

Программа учебной дисциплины «IT-Projects Risk Management»

Утверждена

Академическим советом ООП

Протокол № от «__» ____ 20__ г.

Автор	Сизых Д.С., Грекул В.И.
Число кредитов	5
Контактная работа (час.)	64
Самостоятельная работа (час.)	126
Курс	1
Формат изучения дисциплины	Без использования онлайн курса

I. ЦЕЛЬ, РЕЗУЛЬТАТЫ ОСВОЕНИЯ ДИСЦИПЛИНЫ И ПРЕРЕКВИЗИТЫ

The program is developed in accordance with:

- with the educational standard of the Federal State Autonomous Educational Institution for Higher Professional Education "National Research University Higher School of Economics" (HSE) in the training direction of 38.04.05, "Business Informatics", qualification: "Master", approved 02.02.2018, protocol № 1;
- working curriculum of the university in the training direction 38.04.05 "Business-Informatics", training level - Master, 1st course, approved in 2018

The purpose of mastering the discipline

The purpose of mastering the discipline is to form students' knowledge and skills that are necessary for understanding, developing, implementing and managing the risks of investing in information technology projects.

The discipline "IT Project Risk Management" is lectured in English..

Competences of the student, which are planned to be formed at the as a result of the discipline mastering

As a result of the discipline mastering, the student must:

- **know** the methodology for making decisions on investments in information technology and risk management of these investments;
- **be able to** analyze the risks of investing in IT projects and manage these risks using modern methodologies;
- **have the skills** (to gain experience in the implementation of case studies / case studies) of risk management of an IT project based on a real option analysis using the Monte Carlo method for numerical modeling of the main project factors..

As part of the master's program "Business Informatics" this discipline is a discipline by a choice.

The study of this discipline is based on the following disciplines: "Designing IP", "Methodology and tools for modeling business processes", "Improving enterprise architecture".

In order to master an academic discipline, students should know econometrics, conceptual foundations of enterprise architecture, business process modeling methodology, and have an understanding of the organization of information technology management.

The main provisions of the discipline should be used in the future when writing course and final qualifying works, the preparation of scientific articles, reports, presentations of research works, in practical and research activities.

II. СОДЕРЖАНИЕ УЧЕБНОЙ ДИСЦИПЛИНЫ

Content of the discipline

1. Introduction to Information Technology Investments Risk Management

1.1. Information Technology Investment Decision-Making Issues

Describe different types of IT investment decisions manager face. Briefly describe some of the methodologies that are used in IT investment decision-making. Explain why IT investment decision-making is important as a subject to study. Explain some of the limitations that should be considered when using IT investment methodologies. Explain the role of IT investment decision-making within organizational planning.

1.2. Needs Analysis and Alternative Information Technology Investment Strategies

Describe the steps in the “IT project” planning. Describe a “needs analysis” and explain how it is used. Describe the types of costs that are considered in a needs analysis report. Describe the composition of an “IT project team” and their purpose. Explain how “reengineering” can be used in IT investment analysis. Define “IT outsourcing” and explain its role in IT investment analysis. List and explain strategies for IT outsourcing.

1.3. Measuring Information Technology Investment Performance

Define the “economics of information”. Explain why we have to measure IT value of investments. Describe financial performance measures used in IT investment decision-making. Explain what measures of IT effectiveness are used for in IT investment decision-making. Explain what measures of IT efficiency are used for in IT investment decision-making. Explain some of the cost categories that should be considered in IT investments.

1.4. Basic Financial Methods

Describe “basic financial methods” of IT investment. Use “breakeven analysis” for IT investment decision-making. Use “payback period method” for IT investment decision-making. Use “accounting rate of return” for IT investment decision-making. Understand the totality and variety of differing methods of information technology (IT) investment decision-making. Explain the difference between “ex ante” and “ex post” IT investment decision-making. Utilize “present value analysis” in IT investment decision-making. Explain what unequal investment lives can mean to an IT investment decision. Utilize “return on investment” methodology in IT investment decision-making. Utilize “internal rate of return” methodology in IT investment decision-making.

