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SOLUTION UNDER RISK CONDITIONS: LAPLAS CRITERION. MINIMAX AND MAXMIN CRITERION. SAVAGE AND HURWITZ CRITERIA

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Abstract : Decision-making under risk refers to the consideration of risk in decision-making processes. The Laplace criterion is a method that considers probabilities equal and calculates the average value of each option for each possible situation. The minimax criterion aims to minimize the worst-case scenario under risk. The maxmin criterion is the inverse of the minimax approach. The Savage criterion aims to consider the average and worst-case scenarios in terms of risk in decision-making. The Hurwitz criterion aims to reduce the uncertainty between the average and worst-case scenarios under risk. The approaches presented in this article show what methods can be used in decision-making under risk.

Keywords: Risk, decision making, Laplace criterion, minimax criterion, maxmin criterion, Savage criterion, Hurwitz criterion, uncertainty, probabilities, decision making.

Introduction . Processes research and optimal management – decision acceptance to do and systems to optimize scientific fields oriented .
1-Process research resources effective distribution for mathematician models , linear programming , games theory and networks optimization such as from methods uses .
2-Optimal management systems the most good management strategies determination with He is engaged in his work . main methods Pontryagin's Maximum principle and Bellman's dynamic programming .
Risk-taking under the circumstances solution acceptance to do , to do a lot in fields including economics , management , engineering and other technician in the fields wide This topic is used according to literature various methods and approaches offer it will , this and decision acceptance to do in the process risk-taking how to manage to study help gives . References analysis following criteria based on take Let's go : Laplace criterion , Minimax criterion , Maximin criterion , Savage criterion and Hurwitz criterion .. Laplace criterion risk under the circumstances decision acceptance to do the most simple and wide widespread from the methods Laplace (1814) defined risk as equal distribution hypothesis does and all of circumstances probabilities He considers all possible was situations for of values average value to calculate and the most high average to value has was option to choose provides . Minimax criterion decision acceptance in doing the most inconvenient the situation to minimize This approach is aimed at main purpose , decision acceptance doer for the most bad the results the most less to the level von Neumann and Morgenstern (1944) in their "

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Theory in the work " Games " minimax approach game theory within current those who have reached.Maxmin criterion minimax approach reverse approach decided acceptance doer every one option the most good in the state value This method main advantage is that the decision acceptance doer the most good the situation to take strives . Savage criterion decision acceptance in doing average and bad situations in consideration to take goal This method is mainly used to determine acceptance the one who does risk level to balance Savage (1950) in his method risk relief , average the value maximum to do aimed at strategy 5. Hurwitz criterion risk to minimize aimed at from methods He is a risk taker . relief for average and bad situations between the difference tries to alleviate . Gurvitz (1956) in his criterion risk and uncertainty alleviate for working came out .

This study aims to explore effective methods for making decisions in risky situations. The study methodology theoretical analysis , mathematics modeling , comparison analysis and experimental analysis own inside Research during literature analysis through risk under the circumstances decision acceptance to do according to there is scientific sources and methods Laplace , Minimax , Maxmin , Savage and Hurwitz criteria such as various approaches analysis will be done and their risk-taking in management efficiency is studied. In the study mathematician modeling methods using risk under the circumstances decision acceptance to do processes simulation In these processes probability distributions , risk and uncertainties in consideration is taken . Simplex method , graphic method and other modeling methods using decision acceptance to do process optimization opportunities analysis Comparative analysis through various methods compared and their efficiency is determined . Experimental analysis methodology theoretical shaped risk under the circumstances solution acceptance to do of the plan to practice implementation to be and the results to study In this process methods using solutions learned , risk - taking management the most effective methods working This is methods using risk under the circumstances decision acceptance to do process improve and economic efficiency increase possible .

Analyses and results

Optional the process research to grow during decision (solution) to do right comes . In this case , the solution acceptance to do how in the situation : m data full or full it's not being important are , they are two opposite situations represents . Of these in the middle was again one situation There is something called risk . In this event to give possible was of circumstances probability , or their distribution functions given It can also be . For example , in the market any to the product was price accuracy under the circumstances unchanged stands , risk under the circumstances and it is random quantity become , change law distribution function through given will be , uncertainty under the circumstances and it is random quantity is , its change legality or not given , or in general clearly It won't be . But uncertainty under the circumstances information no means , this only random of the amount surrender to the law relatively said is , its acceptance to do values (cases) complex , situations set) in advance known will be . The data surrender to the level Depending on the issue , the given issue is also different. For example , the above in the example : clear under the circumstances , accepted made solution quality gone cost express through (criterion) possible , risk under the circumstances and price random quantity to be , to be into account received without criterion to compose need will be , uncertainty under the circumstances and the price about information absolutely unknown is , above clear generally support the criteria It will not be . These considerations shows that the data indeterminacy increasing progress criterion both choice and solution acceptance to do making the issue even more

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difficult , and generally , firmly reliable to the results take doesn't come . So so , accuracy under the circumstances criterion to compose no how difficulty It doesn't work , but it's risky. and uncertainty under the circumstances and various criteria are used . Their no one flawless , without flaw without counting , only various in appearance was requirements satisfaction with The issue under consideration is twofold . participatory to the game cited is the second participant " unconscious " opponent as acceptance if done , such game nature with is called a game . Such of the game the most important side : nature various situations brought release with , it is this of circumstances which one event from giving interested not . Nature with game in the matter main problem-to-goal directed criterion determination and to him/her relatively optimal solution is to find . If the in the matter second participant conscious opponent , suppose if done , this situation controversial with him games theory is engaged in .

