



# STATISTICAL RESEARCH METHODS

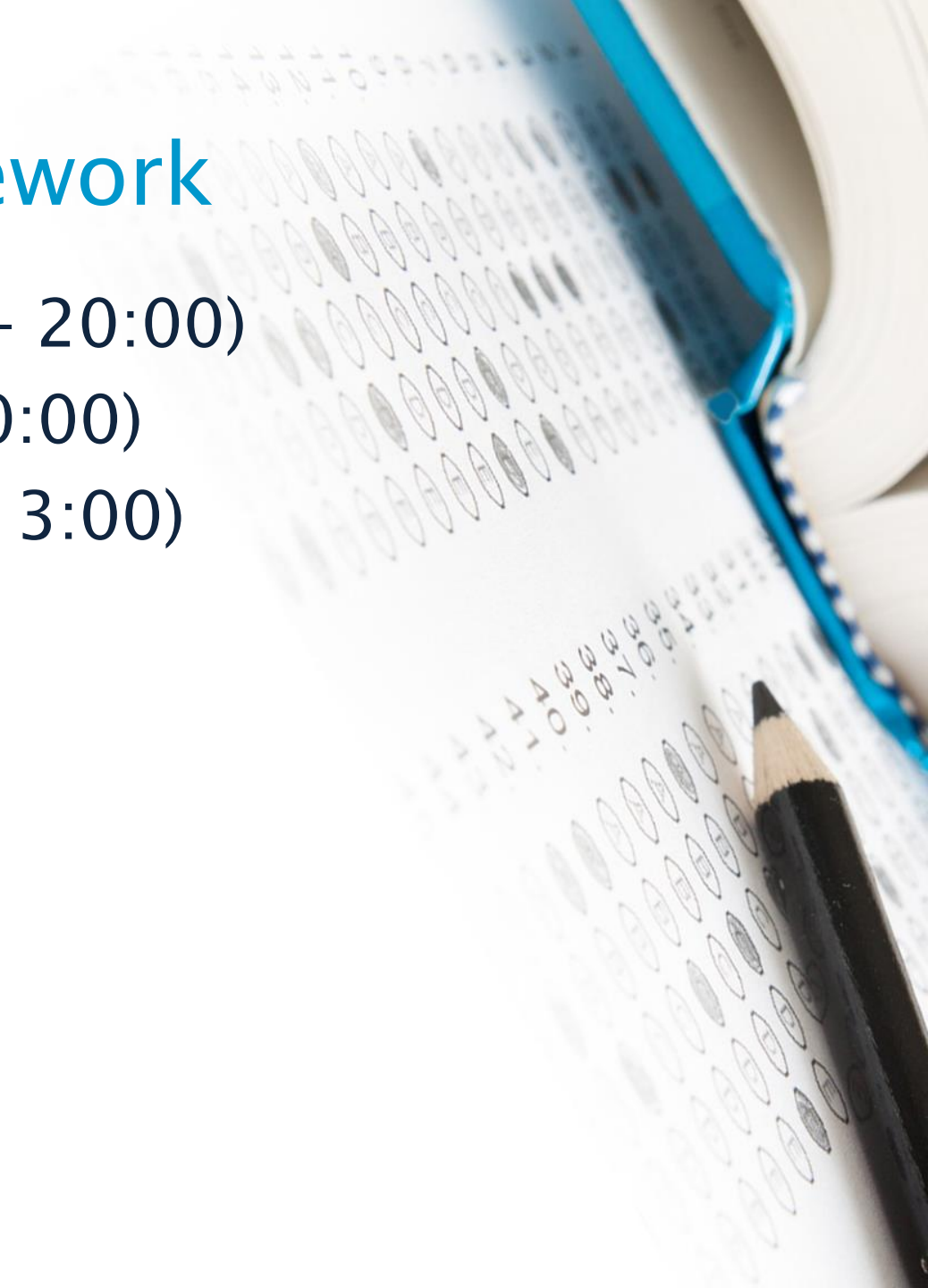
International inter-university postgraduate interdisciplinary  
doctoral study ENTREPRENEURSHIP AND INNOVATIVENESS

**Jasna Horvat, Ph.D.**

**Josipa Mijoč, Ph.D.**

# Teaching framework

- Thursday (16:30 – 20:00)
- Friday (16:30 – 20:00)
- Saturday (9:00 – 13:00)





Doctoral dissertation, construction and development of the research process, application of the doctoral dissertation...

# In focus:

- Scientific and research work:
  - Doctoral dissertation
  - Articles
  - Research reports
- Publishing results
- Research methods







- Forget about.... all the existing obligations







# Teaching framework (Thursday)

## 1. Project assignment

- Research process

## 2. Construction and development of the research process

- Previous research
- Research plan
- Future research (development of the research process)

## 3. Data

- Types of data

The background of the slide is a close-up, slightly blurred image of a multiple-choice test paper. A black pencil is visible in the upper right corner, resting on the paper. The paper contains rows of questions with circular bubbles for answers, labeled with letters A, B, C, D, and E. Some numbers like 13, 14, 15, 34, 35, 36, 41, 42, 43, and 44 are visible next to the questions.

# Teaching framework (Friday)

1. Data
  - Access to the free datasets
2. Samples
3. Project assignment



The background of the slide features a close-up, slightly blurred image of a survey form. The form has a grid of oval bubbles for marking answers, with some bubbles already filled in. A black pencil is positioned diagonally across the top right corner of the form. The overall tone is professional and academic.

# Teaching framework (Saturday)

## 1. Methods of data collection

- Questionnaire
- Survey Gizmo
- Interview
- Projective techniques

## 2. Methods of data analyze

## 3. Project assignment

The background of the slide is a close-up, slightly blurred image of a multiple-choice test sheet. The sheet features rows of questions with circular bubbles for answers, labeled with letters A through E. A black pencil is positioned diagonally across the top right corner of the image. The top of the slide has a solid blue horizontal bar.

# Project assignment

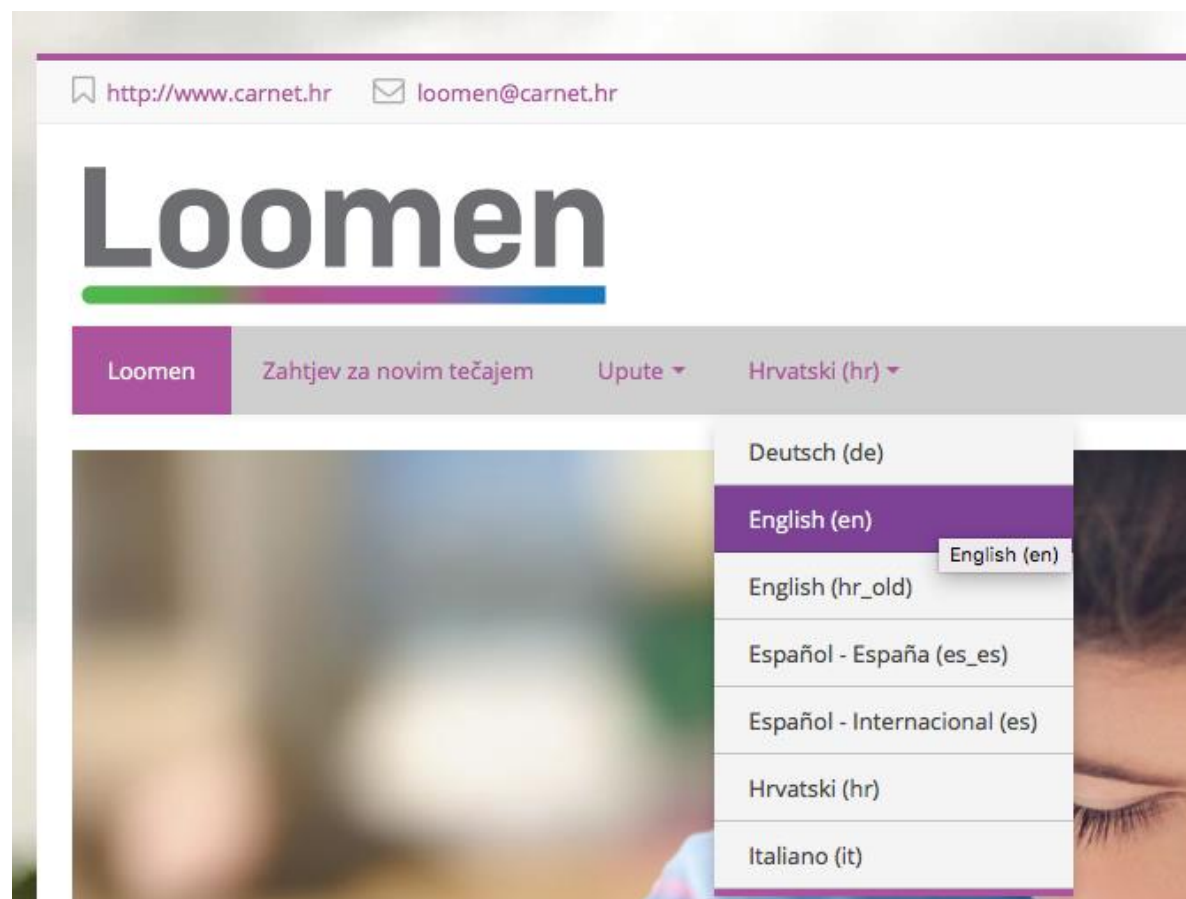
- Individual assignment
  - Construction of research plan
  - Discussion about individual project assignment

**Loomen**

A horizontal bar with a rainbow gradient, transitioning from green on the left to blue on the right, positioned directly beneath the word "Loomen".