1.5. Cost / Benefit Analysis

Describe the stages of a «cost/benefit analysis». Explain how “cost/benefit analysis” can be used in IT investment decision-making. List and identify tangible and intangible costs and benefits used in “cost/benefit analysis.” Be able to use various financial investment methodologies within the context of the “cost/benefit analysis.” Explain how the “payback period” method works to aid in the “cost/benefit analysis.” Define what “sensitivity analysis” is as it is related to “cost/benefit analysis.”

1.6. Critical Success Factors. Delphi Method and the Balanced Scorecard Method

Define “critical success factors”. Explain how critical success factors are used in organization strategic planning and IT investment decision-making. Explain how to develop a set of critical success factors. Explain what the “Delphi method” is and how it can be used in IT investment decision-making. Explain what the “balanced scorecard method” is and how it is related to strategic planning. Define the four perspectives of the “balanced scorecard method” and how they are related. Explain how the “balanced scorecard method” can be applied.

1.7. Multi-Factor Scoring Methods and the Analytic Hierarchy Process

Define and describe two types of multi-factor scoring methods. Use multi-factor scoring methods to make IT investment decision choices. Describe how the analytic hierarchy process can be used to make IT investment decision choices. Understand and use the analytic hierarchy process methodology to generate priorities useful in IT decision choices. Understand and use consistency statistics to support the analytic hierarchy process results. Understand how spreadsheets can be used to model multi-factor decision-making and analytic hierarchy process problems.

2. Decision Analysis and Multi-Objective Programming Methods

Explain what “decision analysis” is and how it can be used in IT investment decision-making. Explain how to compute answers for a variety of “decision analysis” methods. Define the decision environments under which “decision analysis” can operate, and explain how differing environments require differing methodology. Explain what “goal programming” is and how as a multi- objective programming approach can be used in IT investment decision-making. Understand how to formulate “goal programming” models.

3. Benchmarking Techniques and Game Theory

Explain what “benchmarking” is and how it can be implemented for information technology planning. Explain what “gap analysis” is and how it can be used to identify and graphically display performance issues in information technology management. Describe “game theory” as a means of selecting information technology investment alternatives. Explain the difference between “pure strategy” and “mixed strategy” decision situations. Explain the consequences of information technology alternative investment selections when a “game theory” problem has a “saddle point” solution.

4. Investment Portfolio Methodologies

Describe different types of investment portfolio methodologies used in IT investment decision-making. Describe Wards portfolio approach and how it can be used to set priorities in IT investments. Describe Peter's portfolio mapping methodology and how it is used to map IT investment strategies.

5. Value Analysis and Benefit/Risk Methodologies

Explain what "value analysis methodology" is and how it can be used in IT investment decision-making. Describe the steps in a "value analysis". Explain what "Benefithsk analysis methodology" is and how it can be used for in IT investment decision-making. Explain how "risk assessment" questions can be used in IT investment decision-making.

6. Real Options Valuation

Modeling the European & American Call and Put Options Values using binominal tree approach (problem in Excel). Modeling the European Call and Put Options Values using Black-Sholes formula. Modeling the European & American Call and Put Options Values using Monte Carlo method (problem in Excel). Modeling the Real Option Value with the Binominal Tree Method. Modeling the Real Option Value with the Black-Scholes Method. Staged Investments, Decision Tree Valuation Approach with Project Gates. Sensitivity Analysis, Value Drivers, Tornado Diagram and Critical Success Drivers for a Real Option. Modeling the Real Option Value with the Monte Carlo correlated simulation for the Real Option Critical Success Drivers (problem in Excel).

III. ОЦЕНИВАНИЕ

The formation order of grades for the discipline

Lecturer puts in the work sheet the scores for the work of students on lectures and practical classes. The cumulative score on a 10-point scale for work in practical exercises is determined before the final control $S_{\text{auditorium}}$. The score includes monitoring of the attendance according to the following scheme:

- 100% attendance - 10 points
- 90% attendance - 9 points
- 80% attendance - 8 points
- 70% attendance - 7 points
- 60% attendance - 6 points
- 50% attendance - 5 points
- 40% attendance - 4 points
- 30% attendance - 3 points
- 20% attendance - 2 points
- 10% attendance - 1 point

The lecturer puts the scores for the student's homework on the work sheet. Accumulated score on a 10-point scale for homework is determined before the final control – $S_{\text{home work}}$

The cumulative score for current control takes into account the student results under the current control as follows:

$$S_{\text{current}} = 0,2 \cdot S_{\text{auditorium}} + 0,6 \cdot S_{\text{home work}} + 0,2 \cdot S_{\text{control work}}$$

The rounding method of the cumulative score of current control is made according to the rules of rounding arithmetic.

