

DECISION-MAKING COMPETENCES: ASSESSMENT APPROACH TO A NEW MODEL

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Supervisors:

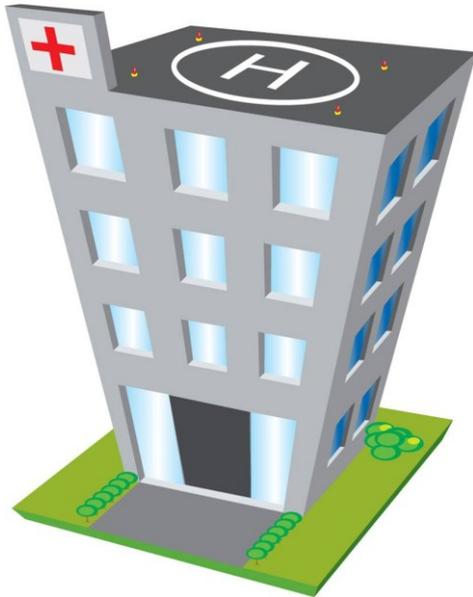
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Prof. Michel Decker



What I Wanted To Know...

How is the decision-making process characterized?



What I Wanted To Know...

Who are the potential decision-makers?



What I Have Found ...

Literature review ...

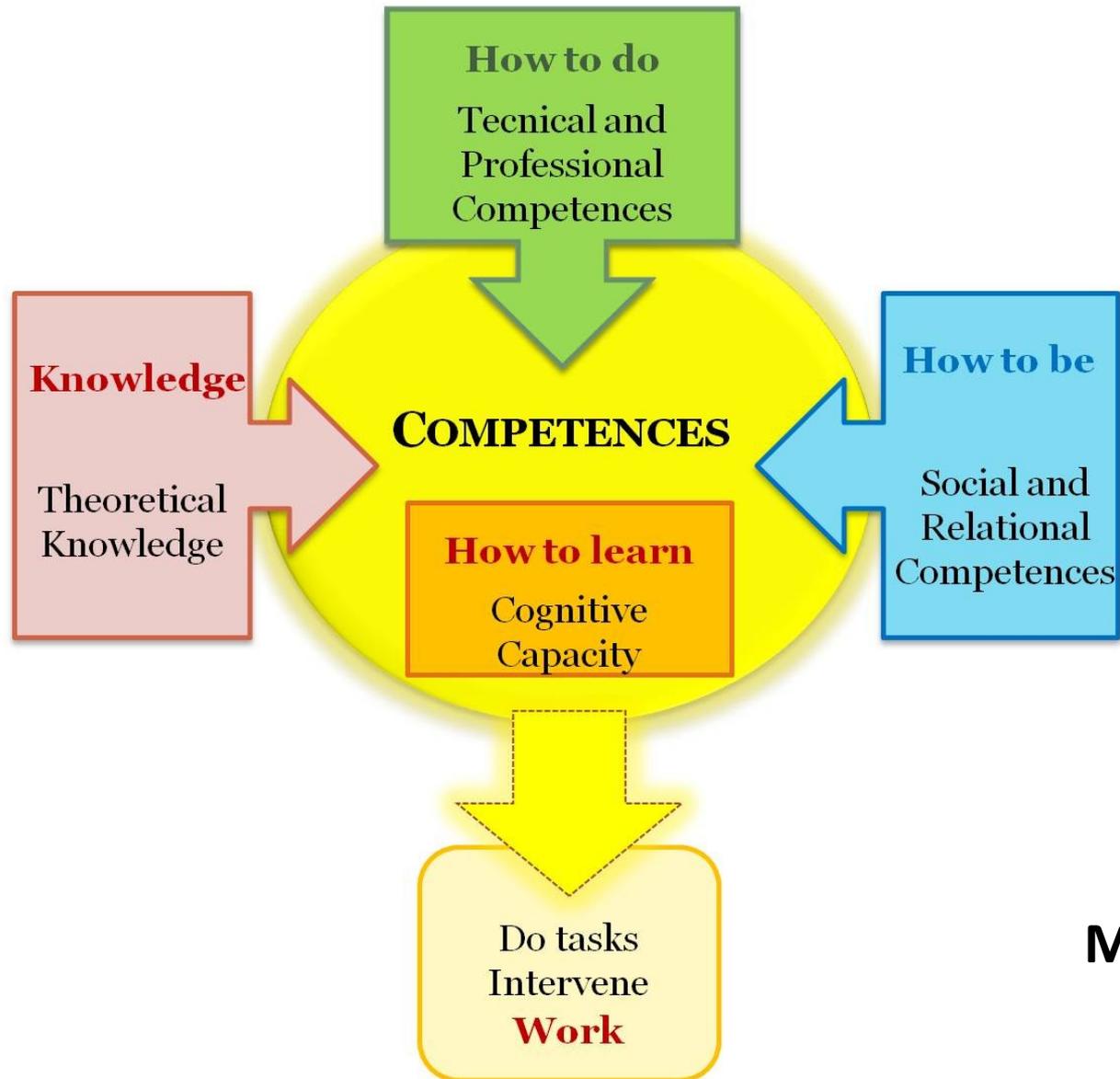
Competence is the intersection of three axes (Le Boterf , 1995):