# Sign in

- (Course materials and assignments)
- <https://loomen.carnet.hr>



# Log in:

- [name@efos.hr](mailto:name@efos.hr)



The login form is displayed on a light gray background. It features a white header area with the logo 'AA@EduHr' in the top right corner. The logo consists of the letters 'AA' in a stylized blue font, followed by '@EduHr' in a smaller, gray font. Below the header, the form has a light blue background. It contains two input fields: 'Korisnička oznaka' (Username) and 'Zaporka' (Password). Below the password field is a red button labeled 'Prijava se' (Log in). To the right of the button is a red link labeled 'Pomoć' (Help). At the bottom of the form, there is a red text block that reads: 'Autentikacijska i autorizacijska infrastruktura znanosti i visokog obrazovanja u Republici Hrvatskoj'.

**AA@EduHr**

Korisnička oznaka

Zaporka

**Prijava se** [Pomoć](#)

Autentikacijska i autorizacijska infrastruktura znanosti i visokog obrazovanja u Republici Hrvatskoj



# Next step – find a course

http://www.carnet.hr loomen@carnet.hr

# Loomen

AAI@Edu.hr prijava

Loomen

Zahtjev za novim tečajem

Upute ▼

English (en) ▼

Search courses



## Obrasci

Obrasci za imenovanje administratora kategorije i otvaranje lokalnih korisničkih računa. Administrator kategorije je službeni predstavnik ustanove imenovan od strane ovlaštene osobe na ustanovi s koje dolazi. U iznimnim slučajevima CARNET može omogućiti pravo pristupa na sustav Loomen i drugim pojedincima povezanim s CARNET-ovim korisnicima upotrebom lokalnih korisničkih računa

more ...

Search courses



SRM



[Dashboard](#) > [Courses](#) > [Search](#) > SRM



## Navigation

### Dashboard

- Site home
- Site pages
- ▼ My courses
  - Visokoškolske ustanove

## Search results: 2

### Modeliranje i vrednovanje kondicijske pripreme u rukometu

Teacher: Marina Bolanča, Marijana Čavala

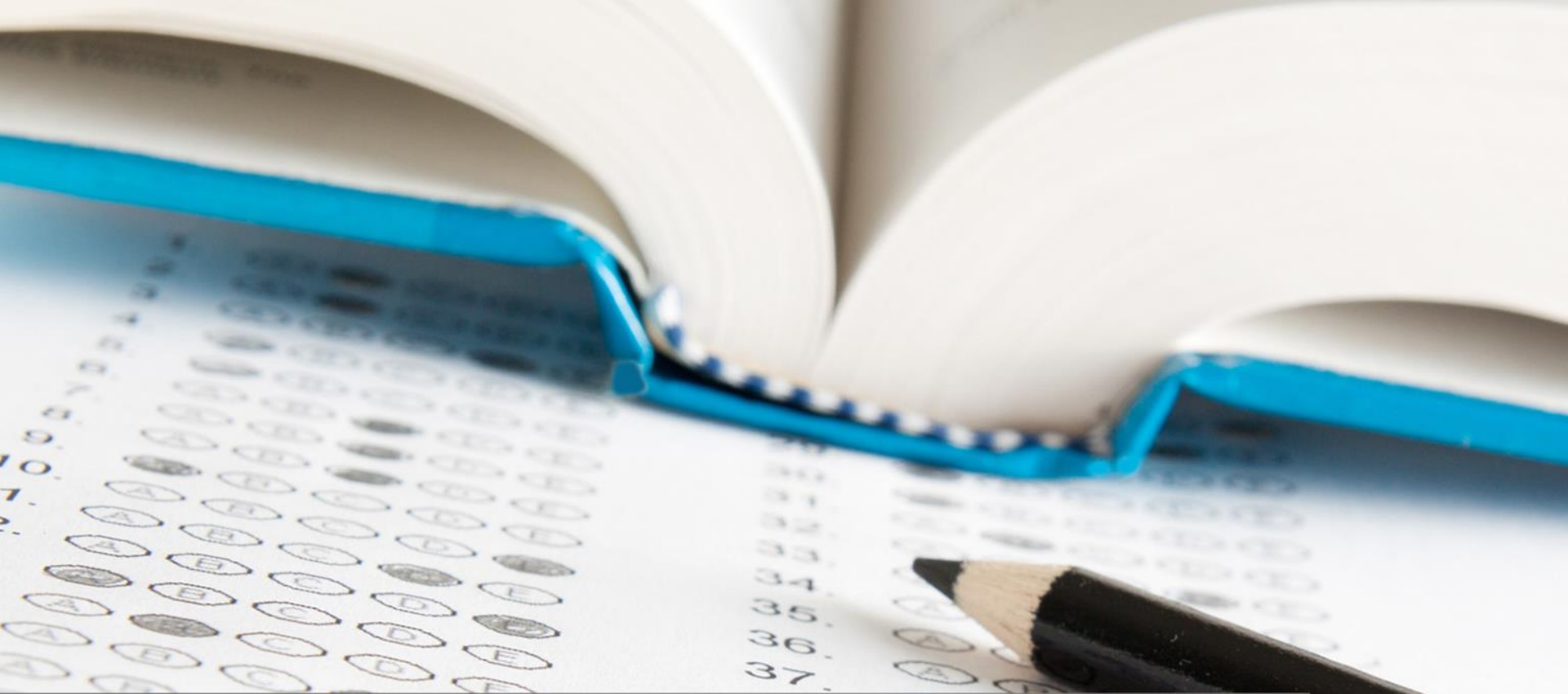
[Click to enter this course](#)

### Statistical Research Methods (Doctoral study)

Teacher: Josipa Mijoc

[Click to enter this course](#)

srm2018

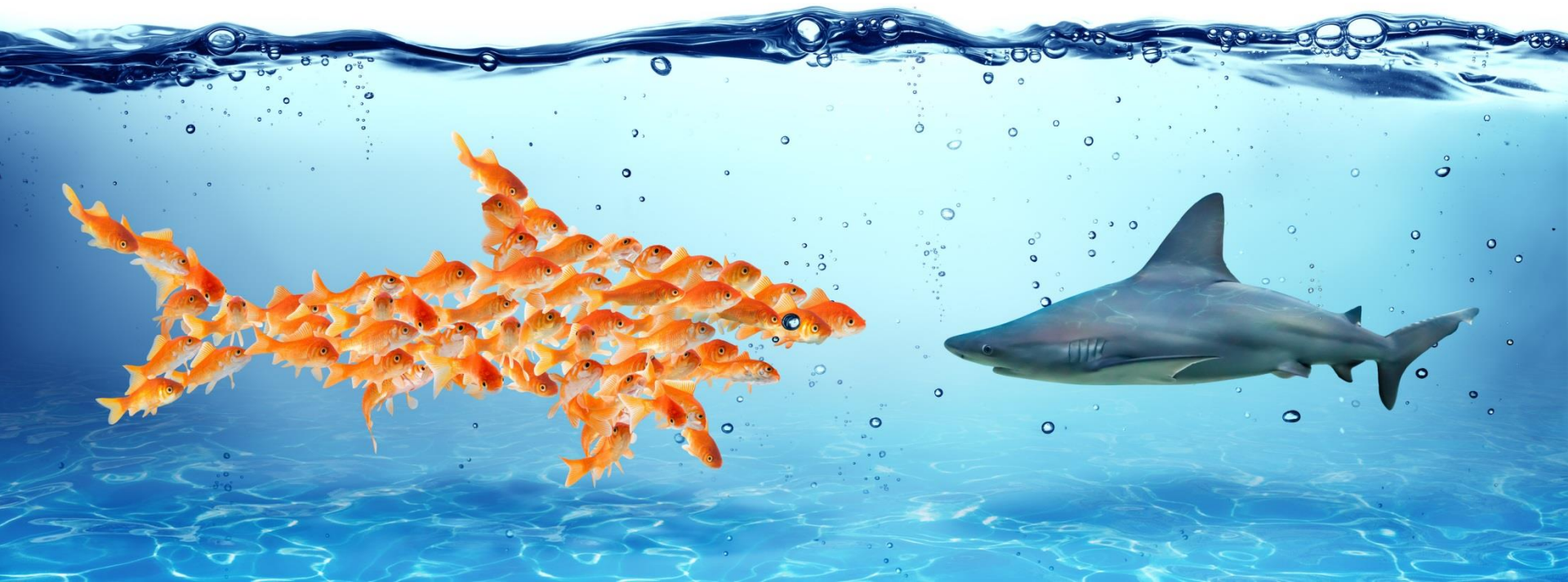


Layout of the project assignment

Elements of the assignment	
Area of research	
Name of the chosen topic	
Keywords	
Research problem	
Research question/s	
Objectives	C1:
	C2:
	C3:
	C4:
Hypotheses	H1:
	H2:
	H3:
	H4:
Sample	
Data and variables	Primary
	Secondary
Method/s of data collection	Primary
	Secondary
Methods of data analysis	H1:
	H2:
	H3:
	H4:
Expected scientific contributions	







