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Designing a model of credit risk management in the network of agents of after-sales service companies Using the financial components of after-sales services and meta-innovative algorithms

Diseño de un modelo de gestión del riesgo de crédito en la red de agentes de empresas de servicios posventa Utilización de los componentes financieros de los servicios posventa y algoritmos meta innovadores

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Resumen

Los correos electrónicos se pueden utilizar como herramientas de marketing eficaces para difundir mensajes publicitarios a una lista de destinatarios objetivo. Sin embargo, enviar correos electrónicos sin una estrategia adecuada sólo conduciría a que un gran número de destinatarios ignoraran totalmente el correo electrónico, se dieran de baja de la lista de correo electrónico o lo marcaran como spam. Las estrategias de segmentación de correo electrónico intentan reducir dichos resultados y mejorar el rendimiento de la campaña de correo electrónico. Este artículo presenta el estudio de caso de una campaña de marketing por correo electrónico para la industria de componentes electrónicos de empresa a empresa (B2B). En este artículo se estudia el caso de Electronents, un proveedor B2B de componentes electrónicos, bajo un esquema de segmentación por ubicación geográfica en el que se eligen cuatro regiones diferentes. Los resultados de las cabras se analizan en función de múltiples métricas, incluida la tasa de apertura, la tasa de clics para abrir, la cantidad de quejas y la cantidad de suscripciones. Los resultados del estudio muestran que para lograr una campaña de email marketing eficaz es crucial invertir en datos adecuados y de calidad, así como definir un criterio de segmentación claro.

Palabras clave: Email Marketing, Componentes electrónicos B2B, Herramientas de Marketing

Abstract

Type of service Customer service in the field of after-sales service is important for every component Many companies can help with this to improve customer satisfaction; most companies are aware of this and that providing high-quality and balanced after-sales services is effective in customer loyalty and repeat purchases. This research aims to design a credit risk management model for Saipa Yadak Company and its agency network. It uses the component Financial after-sales service and algorithm He has paid innovative ideas and has been a Sample Case Review in this representative research of Saipa company. The research results showed that the component Financials include, service cost, performance, satisfaction account, the amount of the deposit and the amount of buying the agency presentations After-sales service provider on management Credit risk has an effect; And also the night worm algorithm Swing and pre-capable honey bee colony algorithm The vision of credit risk management using the component have financial In this way, the night worm algorithm Tab and the algorithm of the honey bee colony have a high ability (more than 85 %) in the forward direction Optimum management of credit risk using components they have financial resources. The Nightworm Algorithm Swing with 88.01% accuracy and the bee colony algorithm with 87.78% accuracy succeeded and credit risk management using the component advance finances to see.

Keywords: Organization Service, management optimal Risk credit, algorithm, Algorithm Colony honey bee

Introduction

Credit risk assessment uncertainty is an important topic for research in the field of financial risk management to It counts. Correct assessment of credit risk can be A very effective use of capital to become economic (Pacelli & Azzollini, 2011). When some customers cannot pay to repay their loans, a kind of failure of the economic system for loan financial organizations donors occurs; Therefore, the importance of improvement in the matter of decisions Regarding granting credit to bank customers and credit grading, is one of the issues that should be addressed more business malpractices work, phenomenon are not common but in most cases to they happen unexpectedly (Bussmann et al., 2021).

However, the truth is that when this default occurs, it often causes a lot of damage to the loan It becomes lenders or creditors, but we don't know how to measure the amount of these losses in advance to take the approach of different authors about this issue is different and clear Ace to Use in this way also in the same way (Giudici et al., 2021; Gnoatto et al., 2020).

Structural models, first group and old most models are historical. in these models, failure business work, and endogenous event is influenced by the capital structure (Gnoatto et al., 2020). Reduction models found are not like structural models that are based on a strong economic structure (Yan et al., 2015).

While structural models are dependent on the capital structure, in reduction models found, failure to The title of an external variable Za is considered and it is tried to be checked periodically. Recently, a new type of model has also been created (Huang et al., 2005).

In the specialized background of research, from them to the title of combined models Be remembered. Elements of structural models and reduction Found Inspired Part of this group of models is to provide many models in line with credit risk management abstracts of these models (Huang et al., 2005; Ahelegbey et al., 2019).