- individual
- educational background
- professional experience

Competencies are operationalized at the level of "Knowledge."

The knowledge can be described as: **knowledge per se, how to do, how to be** and **how to learn**, which correspond respectively to the skills acquired in training, the skills acquired in the performance of the profession, to attitudes that the professional assume in his daily life and cognitive abilities that allow to learn, think and process information (Maia, 2012).

What I Have Found ...

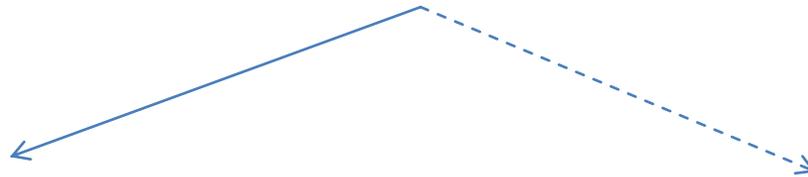


MODEL 1

What I Have Found ...

BUT Its not a state of being ... nor restricted to a specific knowledge or know-how

Competences



NOT Directly measured

LATENT VARIABLE



HOW TO MEASURE ?

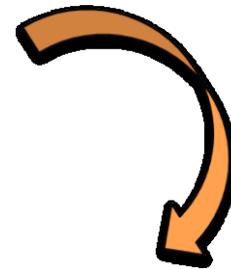


What I Have Found ...

AND



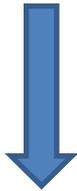
➤ It would be helpful to know whether the different knowledge's really do reflect a single variable - **COMPETENCE**



Are these different variables driven by the same underlying variable?

Method Choice ...

Factorial Analysis (FA)



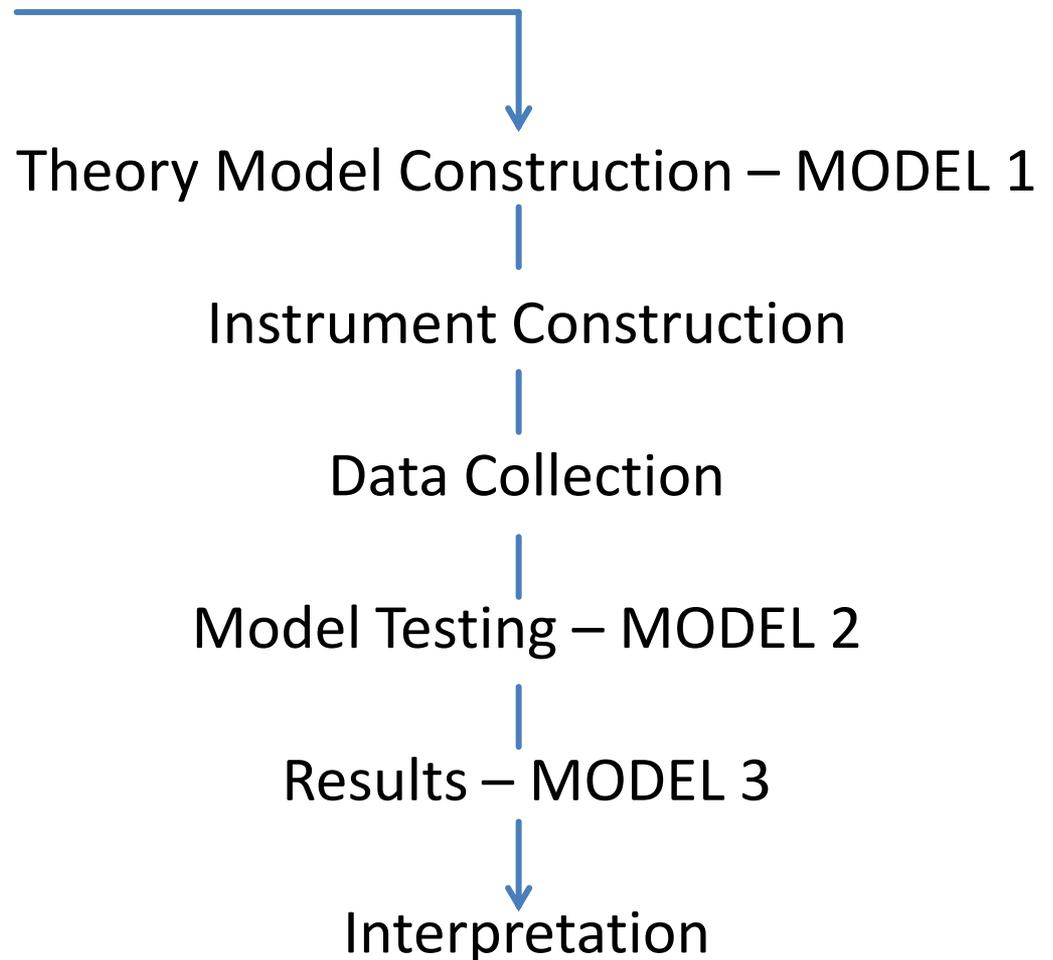
Statistical Method
(technique) for identifying
groups or clusters of
variables