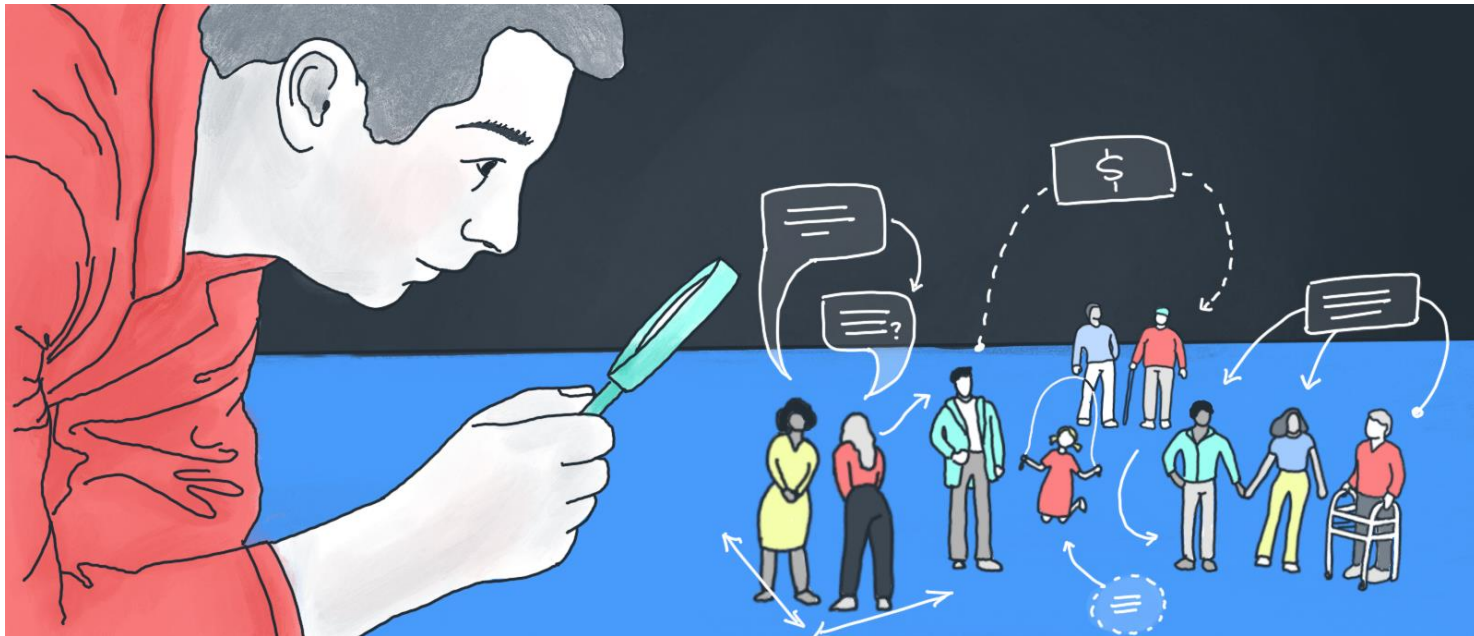
Lecturers and  
doctoral student

Doctoral dissertation  
Designing the research  
process

Mentor and co-mentor

# Project assignment

- Work assignment 1
  - Current stage of your research



The background of the slide features a close-up, slightly blurred image of a multiple-choice test sheet. A black pencil is positioned diagonally across the top right corner, resting on the paper. The test sheet contains rows of questions with circular bubbles for selecting answers (A, B, C, D, E).

# METHODOLOGY

- Methodology (Milas, 2005)
  - covers the system of rules by which **research procedures are conducted**, theories are built and also evaluated
    - the study about the tools of research
    - the technique(s)/how to conduct research
- Method
  - tools or techniques applied in the research process

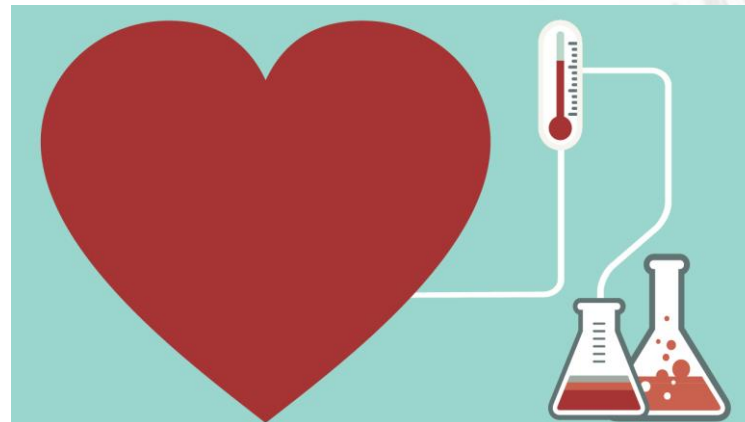
# RESEARCH

- Process of collecting answers to questions (research):
  - *Pre-designed*
  - *Logical*
  - Systematic process
- **Connects opinions and experiences**
- Leads to (new) insights
- Increases **knowledge**
- **Way of thinking**
  - structural thinking





- Developing and testing new theories
- Habit of questioning
- **It is based on data:**

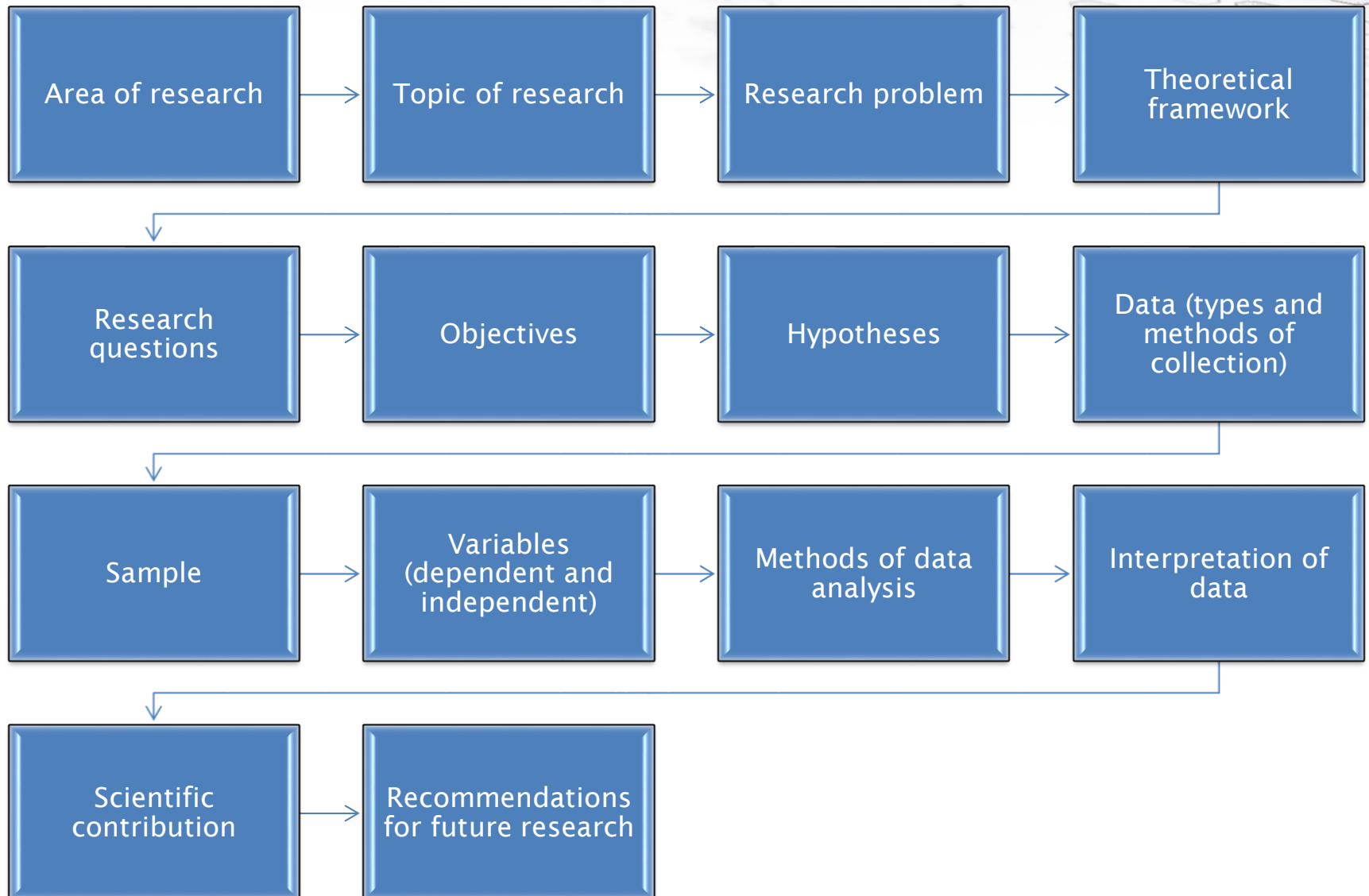


# Research design

- Gives answers to:
  - Research problems
  - Research question
  - Details of methodology-research process

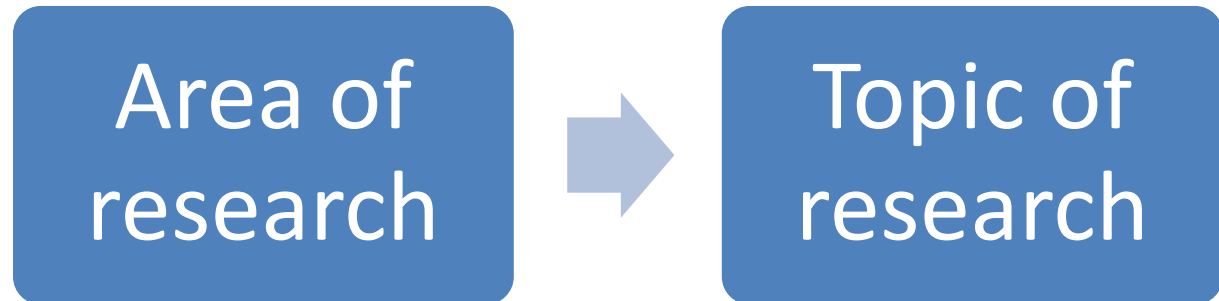


# RESEARCH PROCESS



## Determining the area of research

- **Area of research** is a broad area of interest from which a specific topic can be generated



- Answer the question: ***What interests you?***
- Select an **area** that you are sincerely interested in





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# Classifications

- National Council for Science
- [JEL classification](#)
  - Standard methods for classification of papers in the field of economics
    - Articles, doctoral dissertations, books, book reviews, papers in the publishing process, etc.