Size Taking credit risk in advance Predicting the losses of non-repayment of loans and creating a logical relationship between risk and return, optimal possibility Composition of the credit portfolio, price Investment of assets and determination of economic capital To reduce capital costs and maintaining competitive power, providing a kind of relative advantage for automobile manufacturers and after-sales service companies of automobile manufacturers; will create therefore, according to the ownership-representative resources of these companies and the importance of assessing the repayment ability of the representatives of after-sales service companies, research and research in the field of credit risk management and the design and preparation of a suitable and desirable model in this field are very important (Khashman, 2010; Khashman, 2009).

Today, we see an increasing number of after-sales service agencies in all parts of our country, Iran. As a result, many people are involved in different positions such as the company (genuine), after-sales service representative and third parties (customers) after-sales service representatives (Bekhet & Eletter, 2012). In the proposed research, designing and compiling the model of optimal management of credit risk in after-sales service companies of automobile manufacturers (in particular, Saipa Yadak company is considered and in it, components such as management of dealer network services, line you walk management and credit facilities for authorized agencies, proper structure and organization of these agencies, integrated information and communication system and efficient human resources in these agencies as well as methods Validation methods, credit score and rating components and credit behaviors, financial criteria component, rank Classification and quantity Risk creation and appropriate credit assessment methods, as well as the correct methods of checking, analyzing and predicting credit risk, are examined and studied so that by designing such a model, certain mechanisms for measuring, evaluating, developing the line The policy and quality improvement of the credit system of after-sales service companies of automobile manufacturers, extraction and the context and the possibility of comparative assessment and monitoring the credit performance of each of these agencies, a separate and case-by-case form can be obtained (Angelini, et al., 2008; Wang, 2021).

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Therefore, in this research, the design of the model of credit risk management in Saipa Yadak dealers network using the financial components of after-sales service and algorithm of meta-innovative has been made.

This research with the outline of the theoretical foundations and the background of the research related to the subject as well as the explanation of the research method and hypothesis taken from the problem and the theoretical foundations of the research continued and then explained the results of the hypothesis test were paid and finally, the result conclusions and suggestions are expressed.

Literature review

Due to the expanding complexity of the environment, procurement administration frameworks Work ought to be done from the strategy utilizing the unused ones for their exercises. The administration of each company must define a long-term methodology and arrangement that fits the inner rationale of the organization and its claim characteristics (Alzeaideen, 2019; Dadios & Solis, 2012).

Therefore, management systems should be flexible and have the appropriate adaptablity to gain a competitive advantage and the ability to respond to environmental changes (Zhao & Chen, 2009; Keramati & Shaeri, 2014). In this situation, the activity of managers without a systematic approach leads to management inefficiency (Wu et al., 2010; Lai et al., 2006). Until the acquisition environment Work requires constant change, facilitating processes Change risk takers need risk management.

It is necessary to set the characteristic structural elements required by acquisition Work, maintenance becomes the current organizational structure and the structure after the change can be related to the change and its risks the organizations have to be good at analyzing and understanding the right conditions (Cossin & Schellhorn, 2007).

During organizational change processes, presenting different techniques has been trying to reduce the risk of organizational change been these Different factors can affect the amount of change risks; Therefore, to facilitate organizational change, it is necessary to facilitate change risk assessment, which is a critical process for development It is an organization (Li et al., 2021).

Soltani Zadeh et al., (2016) stated that no specific law has been proposed for the implementation of enterprise risk management. Therefore, the executive plans of companies are the main factor for risk management. manner Risk management due to the various benefits they have for companies, but still in organizations It has not been accepted well. Organizational strategy is one of the main obstacles for the implementation of risk management and the relationship between strategy and risk management It is not well explained, but there is a general discussion in the field of risk management and corporate performance. Previous studies showed a positive relationship between acquisition strategies There is work and organizational performance.

In this regard, credit risk shows the giver It is the possibility of a loss that a company incurs due to the negligence of a business partner (the other party to the contract). This deficiency can be reduced Work and inability to fulfil the obligations contained in the provisions of the contract which in turn leads to a loss in business (creditor's loss) (Miglionico & Parillo, 2012). Specifically, about obligations arising from activities related to credit, trading or capital we are talking about setting, payment system and agreement for example, we can face defects taken in repayment of loan Payments to customers, outstanding invoices, back obligations Fallen choose from the issuance of debt or stock securities or the obligations arising from trading in the financial and capital markets (Karthikeyan, 2014; Changjian & Peng, 2017).