- to understand the structure of a set of variables
- to construct a questionnaire to measure an underlying variable
- to reduce a data set to a more manageable size retaining as much of the original information as possible

What I Did ...

Approach to **SEM** Analysis

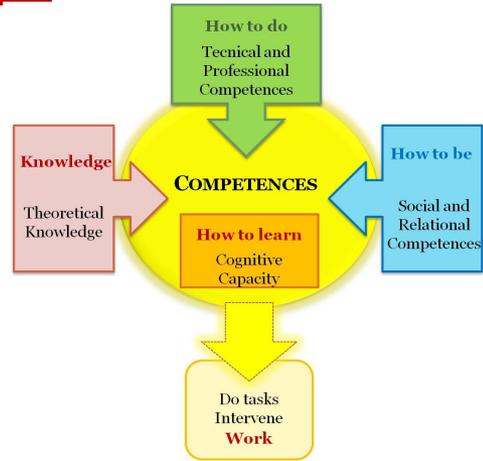
↓
Structural
Equation
Modelling



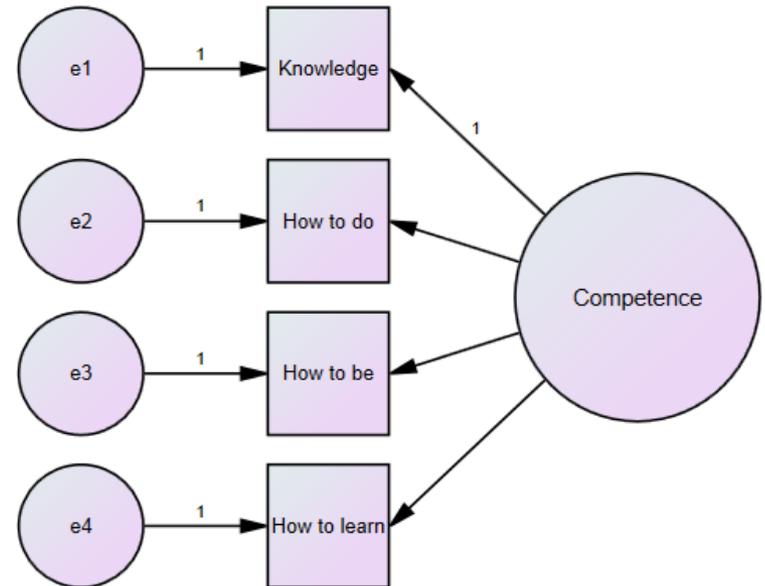
PHASE 1

THEORY MODEL CONSTRUCTION

MODEL 1



MODEL 2
(AMOS / SPSS)



PHASE 2

INSTRUMENT CONSTRUCTION



Literature Review ---- 4 Knowledge's



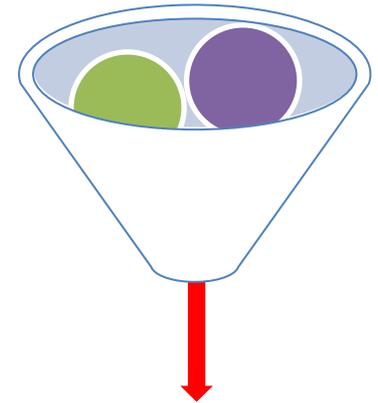
Questionnaire ----- 29 Items



Lickert Scale: “Don’t agree” --- “Fully agree”

