PPGCAP
Programa de Pós-Graduação em Computação Aplicada
Unipampa Campus Bagé
Embrapa Pecuária Sul

Programa de Pós-Graduação em Computação Aplicada - PPGCAP

Risks in agriculture and opportunities of their integrated evaluation

Procedia - Social and Behavioral Sciences

Componente Curricular: Metodologia de Pesquisa
Professor: Dr. Daniel Mesquita
Aluno: Luciano Moraes da Luz Brum

Introduction

- Agriculture is a unique sector because of its dependence on the climate and biological variables.
- Agriculture is highly exposed to adverse natural events, such as insect damage or poor weather conditions, which have a negative impact on the production.
- Hence in agriculture it is extremely important to evaluate and manage risks and to select the best management methods.

Introduction

- **Hypothesis:** Integrated risk assessment helps to identify more than one risk and leads to greater decision-making efficiency.

Introduction

- **Scientific problem:** what kind of risks can integrated approach be applied to and how those risks affect the economic decision-making process on farms.

Objective

- **Aim:** to identify the types of risks that have the greatest impact on agriculture and to analyze the possibilities to create an integrated risk assessment model.

Methodology

- **Tasks:**
  - 1. Identify the main types of agricultural risks and the circumstances of their occurrence;
  - 2. Reveal their relevance with respect to scientific theories;
  - 3. Analyze risk evaluation methods and their specific features;
  - 4. Create a logical framework for integrated risk evaluation.

Methodology

- **Research methods:**
  - The theoretical risks analysis is based on scientific research methods: generalization and comparative analysis.
  - The techniques of deduction, induction, modeling and synthesis are used to create a logical framework for the integrated risk assessment model.

Methodology

- All utility-related theories emphasize the underlying principle: a decision maker always chooses the alternative that offers the biggest benefit.

- Therefore, integrated risk assessment in agriculture will help to choose an optimal alternative and to come up with the most advantageous solutions.

Methodology

Table 1. Risk types in agriculture and their features

Types of Risk	Features	Key-Factors
Production	Uncontrollable events related to weather.	Natural condition and disasters.
Credit	When borrowers fails to make payments as agreed.	Legal transactions, partner's financial status.
Personal	Death, divorce, injury, poor health, changing objectives.	Experience, education, health, personal goals.
Political	Changes in policies and regulations that affect agriculture.	Environmental regulation, business regulation.
Economic	Trade transactions and the capability of the participants to honor obligations under conditions in the country.	Tax policy, price control, Market flutuations.

Font: Girdžiūtė, 2012.

Methodology

Method	Risk type				
	Personal	Production	Economic	Political	Financial
What if?: a hazard analysis method that determines what can go wrong and judges the likelihood and severity of the occurrence of such situations.	☐	☐		☐	
Fuzzy matrix: a mathematical algorithm to predict the future performance.			☐	☐	
Scenario analysis: a method of analyzing "bad" to "good" variations of circumstances and comparing them with the most probable situation or the base case.	☐	☐	☐	☐	☐
Event tree analysis (ETA): a logical model to determine how an unexpected event could take place.	☐		☐	☐	☐
Fault tree analysis (FTA): a diagram that shows the logical relationships between errors of the subsystems and the components.	☐		☐	☐	☐
Delfi technique: a method based on a variety of expert opinion. There is a special questionnaire to interview experts.			☐	☐	
Monte-Carlo simulation: a method where computer simulations of the future are developed and the expected rate of return and risk indexes are obtained.			☐		☐
Cost-benefit analysis (CBA): this method weighs the potential costs and the expected profitability. It uses the time value of money.			☐	☐	☐
Risk-at-value (VAR): the VaR method is a statistical method to measures potential losses, which a business entity will incur over time with a certain probability.				☐	☐
Variation-covariation method: this method uses massive historical data and usually it is highly adaptive.			☐	☐	☐

Figure 1: Risk methods for assessing risks in agriculture. Font: Girdžiūtė, 2012.