The resulting score for the final control in the form of the exam is set according to the following formula:

$$S_{\text{final}} = 0,4 \cdot S_{\text{exam}} + 0,6 \cdot S_{\text{current}}$$

where S_{exam} is the score for the exam.

The rounding method of the cumulative score of final control is made according to the rules of rounding arithmetic.

IV. ПРИМЕРЫ ОЦЕНОЧНЫХ СРЕДСТВ

4.1 Примерная тематика домашних заданий для самостоятельной работы

Subjects of educational examples

1. Valuation of the real option by application the Monte Carlo method for modeling the main factors of a project (case study).

2. Analysis of the cost of an IT project for a case study with a decision tree and Project Gates.

Examples of tasks to control students' knowledge

Modeling the European & American Call and Put Options Values using binominal tree approach (problem in Excel).

Modeling the European & American Call and Put Options Values using Monte Carlo method (problem in Excel).

Modeling the Real Option Value with the Binominal Tree Method (problem in Excel).

Modeling the Real Option Value with the Black-Scholes Method (problem in Excel).

Modeling the staged Investments, Decision Tree Valuation Approach with Project Gates (problem in Excel).

Provide Sensitivity Analysis and Define Critical Success Drivers using a Tornado Diagram for a Real Option (problem in Excel).

Modeling the Real Option Value with the Monte Carlo correlated simulation for the Real Option Critical Success Drivers (problem in Excel).

4.2 Вопросы для оценки качества освоения дисциплины

Примерный перечень вопросов к экзамену

Questions for Pass-Final Examination

1. How does “sequential decisions” add complexity to a particular decision situation?
2. What are four types of IT investment problems? Explain each.
3. How would you describe three IT investment decision-making methodologies?
4. What are the four components that make up an IS? Are decisions on IT supported in all four areas?
5. What are the three stages of IS hierarchical planning? How are they further broken down into nine different steps? Where does
6. IT investment decision-making fit in to the hierarchical plan?
7. What are the two components of a “needs analysis”?
8. What do you expect to find in a “request for proposal” document?
9. What is a “reengineering program” and how is it related to IT decision-making?
10. What are the four alternative IT investment strategies? Explain each.
11. What are five of the benefits of “IT outsourcing”?
12. What are three of the problems associated with “IT outsourcing”?
13. What are four of the barriers that limit the use of “IT outsourcing”?
14. What are five of the guidelines recommended for the implementation of “IT outsourcing”?
15. What is “transactions cost theory”? How is it related to IT?
16. What is “agency theory”? How is it related to IT?
17. What is “business performance”? How is it measured?
18. What are four “financial performance measures”? Explain what each seeks to do.
19. Why is it necessary to collect cost information in order to assess the business value of IT information?
20. What are “IT effectiveness values”?
21. How do we use the “value chain model” in IT investment decision-making?
22. What are “IT effectiveness factors” and how are they used in IT investment decision-making?
23. What are the “effectiveness measures for IT sourcing”? Listing any two objectives, what “IT effectiveness measures” can be used for IT sourcing?
24. What are the “efficiency measures for IT sourcing”?
25. What are the steps and the information needed in order to conduct a “breakeven analysis”?
26. What are some of the limitations and disadvantages in using “breakeven analysis”?
27. How are “present values” used in “breakeven analysis”?
28. What is the difference between a “real asset” and a “capital asset”?
29. How can you use “regression analysis” to estimate non-quantifiable benefits?
30. What are the steps and the information needed in order to use “payback period method”?