E.g.

- Entrepreneurial education
- Small and medium-sized entrepreneurs
- Family businesses
- Self-employment intentions
- Creative industries
- Copyright
- Corporate social responsibility

# Example

**Area of research:**

## **Career choice**

- Area: 5. Social sciences
- Field: 5.01. Economics
- Branches: 5.01.01 economics of entrepreneurship, 5.01.03 quantitative economics, 5.01.06 general economics, 5.01.11 economic mathematics and statistics
- JEL: A23, C1, C2, C3, C8, E24, J62, J24, L26

# Topic of research (title of dissertation)

- **Narrowly** defined area of interest
  - One scientific discipline
  - Several scientific disciplines (!)
- Enables detailed:
  - Research
  - Describing by all the elements of scientific discourse
- Topic of research indicates
  - Tendency towards one area
    - Caution: availability of data, consent of institution/company leaders

- Width of the topic
  - Broad:
    - Difficulties in research
    - Difficulties in reaching a conclusion, etc.
  - Narrow:
    - Lack of scientific contribution
  - Optimal:
    - Title neither too long nor too short
    - Without too many conjunctions (just for Croatsians 😊)
    - Covers all the **keywords**
    - Specifying the **dependent variable**
    - What will be **methodologically applied**
      - e.g. measuring, modeling, developing, conceptualizing analyzing, predicting, investigating, etc.



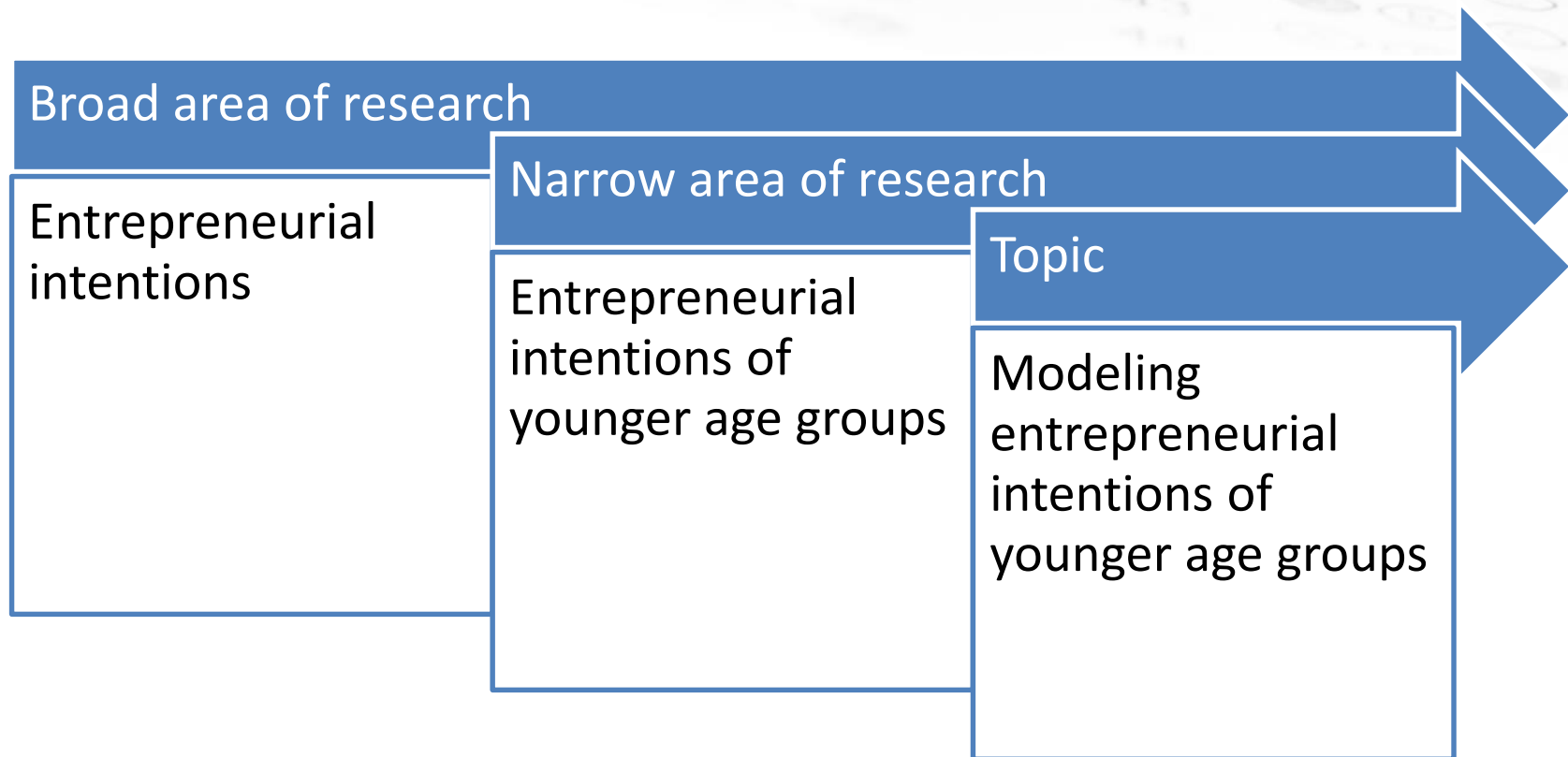
- Characteristics of a well-set topic of research
  - Feasible
    - Available literature?
    - Available data?
    - Is the research feasible?
    - Sensibility of the research
  - Relevant (significant)
  - Current
  - Original
  - Innovative
  - New in scientific sense



## Characteristics of a well-set topic

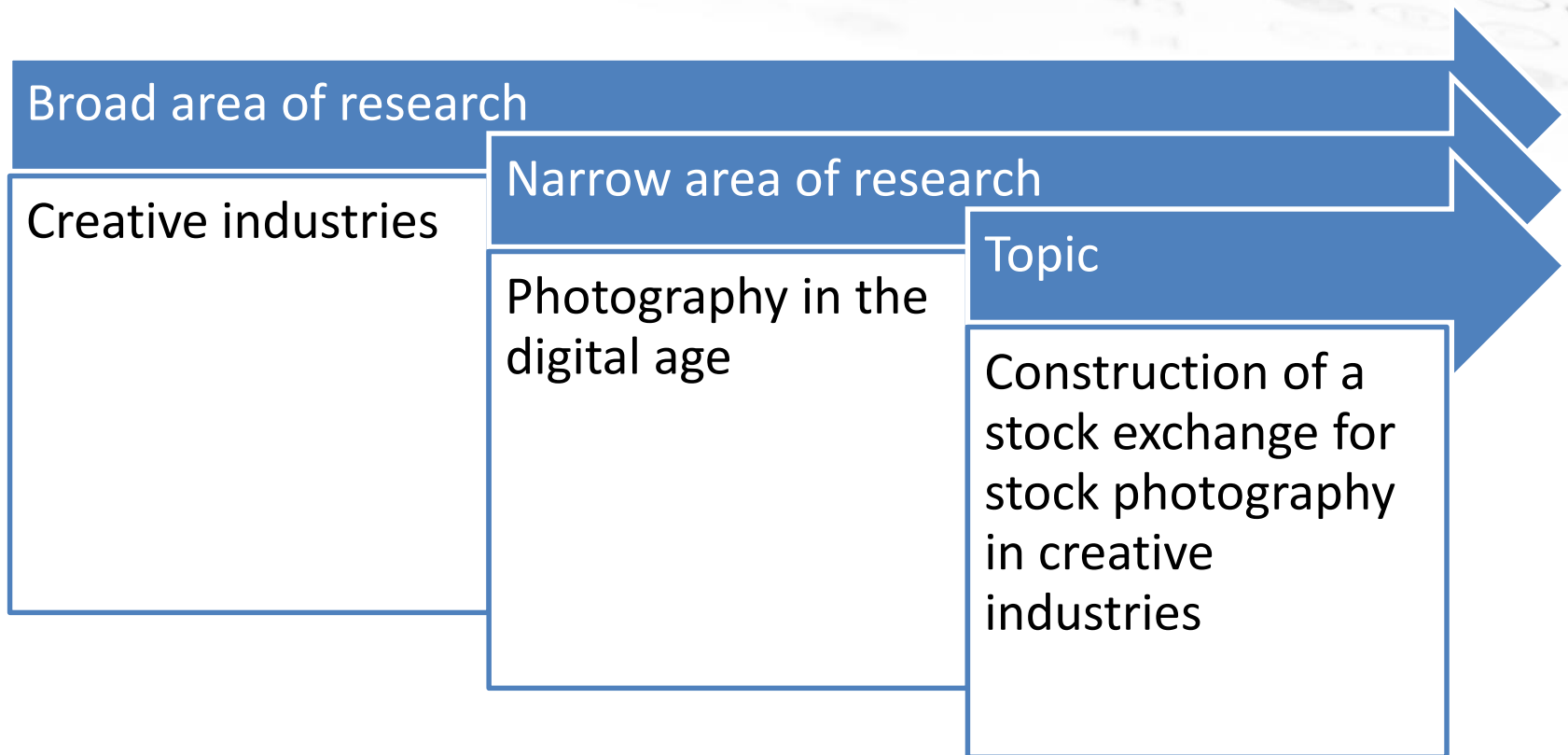
- Interesting:
  - For the doctoral student / researcher
    - Stimulating
    - Useful in the future career
  - For the mentor
    - Change of mentor?
- Meets:
  - Project guidelines
  - Doctoral program guidelines