To the topic issue

If an investor buys shares or other to assets investment want to enter If so , he is taking the risk. in consideration take it , take it financial status and of the market future status guess For example , high risk-taking has was startup company's to shares investment input is decision , investor risk acceptance to do depends .

Investments risk under the circumstances decision acceptance to do methods various kind methodologies own inside takes.Ush this issue Laplace , Minimax , Maxmin , Savage and Hurwitz criteria using analysis We try to do it . Every criterion risk and risks management methods to oneself typical in a way illuminates . Now and every one method seeing we go out :

1. Laplace criterion: Laplace criterion is all possible was situations for probabilities equal if , decision acceptance to do method . That is , every one of the situation probability one suppose that different will be done .

Issue: Investor to shares investment input according to decision acceptance The investor is choice :

Action 1: Year 60% increase at the end or 20% reduction probabilities there is .

Actions 2: Year 30% increase at the end or 10% reduction probabilities there is .

This is an investor situations for probability considers equal (i.e. , every one 0.5 probability for). So , Laplace to the criterion According to the average investor income calculating comes out .

Action 1: $(\frac{1}{2}*60\%)+(\frac{1}{2}*(-20))=30\%-10\%=20\%$ (Average income)

Actions 2: $(\frac{1}{2}*30\%)+(\frac{1}{2}*(-10))=15\%-5\%=10\%$ (Average income)

Laplace criterion The investor chooses Stock 1 because this average income high does .

2. Minimax criterion : Minimax criterion the decision the most bad in case acceptance to do emphasizes , that is the most bad probably based on , most less damage causing option selection .

Issue:

Action 1: Year 60% increase at the end or a 20% decrease .

Actions 2: Year 30% increase at the end or a 10% decrease .

Each option the most bad to the state let's see :

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Action 1: The most bad status - 20% decrease .
Actions 2: The most bad status - 10% decrease .
Minimax to the criterion Therefore , the investor chooses Stock 2 because this the most bad in case less damage brings (-10%).

3. Maxmin criterion : Maximin criterion is decision acceptance in doing , every for one option the most good the situation choice and from them the most above choice is a method .
Issue:
Action 1: Year 60% increase at the end or a 20% decrease .
Actions 2: Year 30% increase at the end or a 10% decrease .
Each option the most good status seeing we go out :
Action 1: The most good status - 60 % increase .
Actions 2: The most good status - 30 % increase .
Maxmin to the criterion Therefore , the investor chooses Stock 1 because this the most good in case the most high growth presented reaches (60%).

4. Savage Criterion : Savage criterion risk-taking relatively conservative approach In this method , the investor himself acceptance to do possible was the danger into account takes and probability into account take the most cautious option chooses .
Issue:
Action 1: Year 60% increase at the end or a 20% decrease .
Actions 2: Year 30% increase at the end or a 10% decrease .
this method, the investor calculates probabilities seeing comes out and from them the most conservative the situation For example , select Actions 2 possible , because this decrease probability smaller and danger decreased .

5. Hurwitz criterion: Hurwitz criterion probabilities optimistic and pessimistic values with compare this two the situation average This is mainly due to the risk relatively balanced approach provides .
Issue:
Action 1: Year 60% increase at the end or a 20% decrease .
Actions 2: Year 30% increase at the end or a 10% decrease .
Hurwitz criterion according to , each one situation for the most optimistic (good) and pessimistic (bad) probabilities seeing we will go out and average to take let's count .

Action 1: Average value $= \frac{60\% + (-20\%)}{2} = 20\%$

Actions 2: Average value $= \frac{30\% + (-10\%)}{2} = 10\%$

Hurwitz criterion by , Select Actions 1 acceptable will be , because his/her average value high (20%).

Final analysis
Laplace Criteria : Promotions 1
Minimax Criteria : Promotions 2
Maxmin Criteria : Promotions 1
Savage Criteria : Actions 2
Hurwitz Criteria : Promotions 1

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Decision acceptance in doing every one criterion various kind approaches presented will be , and the investor will risks how acceptance to do and probabilities how evaluation choice need .

Conclusion

Risk-taking under the circumstances decision acceptance in doing used methods and criteria about many research available . Laplace criterion simple and equal probabilities into account received without effective works , but there are inaccuracies high was in cases limitation possible . Minimax and Maxmin criteria decision acceptance the one who does the most inconvenient or the most good situations into account to take focused on . Savage criterion and Hurwitz criterion and , risk into account take , average and bad situations between the difference to minimize is focused on . Each of the method to oneself typical advantages and disadvantages there is are , they are various under the circumstances decision acceptance in doing usage possible .

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