31. What is a “cutoff period” used for in “payback period method”?
 32. Can you make a decision using the “payback period method” without a cutoff period?
 33. What are some of the limitations and disadvantages in using the “payback period method”?
 34. How is “net present value” used in the “payback period method”?
 35. What are the steps and the information needed in order to compute an “accounting rate of return”?
 36. What are some of the limitations and disadvantages in using an “accounting rate of return”?
 37. What is the difference between “ex post” and ex ante” evaluations?
 38. What is the difference between PV and NPV? Given an example.
 39. What index can we use to compensate for unequal investment sizes?
 40. What is ROI? How is it computed?
 41. What is a reason why ROI is used as a supplement to other methodologies?
- Explain.
42. What is IRR? How is it computed?
 43. What are the five stages of the “cost/benefit analysis”?
 44. “Cost/benefit analysis” can be used in what kinds of investment decisions?
 45. How do you identify relevant costs in a “cost/benefit analysis”?
 46. What are examples of costs in a “cost/benefit analysis”? Give examples of at least five.
 47. How do you identify relevant benefits in a “cost/benefit analysis”?
 48. What are examples of costs in a “cost/benefit analysis”? Give examples of at least five.
 49. Once the costs and benefits are identified, how can we compare them in order to make a decision?
 50. What determines the type of methodology used in the comparison during a “cost/benefit analysis”?
 51. How does “sensitivity analysis” benefit “cost/benefit analysis”?
 52. What is “cost/effectiveness analysis”?
 53. Where do we go to determine CSFs? Explain.
 54. How does the Delphi method help in determining CSFs?
 55. How would you design the steps in a Delphi method process to determine advances in IT?
 56. What are four of the advantages of the Delphi method?
 57. What are three strengths and three weaknesses of the Delphi method?
 58. What are the four perspectives of the balanced scorecard method? Explain each.
 59. Since both CSFs and the balanced scorecard method use “value drivers” to improve organization performance, what is the difference between the two methodologies?
 60. What is the difference between “leading indicators” and “lagging indicators” in the balanced scorecard method?
 61. Why should the use of the balanced scorecard method begin with an organization’s strategic plan?
 62. What are some of the advantages of the balanced scorecard method?

63. What is the fundamental difference between the un-weighted and weighted multi-factor scoring methods? Explain.
64. Which of the decision-making methodologies used in IT selection in this chapter is the best? Explain.
65. What is the difference between the consistency ratio and the consistency index?
66. You have just computed a factor weight CI equal to 0.2. What do you do about that result? Describe a course of action.
67. If you have determined the overall decision priorities for two alternatives, the A alternative is 0.499 and the B alternative is 0.501, why would the size of these two priority weights justify the “consistency ratio” effort? Explain.
68. What are the three decision environments possible in DT problems?
69. What are the criteria used in making decisions in a DT environment of “certainty”?
70. What are the criteria used in making decisions in a DT environment of “risk”?
71. What are the criteria used in making decisions in a DT environment of “uncertainty”?
72. What is the logic behind the Hurwicz criterion?
73. What are the three basic components of a GP model?
74. Where do we get the “mathematical weighting” for some GP problems/models?
75. Why don't we put all the deviation variables of a GP model in its objective function?
76. What does the “incommensurability of goals” limitation mean in GP problems/models?
77. What type of information is provided in an “analysis of deviations” table of a AB:QM printout?
78. How can benchmarking use financial information? Explain.
79. What are some examples of benchmarking measures useful in IT? List three.
80. Where should we look for benchmarks? List and explain.
81. How do we prepare a “gap chart”?
82. When formulating a GT problem what types of choices can be made? List three and give an example of each.
83. Why is the “value of the game” equal for both players? That is, why is the value of gain for Player A equal to Player B's loss?
84. Why must the proportions of “mixed strategy” solutions add to one?
85. Which of the methodologies will work to generate a “pure strategy” solution and which will work for a “mixed strategy” solution?
86. If you had to define portfolio methods in a single sentence, what would it be?
87. IT investments by their role in the organization and their expected contribution to business performance?
88. How do "strategic investments" differ from "high potential investments" in the Ward methodology?
89. How do "factory investments" differ from "support investments" in the Ward methodology?
90. How do we use "critical success factors" in the Wards methodology?
91. How are we able to use multi-factoring scoring method for IT investments?

