have investigated the effects of macroeconomic variables on credit defaults. This study concludes that the shocks of macroeconomic variables affect the credit risk of banks

Some research categories are in line with the research of Siva Bala [25], Bafande et al. [4], Shariat Panahi et al. [22], Dehmardeh et al. [8], Arab Mazar et al. [3], Rai and Soroush [19].

It is suggested that the validation system be updated in the National Bank, and even if possible, software should be used that can be checked and analyzed both in terms of speed and error-free. The defects of the validation system, including the failure to display some facilities, should be removed. The culture of using the validation system among customers should be promoted through advertising, such as introducing the validation system in a brochure or verbally in order to provide information about this system to the customer, so that the customer knows that the credit and debt risk in the bank causes non-acceptance of the facility in bank guarantees from the guarantor. Those who are the minimum wage earners of the bank should be used, which will speed up the collection of claims. In order to realize the collection of claims, try to use employees who have the ability and skills in this field. It is suggested that, in line with the strategies and strategies in the research process, they should pay special attention to the obligations, collection of arrears and valid guarantees in the National Bank. Pay attention to deposit fees, commitment fees, profitability based on facility fees and profitability based on deposit fees.

The results of this research are limited to a geographical location. The data was collected only in Iran. Therefore, it is recommended that future studies be conducted in a wider geographical area.

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