In most cases, credit risk is defined as the risk and risk of losses caused by default in repaying loans by the lender. We define receivers. This becomes relevant when the other party of the contract does not act according to the terms and conditions of the contract and causes financial loss to the owner of the assets (Changjian & Peng, 2017).

Credit risk starts from the truth that the contracting party cannot or will not fulfil its commitments. Within the conventional way, the impact of this risk is measured by the Riyal taking a toll caused by the contracting party's default. Losses caused by credit risk may occur before the actual occurrence of default on the part of the contract party be; Therefore, credit risk can be defined as a possible loss due to an event where Credit happens.

A credit occasion happens when the capacity of the contracting party to fulfill its commitments to altered by this definition, esteem alter Obligation showcase due to an alter in credit rating (change in market awareness of the party's ability). The contract regarding the fulfilment of its obligations can also be considered as a risk Considered credit (García et al., 2013; Giudici, et al., 2020).

In line with matters related to risk management, it can be said that the growth and development of the service sector have caused changes in the structural pattern of the last century. Services are an effective factor for the development of countries, poverty reduction and access to basic facilities such as education, health and treatment (Huang et al., 2018).

Services play an important role in the development of countries. However, making strides in the quality of administrations is one of the key issues in creating nations. Giving tall quality administrations can accomplish higher client fulfilment. Analysts have attempted to look at the quality of administrations based on distinctive strategies and have examined the quality of administrations based on substantial measurements, gear and workers. Be that as it may, analysts accept that benefit quality can be assessed by measuring the hole between benefit desires and real execution (Balina, 2018; Ma et al., 2021).

According to Yang and Fang (2004), moving forward client fulfilment leads to made strides in client maintenance and client dependability, which eventually leads to moved-forward benefits.

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To fulfil clients, the company ought to center on compelling administrations to meet client needs. It has been decided that there are distinctive sorts of benefit exercises, such as dealing with client demands and complaints, deciding client needs and desires, setting benefit guidelines and objectives, and setting up benefit centers and websites. measuring the adequacy of administrations and websites taking remedial activities etc., play a crucial part in improving client fulfillment and along these lines the program Administrations in fabricating businesses are expanding.

This drift and the increment in benefit exercises have caused businesses to not as it were center on the generation of items and administrations, but to consider administrations in conjunction with the item. As a result, fabricating and service-oriented businesses consider after-sales administrations.

Hong J et al., (2019) in research on optimal risk management for the sharing economy with stranger risk and the quality of paid services are recent transitions in consumption behavior Providers of shared ownership Sharing has led to rapid growth in the sharing economy. Despite the benefits of the sharing economy, such as convenience and affordability, the perceived risk of consumption Possible bodily harm caused by strangers unexpected services or poor quality hinder their active participation in the sharing economy.

Eckel, C et al., (1997) states that production organizations do not single They intend to sell their products, but they also try to maintain customer relations by providing high-quality after-sales services. For many manufacturing companies, after-sales service is a natural part of the activities and contributes to the overall goal of profitability.

In line with service activities to customers, the after-sales service network in automobile companies is one of the most important links The supply chain of these companies is considered to be responsible for providing after-sales services of automobile manufacturers to customers in the country.

This network is usually scattered throughout the country in the form of authorized agencies (for example, Saipa Yadak has about 600 agencies in the whole country) which, to provide service, during the warranty period, parts are distributed or sold by car manufacturers' after-sales service organizations such as Saipa Yadak and Isacco and such organizations on the activity They supervise.

According to the indirect relationship of intermediary of these representatives with customers and the continuous and dynamic nature of the market, these representatives must have specific credit licenses from the parent company (Saipa Yadak) to purchase and supply parts in line with the updated with customers.

According to the function of each of the dealers, have the ability and possibility to provide cash and in-person services during the warranty and guarantee period to the customers of automobile manufacturers. Because in this process, there may be a default regarding the obligations of these agents and the payment of their credit debts to the after-sales service companies. This type of risk, which is referred to as "credit risk", occurs.

This risk is the biggest and most important risk in the after-sales service network of automobile companies, which not only affects the financial affairs of these companies but also has systemic risk effects. Because credit risk is a future method. Therefore, the integrated management of credit risk in all stages of providing services by authorized agencies is a vital and very important thing in the financial management of such companies. Currently, increasing the amount of credit risk in the global economy and also in the business sector is very important. At the same time, existence of a purposeful path in the credit risk management framework indicates the financial prosperity of automobile companies and is an important indicator of their stability and financial stability.

