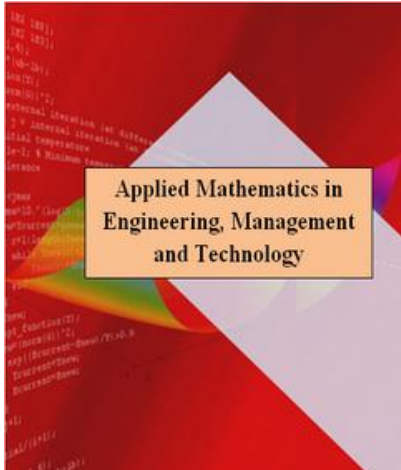


The designing of the mathematical model of the ideal planning for portfolio selection of the sub-categories of the exports insurance

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Abstract:

According to this fact that Iran Insurance industry has recently been in the path of liberalization and privatization, which implies that the insurance companies take steps to protect of themselves and retaining of the market share in the way of the adoption of strategic planning and appropriate strategy marketing. The present article, to identify of the subcategory of the exports insurance, by using of the ideal planning model provides the way for selecting and allocating of the enough resources to those areas that are placed in the higher priority. The most important points of this study can implies to provide a logical framework for selecting portfolio of the subcategories of the exports insurance. In fact, the applying of this model also enables to the managers to focus that in the time of the adoption of the decision simultaneously the profitability of the subcategories of the exports insurance as well as the risk amount of each of the subcategories. This model also enables to the decision-makers to consider their intended policy restrictions. In this

study, two scenarios were evaluated. The deterministic ideal planning model is the selection of subcategories of the exports insurance (deterministic model), and the fuzzy ideal planning model is the selection of subcategories of the exports insurance (fuzzy model). The research results show that the comparing of the deterministic and fuzzy models, we conclude that the apply of fuzzy logic leads to better response.

Keywords: Export Insurance, Profitability And Risk, the mathematical model of planning

The Issue Statement:

The insurance coverage in the insurance companies of different dimension is most importance. On one hand it was confronted with the budget limitations and on the other hand it must be to think to their profitability and in terms of it, it must be to focus to the subcategories that would imposed the less risk on them. Therefore it is necessary to pay attention to these two points, in sections to invest that has the lowest risk for them. Regarding to the considered cases, the main issue of this research is way of selecting of portfolio of the subcategories of the exports insurance, in a way from one side the financial benefits of the company have focused and on the other hand to minimize of the obtained risk of the investments.

The Research Literature:

The Exports Insurance

The part of the international trade is forming of the exports of the countries. The insurance services, including of the affecting factors in the development of export of goods and services. In other words, the insurance industry is a phenomenon that have special important in the domestic and foreign trade. In the exports process, the main risks includes of the transportation risks and the credit risks. The purpose of exports credit insurance, is to protect of exporters of goods or services to sell of their products on credit terms. The exporters against losses caused by a wide range of insurance risks, which may be classified as commercial risks and or political risks (Delbridge. F and Joseph. B ,1992). Pike and Ross (1997) looked at in which that whether users of the exports credit insurance are different from non-users of their credit information activities. They have no evidence of reduction in the motivation of the exporters to prevent losing with regard to transfer of the exports

credit insurance to the insurance companies did not find that leads to risky behavior(Pike, R.H. and Ross, D.G. 1997).

The Exports Credit Insurance Policies:

The exports credit insurance policies have been designed to protect of the exporter against of the commercial risks and or political risks and can provide the coverage for all, but in the most difficult of the markets. Your policy should be based on the recognize and support of your contract terms, in terms of the accounting principle that for the imagination of the market in which you sell. Usually the policy will provide the additional supports on the information procurement, debt collection and loss of the advice(council) improvement, to enable of you to have more comfortable trade in an unfamiliar market(Gomes. F and Dunn. R ., 2004) .

The Definition Of Credit Insurance:

The credit insurance is one of the three sides of the triangle of the monetary loss insurance. The monetary loss is an insurance that its subject relates to the provision of insurance to compensate of immaterial monetary losses of insurer,such as the losing of the earnings, dividends, interest, rents, while the insurance issue,is as the component of material objects and objective and tangible (Karimi, 1387). The highest value of the exports credit insurance derived from the increased business of exporters can with protecting of the exports credit insurance and access improve to the trade finance resources to be managed.The significant differences are visible in the perceived value of the exports credit insurance between the large and small exporters, and as well as the users and non-users of exports credit insurance (Zammit. B, Ross. D. J, Wood. D 2009).