92. How does investment mapping methodology help identify the benefits of an IT investment and to effectively manage those benefits?
93. What are we trying to identify with the three categories of "enhancing productivity", "risk minimization" and "business expansion" in the Peter's methodology?
94. What are the twelve steps in value analysis methodology?
95. Not assessing risk may cause an IT investment to what? Explain.
96. If the benefits and risks of an IT investment are assessed and then compared to determine that the benefits don't outweigh the risks, what are we suppose to do under benefit/risk analysis?
97. What kind of questions would you expect to find on a risk assessment questionnaire? Give examples.
98. What are the characteristics and metrics of a Project Specific (Unsystematic) and Market (Systematic) Risks?
99. What are the limitations of the Black-Sholes, binominal tree and Monte-Carlo approaches?
100. Prove that the price of an American and European call option without dividends should not diverge.

V. РЕСУРСЫ

Educational and methodical and informational support of the discipline

5.1. Основная литература

Core Textbook

1. Schniederjans Marc J., Hamaker Jamie L., Schniederjans Ashlyn M. Information Technology Investment Decision-Making Methodology. -N.Y.: World Scientific Pub.Co.Inc., 2004. - 416 p. ISBN 981-238-695-5.
2. Управление ИТ-рисками. Общие подходы к управлению рисками. <http://upr.ru/article/kontseptsii-i-metody-upravleniya/upravlenie-it-riskami-obschie-podhodi.html>

5.2 Дополнительная литература

Additional literature

3. Процессы анализа и управления рисками в области ИТ: Информация. Онлайн курс в Интуит https://www.intuit.ru/studies/professional_retraining/20748/courses/748/info
4. Jamie L. Hamaker. Ph.D. Thesis: Information Technology Investment Methodologies: An Investigation Into Method/Technology Fit. University of Nebraska. 2009. UMI Number: 3355621. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.
5. Charles Pak. Ph.D. Thesis: Near Real-time Risk Assessment Using Hidden Markov Models. Nova Southeastern University. 2011. UMI Number: 3481329. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.
6. Babak Shoraka. Ph.D.Thesis: An Empirical Investigation of the Economic Value of Information Security Management System Standards. Nova Southeastern University. 2011. UMI Number: 3456209. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.
7. TA-WEI WANG. Ph.D. Thesis: Essays On Information Security From An Economic Perspective. Purdue University. West Lafayette, Indiana. 2009. UMI Number: 3379780. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.

8. Wayne A. Pauley Jr. Ph.D. Thesis: An Empirical Study of Privacy Risk Assessment Methodologies in Cloud Computing Environments. Nova Southeastern University. 2012. UMI Number: 3499794. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.
9. William T. Morris. Ph.D. Thesis: Information Technology Project Risk And Performance Across Stakeholder Groups. Capella University. 2011. UMI Number: 3487533. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.
10. Stuart A. Fox. Ph.D. Thesis: An Investigation Of Biases And Framing Effects For Risk Analysis: An Information Technology Context. Capella University. 2012. UMI Number: 3505728. ProQuest LLC. Имеется в электронной библиотеки НИУ ВШЭ.

5.3 Программное обеспечение

Software

For the preparation of practical tasks, reports and speeches by students, modern lecturing and laboratory facilities are used, including standard office application packages, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, as well as an online service for group work with documents “googledocs”

№ п/п	Name	Terms of access/download
1	Microsoft Office	<i>From the university's internal network</i>

5.5 Дистанционная поддержка дисциплины

Remote discipline support

Materials of the discipline and answers to questions arising in the process of self-work on its development, are sent to students by e-mail

5.6 Профессиональные базы данных, информационные справочные системы, интернет-ресурсы (электронные образовательные ресурсы) Professional databases, information help systems, Internet resources (electronic educational resources)

№	Name	Terms of access/download
	<i>Professional databases, information and help systems</i>	
1.	Internet portals for IT services and IT risks:	http://www.itsmonline.ru , http://www.helpdeski.ru , http://www.realitsm.ru , http://www.itilofficialsite.com .

5.7 Материально-техническое обеспечение дисциплины

Material and technical support of the discipline

PC / laptop and projector are used for lectures and practical classes, technical equipment of computer classes.