# Example



TOO NARROW topic of research: Modeling entrepreneurial intentions of younger age groups in social sciences and their comparison with other areas of science

# Example



TOO NARROW topic of research: Collection of receivables by authors of stock photography in the Republic of Croatia

# Topic of research

- Soundness of the topic?!
  - Investigate and verify:
    - Previous studies
    - Published works
    - Scientific contributions
    - Projects in progress
    - Etc.
- Currently open access: [ProQuest](#) (It works for now just from the classroom – IP address ☹)

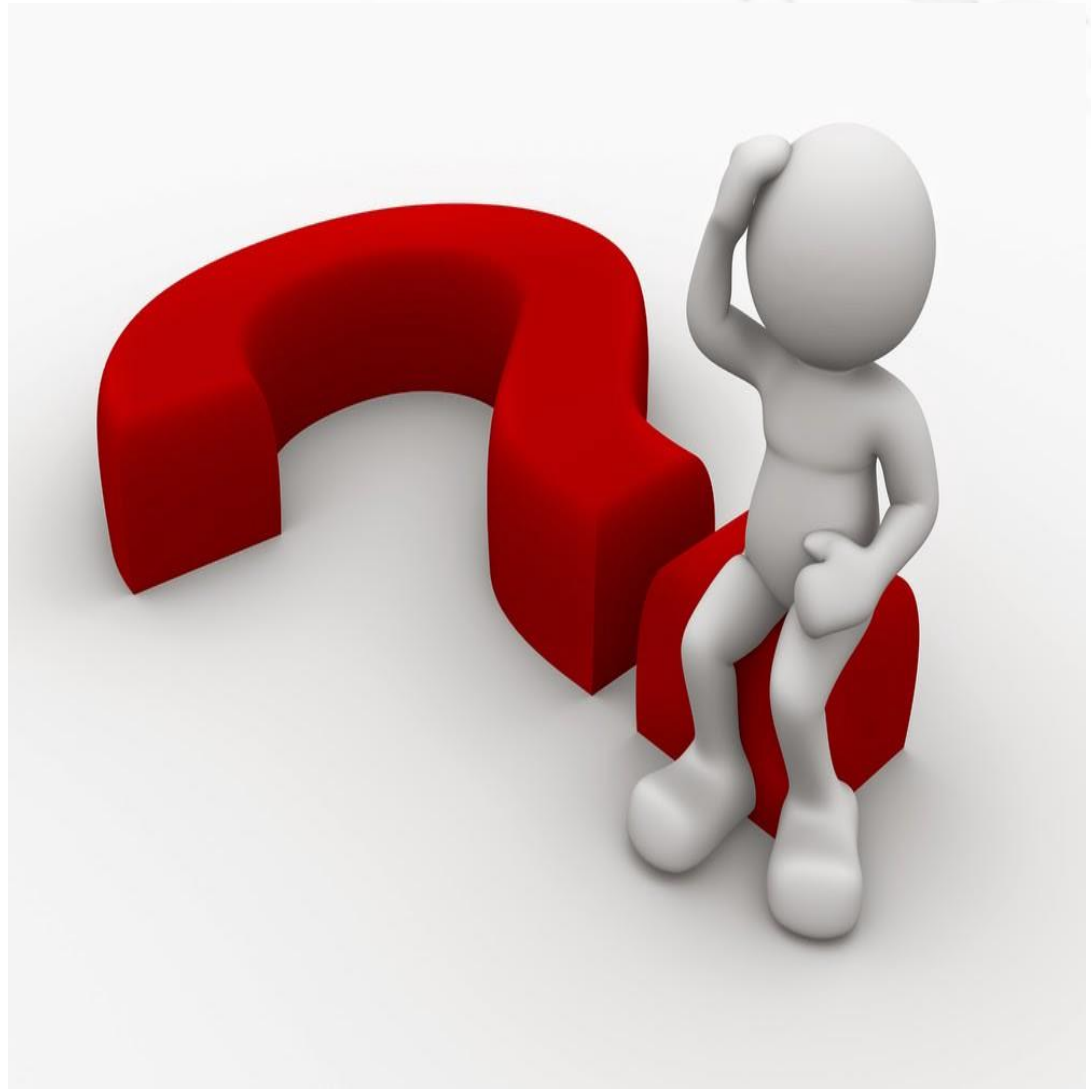


# Example

**Topic of research:**

Modeling the self-employment intentions of younger age groups

What is the problem?



## Research problem

- Often the **most difficult** part of the research process
- In some cases, formulating the problem is more important than solving it
- Research problem defines the topic of research
  - Motive for research
  - Reason for topic?
    - Justification of topic
- How to understand the problem?
  - Discuss! with:
    - Colleagues
    - Researcher from the same or similar field of research
    - Professors
    - Expertise
  - Read!

The background of the slide features a close-up, slightly blurred image of a multiple-choice test sheet. The sheet has rows of questions with circular bubbles for answers, labeled with letters A through E. A black pencil is positioned diagonally across the top right corner of the image. The title 'Setting the research problem:' is overlaid on a solid blue horizontal band at the top of the slide.

## Setting the research problem:

- Should it (can it):
  - Give contribution:
    - To an unexplored phenomenon
    - To deeper understanding of the topic
    - To familiarizing with marginalized social phenomena
    - To a specific practice
  - Replicate:
    - An already conducted research (with other participants in another place)

## Research problem

- It clarifies the topic of research
- It justifies the topic of research
  - Generally
  - Specifically (concrete aspects of the topic)
- Rephrasing the problem into analytical or operational terms

e.g.

**Topic:** Selection of the career path of younger age groups after finishing formal education

**Problem:** do they chose **self-employment** as the career path after finishing formal education



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## Scientific problem (topic of research)

- Requires:
  - Theoretical research
  - Empirical research
- Results in:
  - Creation of new knowledge
  - Leads to new research
  - Builds new theories and corrects the existing ones

# Example

## Research problem

Young people nearing the completion of their formal education are deciding on their choice of career. Secondary publications indicate that young highly educated people in Croatia do not prefer self-employment as a career. Identification of variables that explain intentions towards self-employment.

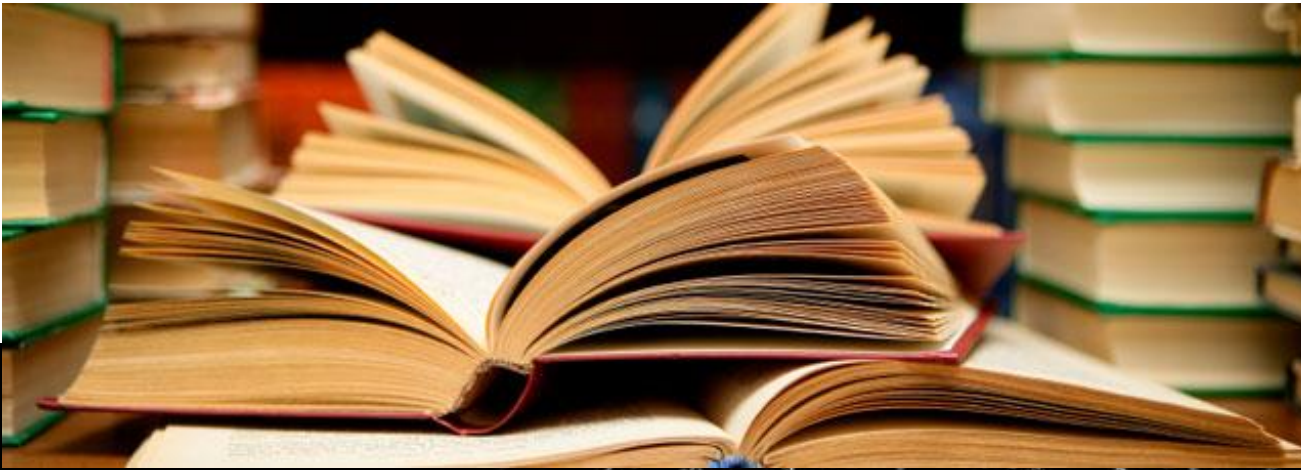


# THEORETICAL FRAMEWORK





- Theory provide key inputs into the research process



## Theoretical framework

- Collection of literature **Step 1.**
- Insight into the area of interest
  - Existence of information:
    - Key books, articles, authors
    - The latest trends in researching the area
    - Key terms and concepts in the area
      - The most significant works in a certain area
    - Principal authors in the area
    - Different theories



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# Theoretical framework

- Examine as many sources as possible
  - Results of previous scientific works and research

- Concepts
- Theoretical frameworks
- Methods of measurement
- Results
- Limitations

**Previous  
research**

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## Review:

- Concepts and theories
- Previous research findings

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## Concerns?