The Transportation Insurance:

Mostly the damageable issues due to the waste or damage of the trade goods in carrying(transferring),remains very serious problems in the today societies and for this reason to appear the need to get insurance coverage for enough supply,so that it merely removed by the getting of appropriate insurance coverage in accordance with any goods.Because any goods during the transportation time have exposed of the wide range of the dangers and for this reason our ancestors had considered the necessity of it and the cargo insurance has been accepted as one of the most ancient form of the insurance in terms of the acceptance of a lot of businessmen. In the today world for transportation of goods are used of the different means and for this reason,the operators of transportation are acting to issuing of the bill of lading that it is famous as the compound B/L and or the global(national) B/L. In this method and goods system of store to the seller carries to a port in the country and then with the floater carried to the destination port mentioned in the sale contract and the other route transported by truck and or to carry of the goods are used of the different means of air, land and sea.Basically if the goods have been carrying by a special mean and pre-determined by the curator, usually the bill of lading(B/L) relates to issued by the same carrier.(Mir Mohammadi, 1365) The insurance coverage through the transportation policies and contractual policies and the services policies have been provided that are includes of both commercial and political risk.The trade risks coverage are include of the buyer bankruptcy and also the buyer defeat for the payment to the exporter from the all or any part of the delivered goods gross invoice value and accepted by the buyer. The political risks coverage,including of the transferring restrictions,import restrictions,cancellation of import licenses,war and other hostilities in the buyer's country(Barbados,1994). The experts of the trade international,including of the exporters and importers of the ship owners and other public transportation vehicle in their daily lives activities with lot of injury and damages areface that the amount of these losses with regard to the long route of transportation and types of the vehicle and the types of goods can be the many difference.For this reason,the insurance plays very important role in providing of the health of the trade international. However,the rapid turnover ofthe capital depends on the payment methods and for this reason,there are different mechanisms for the payment.Usually in the sale's contracts,the provisions will be incorporated that based on it,the procedure and method of payment between buyer and seller are determined that in terms of it,the letters of credit(L/C) and the receivable method have accounted for the two method of

usual and customary in the trade international. The receivable method are used in two methods. In one side, the documents are exchanged against of the cash payment, in which case the provisions will be incorporated in the bill that it briefly calls of the D / P. In the other side, this bill to promise of you, and the documents of 30, 60 and or 90 days must be visible in front of you to deliver of the vendor. In this case, the bill is the promises that are called to deliver documents against acceptance and DAA is shown. (Ahmadvand, 1381).

The Research Questions:

The First question: What are the features of the selection model of sub-categories of the exports insurance?
 The Second question: What kind of parameters are there in the model design to select the types of the insurance coverage?
 The Third question: What are the the type of the decision variables in the model design to select the types of the insurance coverage?

The Research Objectives:

- 1) The prioritize of sub-categories of the exports insurance of two dimension of profitability and risk;
- 2) The model design for selection of sub-categories of the exports insurance with high priority.

The Research Methods and Findings:

The used method in the conduction of this research is based on the experimental- mathematical method. The present research, in terms of orientation, is based on the applied research, in terms of strategy and research method, is based on the survey. The required information for applying of this research have been obtained through the kinds of field, library methods, observation and interview and questionnaire and then has been attempt to design the mathematical model for the selection of the best sub-categories of the exports insurance. Finally, with regard to the existence of multiple goals, the created model was solved by the ideal planning, so that the issue constraints to be considered and to be provided the intended goals of the managers. The above model was a combination model in a way that the mathematical of the ideal planning model has been applied the soft techniques such as the hierarchy analysis process, too. After the designing of mathematical model, the mentioned model has been coding and solved in Lingo space. Then by the comparing of the obtained results of the designed model solution and the happened real results (The previous period and also the experts ideas of the case-study firms, were studied of the analysis of the obtained results and were evaluated the validity of the model.