Based on this, in the current research, the main research question is: What is the optimal model for the optimal management of credit risk in the network of after-sales service companies of automobile manufacturers?

Hypotheses

In present study, the following hypotheses were examined:

H1. The service management components of the dealership network of automobile manufacturers (including the cost of services and the performance of dealerships) play a role in the design of the optimal credit risk management model in these companies.

H2. The well-accountable component of the dealership network of automobile manufacturers plays a role in designing the optimal credit risk management model in these companies.

H3. The component of the amount of collateral in the network of automobile dealers plays a role in the design of the optimal credit risk management model in these companies.

H4. The component of the purchase amount of a car dealer's network plays a role in designing the optimal credit risk management model in these companies.

Materials and Methods

The general method of the present research is to present the proposed model and explain its basics in terms of the theoretical goal and because of the aim of helping to improve the decision. The measurements are practical in terms of purpose, based on the use of historical performance data, based on the post-event research plan, due to the combination of data in the study of the statistical population in expressing the observations of the sample.

It uses the descriptive inference method and the inductive inference method in judging the statistical population, and finally due to the use of functional quantitative data and cross-sectional econometric models in yield estimation and panel data (panel data) to determine the relationships between variables, both in terms of nature The data and the method of analysis were quantitative.

The information used in this research is from the financial statements and notes attached to the financial statements of Saipa Yadak and Agency Subordinates are used. The statistical population of this research consists of representation agencies The after-sales service provider is Saipa, which includes 600 agencies. The method of inductive inference has been realized. The time domain of this research is six years between 1393 AH and 1398 AH for those questions that are few, and for the questionnaire questions it is from 1399 AH, the scope of the research in terms of location is the Saipa Yadak company and its network of agencies.

Research model and variables

To measure credit risk from the model of Leland and Taff (1996) who developed the model of Leland (1994) with the assumption that the debt has a limited life and has been measured. They analyzed the company's debt value and optimal capital structure in a specific framework. The basis of this model is based on the assumption that the debt value is dependent on the company's capital structure and has an impact on default and bankruptcy.

Companies that trade continuously have a fixed amount of P debt with a due date [have] T and pay instalment c continuously. respectively, the sum of the principal amount of the debt P and the sum of the instalments paid C is constant with the equations P= pT and C = cT is calculated. Therefore, the default limit of [V] LT.

$$V_{LT} = \frac{\left(\frac{C}{r}\right)\left[\frac{A}{rT} - B\right] - \tau C_X / r}{1 + \alpha x - (1-\alpha)B} \tag{1}$$

$$A = 2ae^{-rT}N\left(a\sigma\sqrt{T}\right) - 2zN\left(z\sigma\sqrt{T}\right) - 2/(\sigma\sqrt{T}n\left(z\sigma\sqrt{T}\right) + \frac{2e^{-rT}}{(\sigma\sqrt{T})n}/(a\sqrt{T} \tag{2}$$

$$B = -\left[2z + \frac{2}{(z\sigma^2 T)}\right]N\left(z\sigma\sqrt{T}\right) - \frac{2}{(\sigma\sqrt{T})(z\sigma\sqrt{T})} + (z - \sigma) + \frac{1}{z\sigma^2 T} \tag{3}$$

$$a\frac{r - \delta - \left(\frac{\sigma^2}{2}\right)}{\sigma^2} z \frac{\sqrt{(a\sigma^2)^2 + 2r\sigma^2}}{\sigma^2}, x = a + z \tag{4}$$

It is a fraction of the value of assets that have been lost due to bankruptcy n(0) and N(1)Standard notation and cumulative function are normal respectively corporate tax rate, σ Volatility of the company, r is the risk-free rate of return and δ the payment rate. If T tends to infinity, the model will be close to the model of Lelan (1994) The cumulative probability of the company defaulting after the first due date is calculated from the following equation:

$$EDP_{LT} = N(\frac{-lnln\left(\frac{V}{V_{LT}}\right)-(\mu-\delta-0.5\sigma^2)t}{\sigma\sqrt{t}}$$ (5)

$$exp\,exp\left(-2\,ln\,ln\left(\frac{V}{V_{LT}}\right)-(\mu-\delta-\frac{0.5\sigma^2}{\sigma^2})\right)N(\frac{-lnln\left(\frac{V}{V_{LT}}\right)-(\mu-\delta-0.5\sigma^2)t}{\sigma\sqrt{t}}$$ (6)

In this equation, V is the value of the company. Equation (19) depends on the definition of the bankruptcy threshold and what is meant by the parameter t It is not only limited to the due date. On the LT model Company's Other definitions also have before the due date to measure the other variables in this research from the data representative network Saipa spare parts company uses It has been that all of them can be obtained from the financial statements are extracted and finally, according to the degree of influence of each of the relevant factors, the optimal credit risk model of Saipa Yadak Company is presented.