- You have found a rare topic on which there is very little literature?
  - Confirmed:
    - There is no area on which something has not been written
- Also research the associated research

# Searching literature

- Keywords
- Library catalogs
  - Faculty of Economics in Osijek
  - National and University Library Zagreb
  - City and University Library Osijek
- Internet
  - Google? Wikipedia?
  - DATABASES
    - Assignment after the break 😊

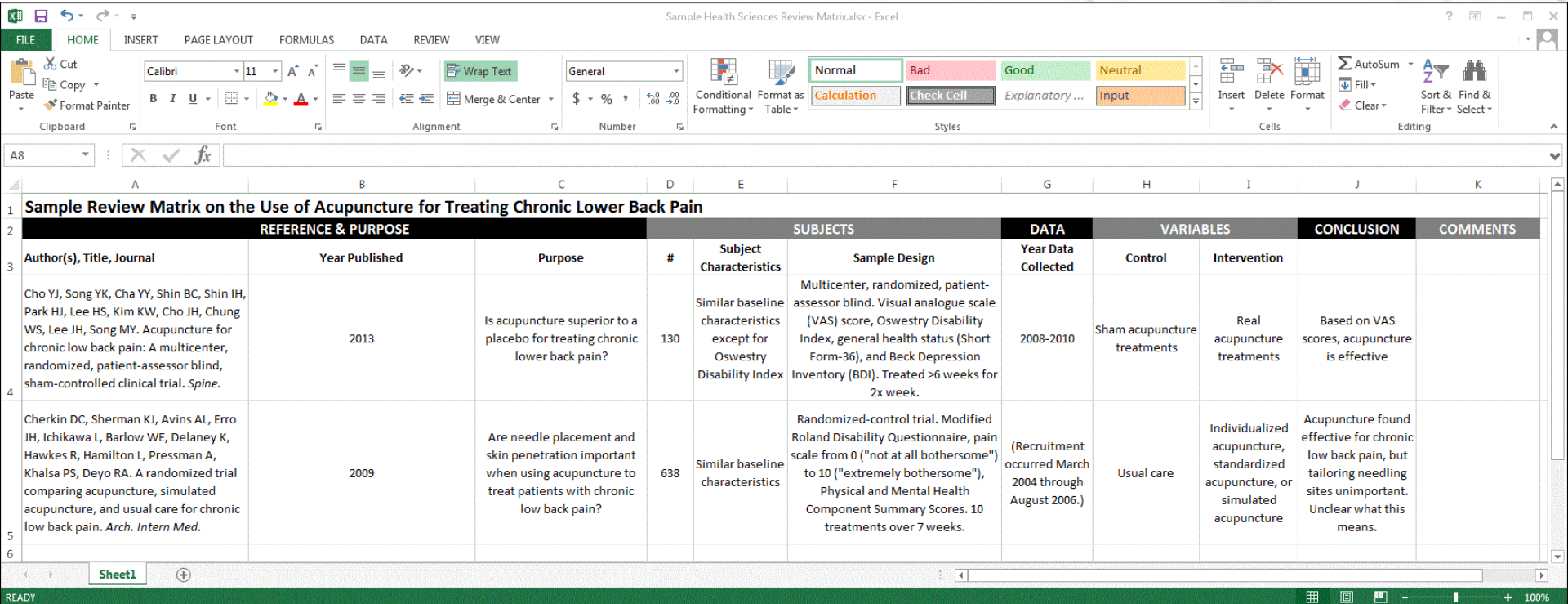
## Advice

- When storing literature, take care of organization of folders on computers
- Building own library of the area
- Write and organize your literature notes









# Example. How to measure dependent variable?

Tablica 16: Mjerenja namjera za samozapošljavanje/poduzetničkih namjera

R. br.	Autori, godina	Nezavisne/kontrolne varijable	Uzorak	Zavisna varijabla			Rezultati modela			Preporuke (long. istraž.)	
				Naziv	Broj čestica	Ljestvica mjerenja	Čestice	Prilagođen $r^2$	Druge analize		Varijable bez stat. značajnosti
1.	Ahmed i suradnici (2010)	Inovativnost, godina studija, poduzetnički kolegij, radno iskustvo u obiteljskom /tuđem poduzeću	276 studenata (Pakistan)	Poduzetničke namjere	3	7-stupnjevana Likertova ljestvica	n. d. (adaptirano po Kolvereid, 1996)		Korelacijska analiza	Rod, poduzetnički kolegij	
2.	Audet (2004)	TPD***	107 studenata (Kanada)	Poduzetničke namjere	2	Procjena vjerojatnosti	Namjeravate li se upustiti u posao u roku od tri godine nakon završetka studija (kratkoročno); ... u nekom trenutku života (nakon tri godine od završetka studija, dugoročno)?	t1 - kratkoročno (0,32), t1- dugoročno (0,32). t2 – kratkoročno (0,13), t2- dugoročno (0,47)		TPD** u kratkoročnom modelu u t2 mjerenju	(da)
3.	Autio i suradnici (2001)	TPP*, radno iskustvo u poduzeću, status zaposlenja, promjena posla unutar jedne godine, godine starosti	3 445 studenata (Finska, Švedska, SAD)	Poduzetničke namjere	4	5-stupnjevana Likertova ljestvica	Koliko je izvjesno kako ćete otvoriti poduzeće sami ili zajedno s vašim prijateljima: -na puno radno vrijeme unutar jedne -pet godina od danas, - na pola radnog vremena unutar jedne - pet godina od danas?	0,263 (sve zemlje zajedno)			da
4.	Basu i Virick (2008)	TPP*, prethodno poduzetničko obrazovanje, samozaposlen otac, prethodno iskustvo u samozaposlenosti	122 studenata (SAD)	Poduzetničke namjere	3	5-stupnjevana Likertova ljestvica	Po Kolvereid (1996)	0,44 (samo varijable TPP)	Korelacijska analiza	Prethodno poduzetničko obrazovanje	da
5.	Carr i Sequeira (2007)	Radno iskustvo u obiteljskom poduzeću, stajalište prema posjedovanju poduzeća, percipirana potpora obitelji, poduzetnička samoeфикаsnost, rod, završena izobrazba, radno iskustvo	308 ispitanika - poduzetnici, početnici, zaposlenici malih i srednjih poduzeća i organizacija, poslodavatelji start-up seminara (SAD)	Poduzetničke namjere	6	Dihotomna (nominalna mjerna ljestvica)	Jeste li podnijeli zahtjev za svoj porezni broj kako biste započeli posao na puno radno vrijeme? Jeste li u procesu razvijanja novog proizvoda/usluge? Jeste li u procesu sastavljanja zajedničkog početnog tima? Tražite li poslovni prostor i opremu za započinjanje posla? Jeste li u procesu pisanja poslovnog plana? Jeste li počeli štedjeti novac koji ćete uložiti u posao?	0,20		Rod, završena izobrazba	da
6.	Gird i Bagaraim (2008)	TPP*, instrumentalna potpora, društvena podrška	247 studenata (Južnoafrička republika)	Poduzetničke namjere	4	5-stupnjevana Likertova ljestvica	Po Autio i suradnici (2001)	0,299		Društvena podrška	da
7.	Goksel i Aydinan (2011)	Osobne karakteristike (motivacija za postignućem, interni lokus kontrole, proaktivnost) / rod, roditelji poduzetnici, ocjene tijekom studija	175 studenata (Turska)	Sklonost poduzetništvu	20	Likertova ljestvica	n. d.	0,536	t test (sklonost poduzetništvu i rod, roditelji poduzetnici, ocjene studenata)	Rod, roditelji poduzetnici, ocjene tijekom studija	

Little help 😊

# Loomen

- Template for organizing previous research
- A Usual phrase in scientific writing (Croatian and English version)

- Obligatory chapter
  - Introduction to:
    - Research problem
    - Previous findings in the area of research
  - Presents theories in the area of research
  - Critically compares the presented theories
  - Scientifically contributes:
    - By reviewing and criticizing theories
    - By stating deficiencies of previous studies
    - By clarifying the reason for this research

## Theoretical framework

- The most common **errors**:
  - Too general and too broad theoretical framework
  - General lamentation (without citation)
  - Without specifics explanations
  - Does not follow the topic
  - Does not cover:
    - Research variables
    - Keywords
    - Topic of the research
- **Correct approach**
  - Specific approach to the topic of research
    - Relevant authors
    - Explanation of narrow areas
  - PhD student shows that he or she knows the area well



**Dedicate time to reading the literature**





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## Some suggestions:

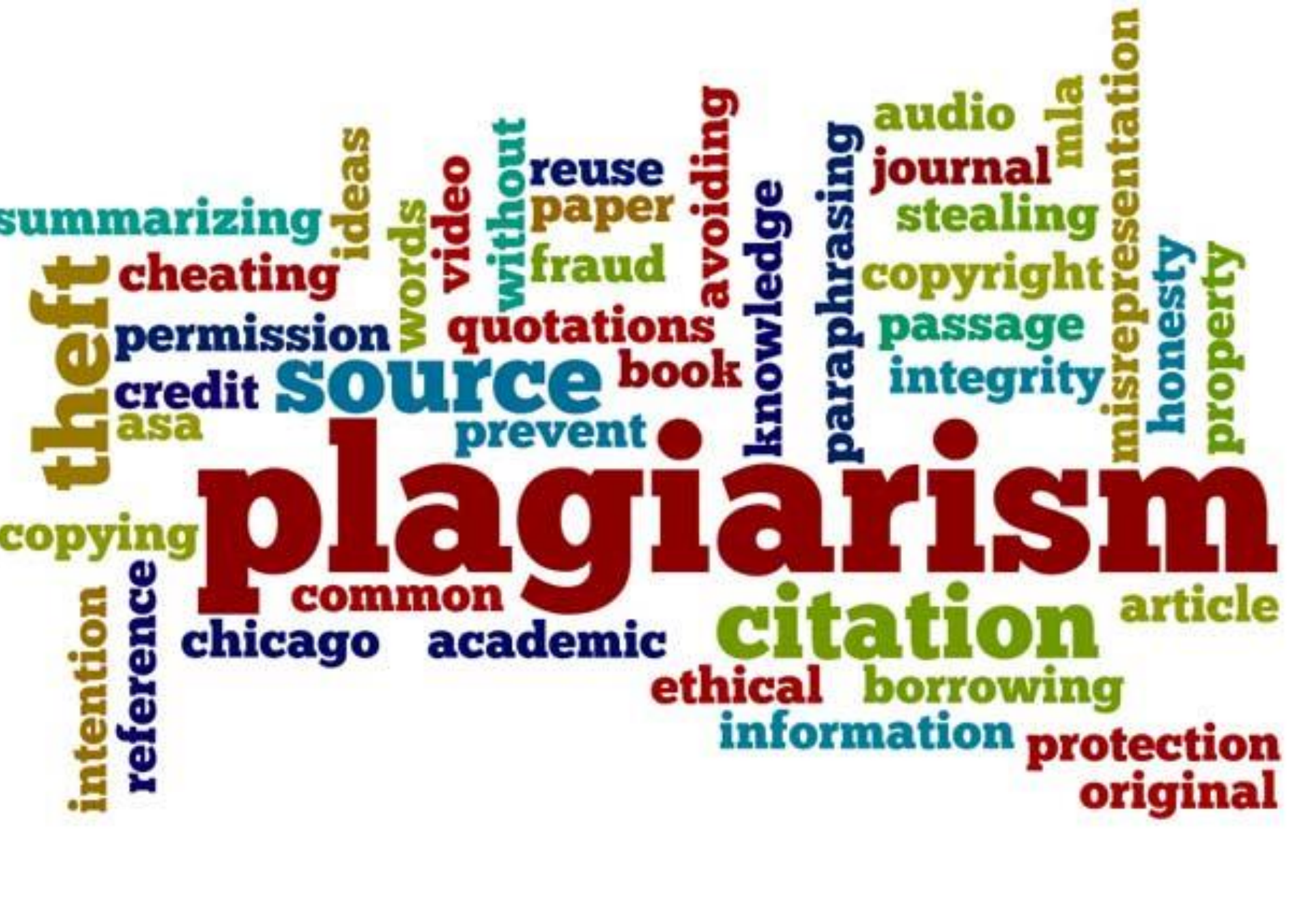
- Baze.nsk.hr
  - Proxy
  - [AAI@edu.hr](mailto:AAI@edu.hr)
    - [name@efos.hr](mailto:name@efos.hr)
- Google scholar
  - Cite?
- Research Gate
- ...

# Example - Theoretical framework

1. Ajzen, I. 1987. Attitudes, traits, and actions: Dispositional prediction of behavior in personality and social psychology. U: *Advances in experimental social psychology Vol. 20*. ur. L. Berkowitz, 1-63. San Diego, CA: Academic Press.
2. Ajzen, I. 1991. The theory of planned behavior. *Organizational behavior and human decision processes* 50, br. 2: 179-211.
3. Ajzen, I. 2001. Nature and operation of attitudes. *Annual review of psychology* 52, br. 1: 27-58.
4. Armitage, C. J. i Conner, M. 2001. Efficacy of the theory of planned behavior: A meta-analytic review. *British journal of social psychology* 40, br. 4: 471-499.
5. Audet, J. 2004. A longitudinal study of the entrepreneurial intentions of university students. *Academy of Entrepreneurship Journal* 10, br. 1-2: 3-16.
6. Autio, E., Keeley, R. H., Klofsten, M., Parker, G. G. C. i Hay, M. 2001. Entrepreneurial Intent among Students in Scandinavia and in the USA. *Enterprise and Innovation Management Studies* 2, br. 2: 145-160.
7. Bakotić, D. i Kružić, D. 2010. Students' Perceptions and Intentions towards Entrepreneurship: The Empirical Findings from Croatia. *The Business Review* 14, br. 2: 209-215.
8. Bandura, A. 1986. *Social foundations of thought and action: A social cognitive theory*. New York: Prentice-Hall.
9. Basu, A. i Virick, M. 2008. Assessing entrepreneurial intentions amongst students: a comparative study. U: *12th Annual Meeting of the National Collegiate Inventors and Innovators Alliance*. Dallas, USA: San Jose State University.
10. Churchill, G. A. 1996. *Marketing research: methodological foundations*. 7., izdanje. Orlando, FL: Dryden Press.
11. Douglas, E. J. i Shepherd, D. A. 2000. Entrepreneurship as a utility maximizing response. *Journal of Business Venturing* 15, br. 3: 231-252.
12. Douglas, E. J. i Shepherd, D. A. 2002. Self-employment as a Career Choice: Attitudes, Entrepreneurial Intentions, and Utility Maximization. *Entrepreneurial Theory and Practice* 26, br. 3: 81-90.
13. Hair, J., Black, W., Babin, B., Anderson, R. i Tatham, R. 2006. *Multivariate Data Analysis*. Upper Saddle River, NJ: Pearson Prentice Hall.
14. Halmi A. 2003. *Multivarijantna analiza u društvenim znanostima*. Zagreb: Alinea.
15. Horvat, J. 2011. Questionnaire. U: *International Encyclopedia of Statistical Science*. ur. M. Lovrić. Part 17: 1154-1156. Berlin: Springer Berlin Heidelberg. DOI: 10.1007/978-3-642-04898-2\_55.
16. Jaén, I., Moriano, J. A. i Liñán, F. 2010. Personal values and entrepreneurial intention: an empirical study. U: *Paper presented at the The 7th ESU Conference on Entrepreneurship 2010*. Estonia: University of Tartu.
17. Katz, J. A. i Shepherd, D. A. 2003. *Cognitive approaches to entrepreneurship research*. 1., izdanje. Amsterdam: JAI.
18. Kolvereid, L. i Isaksen, E. 2006. New business start-up and subsequent entry into self-employment. *Journal of Business Venturing* 21, br. 6: 866-885.
19. Kolvereid, L. 1996a. Organisational employment versus self-employment: reasons for career choice intentions. *Entrepreneurship Theory and Practice* 20, br. 3: 23-31.
20. Kolvereid, L. 1996b. Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice* 21, br. 1: 47-57.
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# Example - Theoretical framework

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## Objectives of research

- What is intended to be achieved with the research
- Underlying intention of the research
- They must be:
  - Clear
  - Specific
    - E.g.
      - Determine the role of lobbies in creative industries
        - » Too general and difficult to achieve (all stakeholders of production/project cycle in creative industries?)
      - Correct: to measure the influence of lobbies in publishing by applying the reputation coefficient
    - Caution: too general and ambitious objectives

## Types of objectives of research

- According to application:
  - Theoretical (scientific) objectives
    - Useful for theory
  - Applicative objectives
    - Useful in practice
- Example.
  - According to generality:
    - Main
      - Measure the influence of lobbies in publishing by applying the reputation coefficient
    - Auxiliary
      - To define the concept of reputation coefficient
      - To apply the measure of reputation coefficient on the selected publishing companies and compare results with each other

**Who needs this?**



The background of the slide features a close-up, slightly blurred image of a multiple-choice test paper. A black pencil is positioned diagonally across the top right corner, resting on the paper. The paper contains rows of questions with circular bubbles for selecting answers (A, B, C, D, E).

# Use action-oriented verbs:

- Example
  - To explain,
  - To apply,
  - To predict,
  - To identify,
  - To study,
  - To investigate,
    - To employ, evaluate, describe, illustrate, defend, integrate, use, assess, interpret, distinguish, categorize, solve, formulate, report, relate, organize, restate, recall, prepare, review, list, arrange, classify, name, construct, recognize, create, determine, ...

The background of the slide is a close-up, slightly blurred image of a multiple-choice test sheet. A black pencil is visible in the upper right corner, resting on the paper. The test sheet features rows of questions with circular bubbles for selecting answers (A, B, C, D, E).

## WORDS TO AVOID

- To know
- To understand
- To really understand
- To fully appreciate
- To grasp the significance of
- To have an awareness of

# Coherence of objectives and research questions

- They don't have to be equal in number
- They must „cover” each other

Objective 1    Question 1  
                    Question 2  
                    ...

or

Question 1    Objective 1  
                    Objective 2  
                    ...

Objective/objectives of research



Research question/s

Objectives  $\neq$  research questions

# Example

## Objective of research:

1. Determine the intentions of younger age groups in selection of future career.
2. Adjustment of existing measuring instruments for the specific needs of research.
3. Examination of the role of education in conjunction of self-employment intentions, theory of planned behavior and level of motivation for achievement of younger age groups.
4. Propose a model with which these intentions can be analyzed and, ultimately, directed.
5. Construction of the *Model of career choice of the student population (XP Model)*.

## Research question/s

- The central part of the research process
- Determines the **direction** of research
- Affects the quality of the entire project
  - E.g. find, determine, analyze
- **Definition: Concrete questions to which the research provides the answer**





# The importance of setting

- Relevance for decision-making
  - Connected to the objective of research
  - Correct choice of variables
    - Reduce the number of variables (a large number of variables that are **seemingly important**)
- Established hypotheses
  - Theory, previous research, data
    - Intuition tested in the above
- Complete research question
  - All the relevant characteristics are measured

## Developing a Research Question

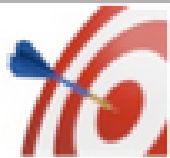


**Are children who play video games more likely to be violent?**

**Do video games contribute to bad behavior?**  
(what bad behavior? on who?)

**What are the effects of video games on society?** (too broad: what effects? on who?)

[Internet source that can help you](#)



A hit!

What is the environmental impact of plastic water bottles?



Close!

What is the impact of bottled water on the environment? (What aspect of bottled water?)



Miss!

How does trash pollute the environment? (too broad: What kind of trash?)