The Model parameters:

The designed models parameters are classified into the six categories as follow: 1) The common parameters in two model; 2) The deterministic model parameters; 3) The fuzzy model parameters.

The common parameters in two model:

With regard to that the main body of the designed models is one model, the common parameters in each model are defined as follows:

1) The ideal importance of coefficients in objective function (U_i): By applying of the expert opinions and by using of the ideals paired comparisons questionnaire, all of ideals were compared to each other and the weight of each ideal in Table(1) were obtained:

Table 1: The value of each ideal in the objective function (U_i)

Third	Second	First	Ideal
45/0	2/0	35/0	Value

2) The ideal amount(G_i): In order to determine of the first, second and third ideal amount , the model was solved once for each one to obtain of the best value. These values were considered as ideal. The ideal amounts observed in the following table:

Table 2:The ideals optimal values

Ideal optimal value	Ideal No.
1,294,909,667	First Value
2,699,822,716,774	Second Value
266,186,697,376	Third Value

3) The risk amount of each of the subcategories of the exports insurance: For calculation each of the subcategories of the exports insurance was used from the ratio of compensation in each subcategory to the total compensation.

The deterministic model parameters:

In here, the values of the used deterministic parameters will be provided in the deterministic ideal planning model:

The high and low limits of the shipments rial value:

This limit(range) was considered with regard to the available figures in the financial accounts of Mellat insurance company.In order to determine the rial value of the high range of the shipments,total the rial value of the shipments, in 1391predictable as the high range and equivalent to 40%(with the insurance expert opinion),this value for the lower range were considered. Due to the high volume of high-and low-level parameters, to provide of the figures related to these parameters have been avoided.

The fuzzy model parameters:

In the fuzzy ideal planning model is confronted with two sets of parameters that will be provided in the following:

The values of Z^1 , Z^0

For this reason, if we consider the following basic linear planning model,

$$\text{Max } f(x) = C^T X$$

s. to:

$$Ax \leq b$$

In order to convert of the above model with fuzzy constraints and with the deterministic objective function,we will have:

$$\text{max } Z = \lambda$$

$$C^T X - (Z^1 - Z^0)\lambda \geq Z^0$$

s. to:

$$Ax + p\lambda \leq b+p$$

$$\lambda, x \geq 0$$

It is obvious that the values of Z^1 and Z^0 are the maximum and minimum of the basic model,so that to achieve of the minimum value (Z^0) was used of the following model:

$$\text{Max } f(x) = C^T X$$

s. to:

$$Ax \leq b$$

$$x \geq 0$$

Also to achieve of the maximum value (Z^1) is used of the following model:

$$\text{Max } f(x) = C^T X$$

s. to:

$$Ax \leq b+p$$

$$x \geq 0$$

By solving of the above two model, the maximum values (Z^1 and Z^0) are as follow:

Table 3: The values of Z^1 and Z^0 in the fuzzy model

232,957,233,806	Maximum value (Z^1)
223,378,065,115	Minimum value (Z^0)

2-The high and low limits of the shipments value at all levels

In order to determine of the high and low limits of the shipments value fuzzy model in were defined two parameters as follows:

1) Nominal values of the high and low limits of the shipments value

This values are equivalent to the deterministic of values of the high and low limits that are passed in the previous section.

2) The changes amplitude in the high and low limits

In order to determine of the fuzzy changes amplitude in the high and low limits of the shipments value at all levels, 0.05 the intended level was considered as the fuzzy changes amplitude. So that, for example, if the high limit is equivalent to 1,000,000 rials, the fuzzy changes amplitude would be equivalent to 50,000 rials.

The Models Solving:

In this section, after the design of the models and define of the parameters, it turns to solve each of the models. As it passed in the view, the extent and the volume of the designed models in terms of the number of variables and the volume of the parameters are very great, therefore due to the complexity of the model and the long solution process, the above models in the space of complexes that are linked in Lingo software had programming with Excel, in a manner that the input data has been recalled of Excell and the obtained output of solution are transferred to Excel. Thus, the computational efficiency is increased. In general, the presented models in this study have the following features:

1. The using of experts opinions in order to determine of the significance amount of the ideals;
2. The use of multiple measures (multiple goals);
3. The desired measure rate of each ideal and determine of the achievement to each ideal;
4. Regarding to the profitability of each of the subcategories of the exports Insurance;
5. The presented fuzzy model, able to respond of the subjective uncertainty a decision-maker.
6. Regarding to theselection of De-fuzzy type of the model, and not require the decision makers to select of the cutting surface and the model in each level will determine the most appropriate of the cutting surface.