Also, the good arithmetic component has been measured using a virtual variable, and if the representative is good is equal to 1 and otherwise equal to zero. The agency's performance has been measured using the agency's assets return ratio. The cost of services, collateral and purchase has also been measured using the natural logarithm of the cost of services, collateral and purchase of dealers. The size of dealerships (the natural logarithm of the total assets of dealerships) and the return on equity (net profit to the dealerships' equity) are considered control variables in this research.

Result and discussion

Table 1. pre-Optimum management of credit risk based on financial components and based on the degree of agencies

Ordinary regression				Weighted regression					
D1	D2	D3	D4	D1	D2	D3	D4		Degree of Representation
12.365	11.412	10.218	1.021	3.632	7.856	8.652	9.642	t statistic	service fee
0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	sig	
%.7171	16.75%	15.56%	6.36%	8.97%	13.20%	13.99%	14.98%		Adjusted R
-15.362	-14.412	-16.123	-13.254	-8.034	-7.012	-8.365	-11.256	t statistic	Agents performance
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	sig	
20.70%	19.75%	21.46%	18.60%	13.38%	12.35%	13.71%	16.60%		Adjusted R
-13.245	-11.021	-13.548	-14.236	-14.325	-12.365	-8.265	-9.652	t statistic	The reliability of the network of dealers
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	sig	
18.59%	16.36%	18.89%	19.58%	19.67%	17.71%	13.61%	14.99%		Adjusted R
-22.123	-18.236	-17.165	-14.021	-15.035	-17.021	-16.254	-13.254	t statistic	The collateral amount of the dealer network
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	sig	
27.46%	23.58%	22.51%	19.36%	20.38%	22.36%	21.60%	18.60%		Adjusted R
15.143	17.156	16.355	14.325	4.105	3.216	7.325	9.254	t statistic	The purchase amount of the dealer network
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	sig	
20.48%	22.50%	21.70%	19.67%	9.447%	8.56%	12.67%	14.60%	t statistic	

The research results in the evaluation of each of the research (hypotheses financial components affecting the optimal management of credit risk) in the above table showed that:

Given that the level of meaning of the t-statistic for independent variables based on the degree of Saipa Yadak dealerships is less than 5 per cent, it can be said that there is a relationship between the cost of services and the purchase amount of the dealership network with optimal management of credit risk based on financial components and based on the degree of dealerships in Saipa Yadak Company. There is a positive significance, that is, the increase in the cost of services has led to the optimal management of credit risk based on financial components and based on the level of agencies in Saipa Yadak company, as well as an increase in the purchase amount of the network of agencies, which causes the level of Saipa Yadak's accounts receivable to increase.

Find that the probability of an increase in the credit risk of this company increases; And there is a significant inverse relationship between the performance, creditworthiness of the dealership network and the amount of collateral in the Saipa Yadak dealership network with optimal management of credit risk based on financial components and based on the degree of dealerships in Saipa Yadak Company, that is, with the increase in profitability in the Saipa dealership network spare parts and improving their performance, we will see a reduction in the amount of credit risk in Saipa spare parts company, also the improvement of the creditworthiness of the dealer network and the higher collateral amount of the company's dealer network has reduced the amount of credit risk in Saipa spare parts company.

Predicting the optimal management of credit risk based on financial components using innovative firefly and honey bee algorithms.

According to the Firefly's model, the input factors include the cost of services and performance of the dealers, the creditworthiness of the dealer network, the amount of collateral of the dealer network, the purchase amount of the car manufacturer's dealer network, and the optimal management of credit risk as a soft output layer. Definition software It has been based on credit using the above financial components Mentioned below prediction has been.

As shown in the diagram above, the firefly algorithm has been trained 8 times in the 2nd order, learning has been better than the next time. So set 2 is selected as network learning. The results of neural network training are based on the communication lines between neurons and other components, both input and output.