The background of the slide features a close-up, slightly blurred image of a multiple-choice test paper. The paper has rows of questions with circular bubbles for answers, labeled A, B, C, and D. A black pencil is positioned diagonally across the top right corner of the paper. The overall tone is educational and academic.

# Examples of research questions

- Wrong:
  - Are women better entrepreneurs?
- Correct:
  - Do female entrepreneurs achieve better financial performance of their companies than their male colleagues?
- Wrong :
  - Are employees in Croatian banks satisfied?
- Correct :
  - What are the key factors of workplace satisfaction of employees in Croatian banks?



# Research question

- **Related to the area, topic and objectives of the research**
  - What am I interested in in the area of research?
- **Good research questions:**
  - Have several potential answers
  - Start thinking in terms: what, how, does, are, is...
  - Require hypothesis and data analysis



# THINK THROUGH

- After defining:
  - Area of research
  - Topics of research
  - Objectives of research
  - Research questions




**Think through again!!!!!!**

- Is your research interesting to you?
- Do you have the necessary resources?





# IMPORTANT!!!!

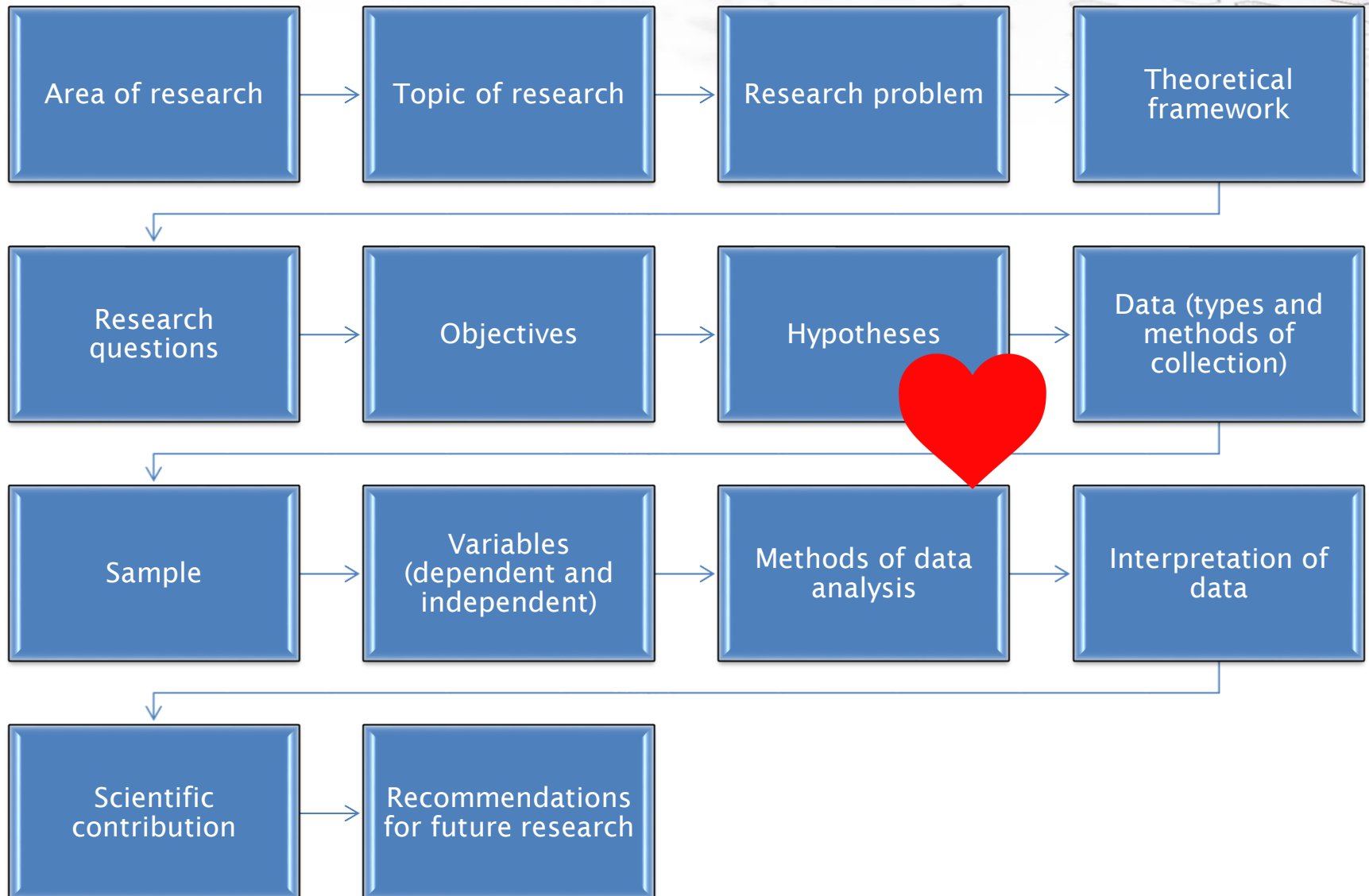
Problem	Objective	Question	Hypothesis
	1	1	
		2	
			
	2	1	
		2	
			
	3	1	
			

# Example

## Research questions:

1. Do the intentions towards self-employment differ with regard to the exposure to entrepreneurial education?
2. Is there a theory that predicts the decision on career path?
3. Are there statistically significant differences with regard to the demographic characteristics of younger age groups and their intentions towards self-employment as a career choice?
4. Do young people more prefer to start their own business than to work for someone else (become employed in private or state companies)?

# RESEARCH PROCESS



## Hypothesis

- Scientific assumption (explanation) that has to be verified (accepted or rejected)
- Temporary explanation of certain facts
- “Educated speculation” 😊
- It brings:
  - Clarity and
  - Precision towards the objective/objectives of the research

# Hypothesis

- Setting previous assumptions or theory which is believed to be a solution to a noted problem (Žuvela, 1978)

## Good hypothesis

- corresponds to the problem and topic of research
- connected with the goal of the research and gives an answer to the research question
- testable by a set of theoretical-empirical procedures

The background of the slide features a close-up, slightly blurred image of a multiple-choice test sheet. A black pencil is positioned diagonally across the top right corner, resting on the paper. The test sheet contains rows of questions with circular bubbles for selecting answers, and some numbers like '13', '14', '15', '31', '32', '33', '34', '35', '41', and '42' are visible. The overall tone is academic and professional.

# Hypothesis

- **Definition: plausible claim about relations between two or more variables**
  - Clear implications for testing the stated relations between the variables
  - It should be expressed as briefly as possible
  - It should be based on theory, previous research, data
- **Relations between variables:**
  - Correlation, differences, influences, types of variables, dependency, prediction, models, measurements, effects, ...



## The role of hypotheses

1. They are directing the research
  - Contribute to the understanding of the problem
  - They set the framework for:
    - Selection of the sampling frame
    - Data collection
      - Selection of the data collection methodology
    - Data analysis
      - Selection of the data analysis methodology
2. Working instrument of the theory
3. Conclusion on hypotheses:
  - Rejection
  - Non-rejection

} In the conclusion of the research
4. A means to improve scientific knowledge

## Some possible issues:

- Insufficient knowledge of the appearance for a hypothesis
- Ignorance of theoretical framework
- Incoherence with the problems/goals of the research
- Non-testability



## Characteristics of hypotheses

### 1. Clarity of hypotheses

H: The average age of male entrepreneurs in a group of medium-sized companies is higher than the average age of female entrepreneurs



# Characteristics of hypotheses

## 2. Unidimensionality of hypotheses

- H: The success of doctoral studies is related to the age and gender of doctoral students
- ??
- H: The success of doctoral studies is related to the age of doctoral students
- H: The success of doctoral studies is related to the gender of doctoral students

## Characteristics of hypotheses

### 3. Specificity of hypotheses

- General hypotheses are difficult to verify
- H: There is a certain number of latent dimensions of the questionnaire (of the second order) for the measurement of the unique indicators of the internal quality of service, internal market orientation and responsible organizational behavior, based on the received latent dimensions (of the first order) of instruments for measuring internal market orientation, responsible organizational behavior.
- Problem: too many different relationships, several different concepts, concepts that are difficult to turn into variables



## Proposals for achieving the specificity of hypothesis:

- H: There is a statistically important positive correlation between the aspects of internal quality of service and internal market orientation
- or/and
- H: There is a statistically important positive correlation between the aspects of internal quality of service and socially responsible business operations

## Characteristics of hypotheses

### 4. Operationalization of hypotheses

- **Translating hypotheses into measurable terms**
- Naming the variables
- Determining the methods and techniques for testing hypotheses

### 5. Verifiability of hypotheses

- H: Companies organize events and by applying the elements of creation of experience of both products and events directly affect the differentiation of the company and creation of competitive advantage
  - ???

## Characteristics of hypotheses

### 6. Connection with scientific knowledge

– The main objective of scientific works:

- The hypothesis stems from the existing knowledge and spreads the scientific knowledge

## What do we do with a hypothesis???

- We decide to reject it or not to reject
- We test it!
  - Theoretical hypotheses
  - Research hypotheses
    - Qualitative methodology
    - Quantitative statistical methodology



## More about hypotheses

- Types of hypotheses
  - Null and alternative hypothesis
  - This will be discussed in detail tomorrow

# Example

## Hypothesis:

1. Students with the highest exposure to entrepreneurial education have more pronounced self-employment intentions than other students.
2. Elements of the theory of planned behavior (attitudes, subjective norm and perceived control of behavior) determine self-employment intentions.
3. Personal experience of respondents in the family business has a positive effect on self-employment intentions.





# RESEARCH PROCESS