Results and Discussions

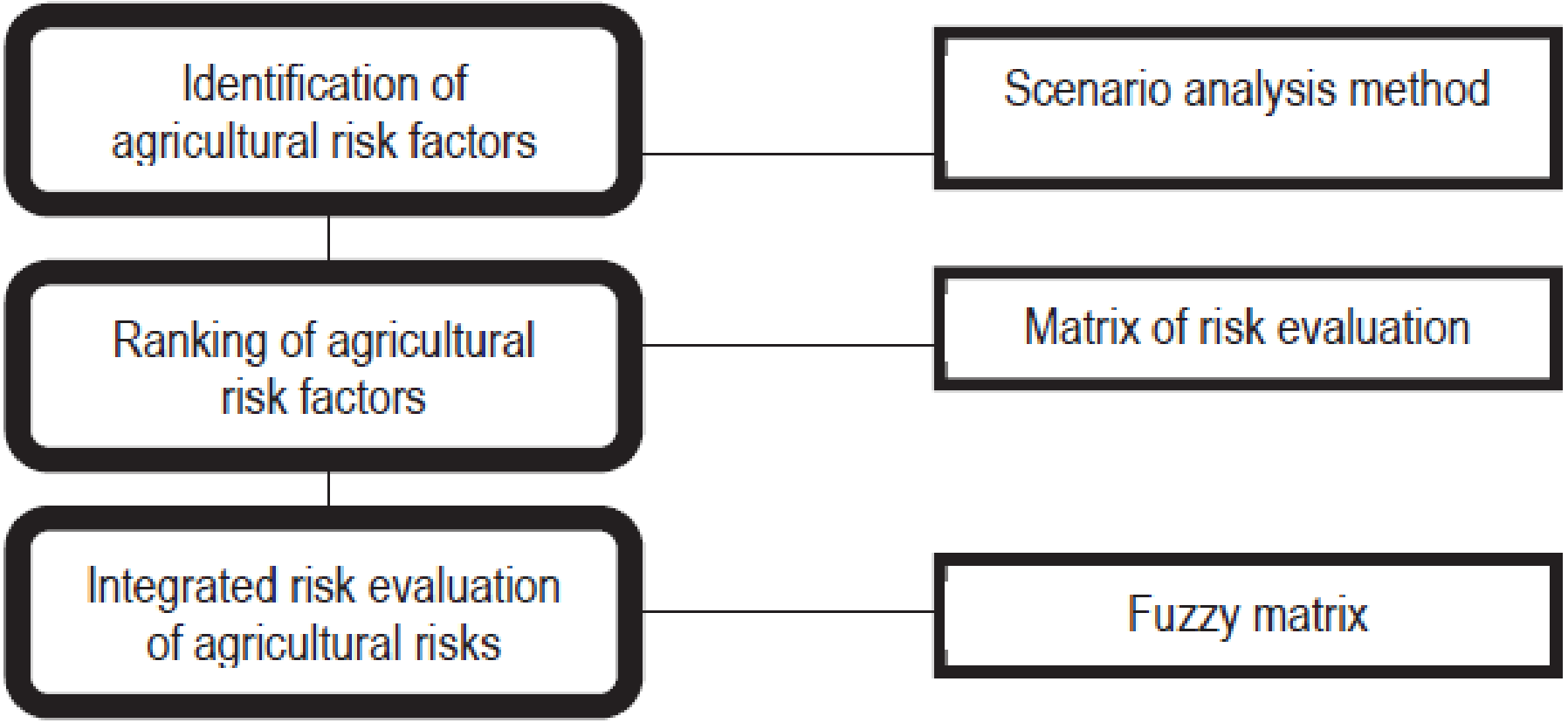

Figure 2: Logic framework of integrated agricultural risk evaluation. Font:Girdžiūtė, 2012.

Results and Discussions

Table 2: Risk ranking matrix.

Probability of risk occurrence	Risk category			
	I	II	III	IV
	Catastrophic	Critical	Low	Insignificant
(A) Frequent	1A	2A	3A	4A
(B) Likely	1B	2B	3B	4B
(C) Occasional	1C	2C	3C	4C
(D) Seldom	1D	2D	3D	4D
(E) Unlikely	1E	2E	3E	4E

Risk index	Risk level
1A, 1B, 1C, 1D, 2A, 2B, 2C, 3A	High
1E, 2D, 3B, 3C, 4A	Medium
2E, 3D, 3E, 4B, 4C, 4D, 4E	Low

Font: Girdžiūtė, 2012.

Conclusions

- Farmers decide which kind of crop to produce depending on the market situation, the price level, the national policies, the climate and the location, and last but not least the expectations of the farmers.

- It is difficult to separate different types of risk because risks affect each other and interact.

- Quantitative and qualitative methods are used in risk evaluation.

Conclusions

- In risk evaluation it is important to take into account not only statistical, quantitative data but also the circumstances, i.e. qualitative data.

- If a single model is used rather than multiple models, the decisions will be timely, fast, and efficient.

References

GIRDZIUTÉ, L. Risks in agriculture and opportunities of their integrated evaluation. **Procedia - Social and Behavioral Sciences**, v. 62., p. 783-790, out. 2012.