The optimal amount of training in learning is given in the form of a diagram. The goodness of their fit has also been determined and the input and target data have been matched. The results of neural network training are based on the communication lines between neurons and other components, both input and output. According to the results, it is possible to predict the optimal credit risk management using the Firefly algorithm.

The above diagram shows the prediction of the network based on the input data (cost of service and performance of dealers, good account of the dealer network, the amount of collateral of the dealer network and the purchase amount of the dealer network of automobile manufacturers) and comparing them with the actual values. The red diagram is the prediction with the neural network and the blue diagram Color is its actual values; In this graph, the actual value is 0.973 and the predicted value is 0.088, the difference between these two values is about 9 %.

Honey bee colony algorithm

Based on the honey bee colony model, the input factors include the cost of services and the performance of dealers, the reliability of the dealer network, the amount of collateral in the dealer network, and the purchase amount of the dealer network of automobile manufacturers, and the optimal management of credit risk is defined as the output layer of the software, based on this, credit using the aforementioned financial components are provided as follows. So set 15 is selected as network learning. The results of neural network training are based on the communication lines between neurons What about other components? What is the input and output?

The optimal amount of training in learning is given in the form of a diagram. The goodness of their fit is also specified and given has matched the inputs and the target. The results of neural network training are based on the communication lines between neurons and other components, both input and output. According to the results, it is possible to predict the optimal management of credit risk using the bee colony algorithm. The above diagram shows the prediction of the network based on the input data (cost of service and performance of dealers, good account of the dealer network, the amount of collateral of the dealer network and the purchase amount of the dealer network of automobile manufacturers) and comparing them with the actual values. The red graph is the prediction with the neural network and the blue graph is the actual values; In this chart, the actual value is 0.982 and the predicted value is 0.982 It is 0.877, and the difference between these two values is about 10% which is very insignificant.

Comparison of prediction of optimal credit risk management between two firefly algorithms, honey bee colony algorithm

In this part, to compare the two approaches, the mean of least square error is used. The error in prediction means the distance between the prediction and the actual value. We know that the closer our prediction is to the actual value, the better the prediction performance. After performing the calculations, the model was used as a representative to predict the price. Finally, models to Hand The results were compared with each other to select the optimal model.

In this diagram, the red color corresponds to the worm algorithm It is a night light and the blue color is related to the bee colony algorithm.

In the diagram above, the error of the firefly algorithm and its jumps are less than the errors of the bee colony algorithm; Therefore, it can be said that due to diffraction The neural network in the firefly algorithm can be considered higher than the bee colony algorithm; Therefore, the firefly algorithm has a higher ability to predict the optimal management of credit risk than the honey bee colony algorithm by using service cost variables and dealer performance, dealer network efficiency, dealer network collateral amount, and car manufacturer dealer network purchase amount.

Table 2. Comparison of the errors of two firefly and bee colony algorithms

Honey bee colony algorithm		Firefly Algorithm	Learning data	FLOD
Evaluation data error	Learning data error	Evaluation data error	error	
1.452	1.365	1.654	1.652	1
1.362	1.215	1.368	1.325	2
1.445	1.415	1.301	1.245	3
1.785	1.748	1.399	1.365	4
1.954	1.845	1.102	1.036	5
1.745	1.649	1.475	1.456	6
1.565	1.254	1.042	1.028	7
1.474	1.134	1.110	1.098	8
1.598	1.453	1.306	1.276	Average
.08778		8801.0		Ability to predict

Based on the results of the acquisition In the table above, the firefly algorithm and the bee colony algorithm have a high ability (more than 85 %) to predict the optimal management of credit risk using financial components. The firefly algorithm has an accuracy of 88.01 % (1.30 % error) and the bee colony algorithm with 87.78% accuracy (error 1.59 %) succeeded and predicted the optimal management of credit risk using financial components. Therefore, the research hypotheses that it is possible to predict the optimal management of credit risk using financial components are confirmed by the firefly algorithm and the bee colony algorithm. In addition, the higher ability of the firefly algorithm compared to the bee colony algorithm in predicting the optimal management of credit risk using financial components is also confirmed.

Conclusion

In today's highly variable, risky and highly competitive environment, the most important message is that you cannot hope for future success, victory over competitors and customer satisfaction with past solutions and tools. In such a situation, a successful organization can be creative and innovative and model the best, to surpass the competitors.