The following table also indicates of the comparison of the obtained results of the deviate values of the ideals in two models of deterministic and fuzzy. Also in the last column, the deviations improvement value has been presented during using of the fuzzy model.

Table 4: The comparison of the deviation values of the ideals of the deterministic model and the fuzzy model

Row	Ideal No.	Deviation Type	Deviation value		
			Deterministic model	Fuzzy model	Improve
1			182,617,062	156,973,014	14.0%
2			481,946,792,583	430,826,427,926	10.6%
3			303,342,131,817	315,438,718,490	-4.0%

The comparison of the results of the deterministic model, the fuzzy model at the operational level. Although the deviations quantities and ideals are the indicator of the position of the rial value of the insurance under coverage; However with regard to the high volume of the model variables and in order to show of the difference in the calculated figures in the fuzzy model and its comparison with the deterministic model, rial value at all levels (the total value, path, Closes (both of the two models)) will be presented. The following table indicates of the rial value of the covered insurance in the triple routes of air, land and sea for both of two deterministic and fuzzy model.

Table 5: The covered rial value in triple routes for deterministic and fuzzy models

Route Type	Deterministic Model	Fuzzy Model
	The proposed covered rial value	The proposed covered rial value
Aerial	1,155,179,809,885	1,184,059,305,132
Land	2,464,383,594,421	2,525,993,184,282
Marine	2,783,675,293,873	2,810,001,841,741
Total	6,403,238,698,180	6,520,054,331,155

Although, in order to the further clarification about the obtained results of the designed models, the rial values of covered to separate of the type of coverage (Close) have been also presented. The following table illustrates this fact:

Table 6: The covered rial value in triple routes to separate of Closes for the deterministic and fuzzy models

Route Type	The coverage type	Deterministic Model	Fuzzy Model
		The proposed covered rial value	The proposed covered rial value
Aerial	A	80,862,586,692	82,884,151,359
	B1	138,621,577,186	142,087,116,616
	B2	115,517,980,988	118,405,930,513
	C1	612,245,299,239	627,551,431,720
	C2	207,932,365,779	213,130,674,924
Land	A	172,506,851,609	176,819,522,900
	B1	295,726,031,331	303,119,182,114
	B2	246,438,359,442	252,599,318,428
	C1	1,306,123,305,043	1,338,776,387,669
	C2	443,589,046,996	454,678,773,171
Marine	A	285,714,472,978	292,857,334,803
	B1	489,796,239,391	502,041,145,376
	B2	408,163,532,826	418,367,621,147
	C1	865,306,689,591	843,674,022,351

As it opposed before, one of the goals of the insurance company, is the more profitability. On this basis, the profitability ratio has been presented to separate of each path-Close in the two deterministic and fuzzy models.

Table 7: The profit amount of the goods coverage in triple routes for the deterministic and fuzzy models

Route Type	The coverage type	Interest	
		Deterministic model	Fuzzy model
Aerial	A	7,762,808	7,956,879
	B1	17,466,319	17,902,977
	B2	14,555,266	14,919,147
	C1	45,918,397	47,066,357
	C2	12,475,942	12,787,840
Ground	A	90,566,097	92,830,250
	B1	102,469,070	105,030,797
	B2	85,390,892	87,525,664
	C1	382,041,067	391,592,093
	C2	119,769,043	122,763,269
Marine	A	22,857,158	23,428,587
	B1	51,428,605	52,714,320
	B2	42,857,171	43,928,600
	C1	43,265,334	42,183,701
	C2	73,469,436	75,306,172

Conclusions:

In the table 4 shows that the deviations rate of each of the ideal of the model has been changed. So that by using of the fuzzy model leads to the decrease of the deviation from the first ideal to 14% value and also leads to the decrease of the deviation from the second ideal to 10.6% value. As it was also presented in the ideal realization value, the deviation from the third ideal is facing by the increase of 4% value. But according to the table 8 and the presented figures in the amount of the objective function, can be concluded that the total weight amount of the deviations have been the substantial decrease. In the table 5, are presented the rial value of the covered shipments in each of three path of the air, land and sea. These figures show that the more concentration is on the sea route that this is compatible with the current trend of the insurance company and the concentration amount has been presented on each route. By using of the fuzzy models causes to decrease the amount of severity for the cargo coverage. In the table 6 are presented the rial value of the covered shipments to seperate of the different Closes. Close-C typically has the greatest demand. As you can see, Close-C has been allocated the maximum amount. It is necessary to note that the indexes (1 and 2) B and C Closes respectively, indicates of the condition of lack of delivery.

The table 7 indicates the level of company profitability in each of the transportation routes to separate of the available Closes. As it was set forth before, one of the significant ideals of the insurance company, has been the profitability amount, resulting of the policies selling in each of the sub-categories of the exports insurance. The profitability amount is the each sub-category of function of the deductions record of the each sub-category. Therefore, the amount of the policies selling or in other words, the shipments coverage in each sub-category, will bring interest for the company. However, this interest is difference for the sub-categories of the insurance companies. On this basis, it observed that the coverage of the sub-categories of the insurance based on the designed models, will lead to profitability. From the comparison of deterministic and fuzzy models, we conclude that the uses of fuzzy logic will lead to better response. One of the most important points of this research can be implied to provide a logical framework for selecting of portfolio of the sub-categories of the exports insurance. In fact, the applying of this model also enables to the managers to focus to the time of the adoption of the decision simultaneously the profitability of the subcategories of the exports insurance and as well as the risk amount of each of the subcategories. This model also enables to the decision-makers to consider their intended policy restrictions. All of the defined sub-categories in the designed models are in such a way that in the case of adding of a new variable or any require changes, simply it has capability of the updating. In fact, the main focus of decision-makers should focus on these variables.

In this research by using of the mathematics knowledge in long with of the experts opinions has been presented the ideal planning model in which the logic and mentality has been observed. With regard to the mentioned cases in the previous, it can be concluded that using of this model can be against of the lack of confidence of the existing fuzzy in some of the issue parameters, had met with the improvement in the amount of access to the

ideals and also the objective function amount. Despite of the higher profitability of the Close A, rather than to Close B and C, it was observed that the ratio of the Close A of total exports portfolio is very insignificant. One of the reasons for this can be seen in the high risk rate of this Close. Hence to the managers of the insurance company to be offered that with the adoption of the safeguards policies like the precautionary actions and the protection of the exports goods transportation means, was to reduce of the Close-A risk and also with more concentration on the marketing activities, such as the presentation of preaching about the advantages of the Close-A compared to other Closes, was to increase the demand amount of the Close-A. It is evident that the increase of the demand of the Close-A was due to the increase in insurance premium, will be equal to the increase in company profitability.

References

- Ayatollah (1387), The scientific and theoretical principles of the properties insurance, Iran central insurance, insurance institute.
- Ahmandvand, Mohammad Rahim, (1381), The studying the experience of some countries in the field of the exports insurance, economic journal, second period, first year, page 31-36
- Mir Mohammadi, Seyed Mohammad, 1365, the role of the Exports insurance and its importance in the development of the exports, the unit of extracurricular cultural section of Jihad central office
- Delbridge. F, Joseph. B., EXPORT AND TRADE CREDIT INSURANCE. Presented to the Staple Inn Actuarial Society on 17th November 1992.
- Gomes. F. Dunn. R., 2004. EXPORT CREDIT INSURANCE. Institute of Brazilian Issues The Minerva Program
- Barbados. 1994. Central Bank of Barbados export credit insurance and guarantee scheme. Project & Trade Finance; ProQuest Central pg. 12.
- Zammit. B, Ross. D. J, Wood. D., Perceptions of export credit insurance value: Australian evidence. Asia-Pacific Journal of Business Administration Vol. 1 No. 2, 2009 pp. 109-118.
- Pike, R.H. and Ross, D.G. (1997), "Trade credit information for export sales: the Canadian experience", Management International Review, Vol. 37 No. 3, pp. 243-57.