After-sales service is a major factor in selling products and attracting Considered customer attention It can be matched with needs and desires Customer satisfaction, which is interpreted as service quality, can be a competitive advantage for the organization. A customer satisfied with his services acts as an advertiser for the company and can attract other customers. Uncertainty in the environment and intense competition in organizations have made their managers face many challenges.

For effective management of these challenges, new management approaches and specific competencies are proposed and recommended. Identifying and managing credit risk is one of the new approaches that are used to strengthen and improve the effectiveness of organizations. According to the nature of its work, every organization experiences various risks, and in today's changing conditions, the success of any

company depends on its mastery over risks and the type of management it applies to all types of risks.

In the field of financial activities, risk is considered, as one of the key factors affecting the performance of organizations. Identifying and determining the types of risk in different sectors of financial activities plays a fundamental role in their sustainability and survival. The basic structure of risk assessment includes; Risk identification, probability assessment, consequence severity assessment and risk estimation.

Therefore, the main goal of this research is to design a credit risk management model in the network of Saipa Yadak dealers using the financial components of after-sales services and algorithms.

To achieve this goal, four hypotheses were proposed, and to test the research hypotheses, two methods of regression and algorithm were used Ultra-innovative firefly and honey bee colonies were used. The research results in the evaluation of each of the research hypotheses (financial components affecting the optimal management of credit risk) showed that:

1. The results It has been shown that the credit risk of Saipa Yadak Company has increased with the increase in the service cost of the dealerships. In other words, with the increase in the service cost, the amount of debts of the dealerships and Saipa Company (in the field of car warranty) will be added to Saipa Yadak Company. Debts ultimately increase the outflow of cash from Saipa Yadak, and as a result, reduce the credit strength of Saipa Yadak, which ultimately leads to an increase in the credit risk of Saipa Yadak.

2. The performance of the agencies of Saipa Yadak Company has a significant negative relationship with credit risk management, that is, by increasing the profitability of the agency and their access to financial resources, the amount of credit risk of Saipa Yadak Company has been reduced, in other words, by improving the performance of agencies and increasing their profitability. The amount of incoming cash will be increased for them

and the improvement of performance in the agency has improved their ability to pay their debts to Saipa Yadak Company and ultimately led to the reduction of credit risk in Saipa Yadak Company.

3. The creditworthiness of the dealer network as well as the collateral amount of the dealer network has a relationship with credit risk management They are oppositely, that is, by improving the creditworthiness of the dealer network and increasing the amount of collateral of the dealer network, the amount of credit risk in Saipa Yadek Company has been reduced. Account It is better to pay the debt faster and settlement to at the same time, it improves the credit status and inflow of cash to SAIPA company and ultimately reduces the credit risk in this company is higher than the agency due to the agency's fear of confiscating the debt agency's bond he usually settles his debts on time, which has reduced the credit risk in Saipa Yadak Company.

4. The purchase amount of the dealer network from Saipa Yadak Company has been one of the factors affecting credit risk management in this company and the more dealers have purchased from this company. They have provided more services to their customers and as a result, have better performance and as a result higher profitability finally more cash has entered their financial network, which ultimately leads to their higher power in paying debts This higher debt solvency has caused them to be in debt settle their debts on time with Saipa Spare Parts Company and as a result, the amount of credit risk in Saipa Spare Parts Company has been reduced by settling the debts.

Also, the night worm algorithm Swing and pre-capable honey bee colony algorithm The vision of credit risk management using the component They have financial resources. In this way, the Nightworm Algorithm Swing and the algorithm of the bee colony with a high ability (more than 85 %) to predict the optimal management of credit risk using financial components. The firefly algorithm has an accuracy of 88.01 % (1.30 % error) and the bee colony algorithm with 87.78% accuracy (error 1.59 %) succeeded and predicted the optimal management of credit risk using financial components. In the end, it is suggested

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that to reduce the credit risk in Saipa Yadak Company and other similar companies that are active in the field of automobile manufacturing in the country, to reduce the credit risk and manage it optimally, they should pay special attention to the factors that can be effective in reducing the credit risk and try to improve the situation.

To reduce the credit risk, the companies should have, of course, depending on the component Raised Finances. In this research, it means the cost of services, and the purchase amount of the representative network The collateral amount of the dealer network is good accountability of the network of agencies and improvement of agency performance and their effects on improving credit risk management.

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