PHASE 3

DATA COLLECTION



- National Level
- Private sector
- Public sector
- Hospitals
- Private Practices

- Paper
- On- line

- 297 Valid Data
- no missing values

PHASE 4

MODEL TESTING

1st Factorial Analysis

a) Assessment of the suitability of the data for FA –
Sample size



“Thumb rule” - The number of subjects should be the larger of 5 times the number of variables

(Verma, 2013)

$$29 \times 5 = 145 \quad (297)$$

PHASE 4

MODEL TESTING

a) Assessment of the suitability of the data for FA –
Sample size (cont...)

Kaiser – Meyer – Olkin Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,922
Bartlett's Test of Sphericity	Approx. Chi-Square	5200,483
	df	406
	Sig.	,000

Superb

KMO (0-1) > 0.9 Superb
adequacy of data for running FA
Field (2009) and Verma (2013)

PHASE 4

MODEL TESTING

b) Exploratory Factorial Analysis

EFA seeks to uncover the underlying structure of a relatively large set use of variables.

À priori assumptions is that any indicator may be associated with any factor

PHASE 4

MODEL TESTING

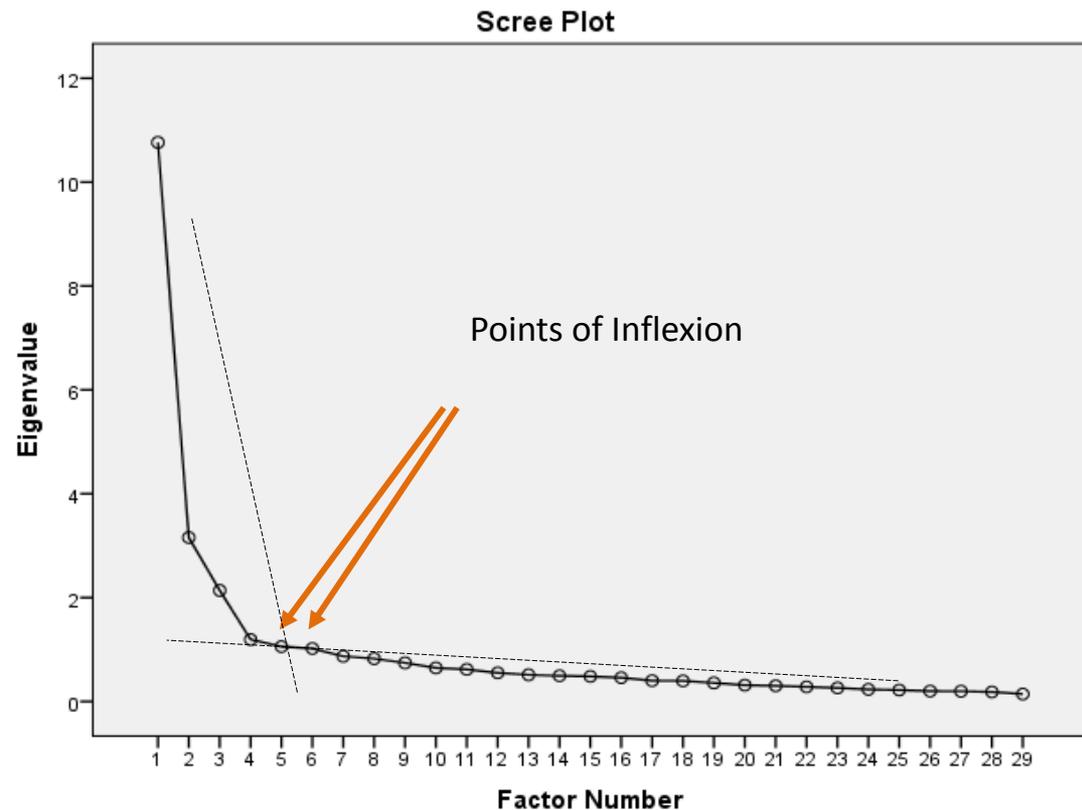
b) Exploratory Factorial Analysis – Principal Factor Analysis (principal axis factoring)

b1. Extraction

Involves examining the graph of the eigenvalues (and looking for the break point in the data where the curve flatters out).

Eigenvalues measure the amount of variation in the total sample accounted for by each factor.

..... If a factor has a low eigenvalue then it is contributing little to the explanation of variances in the variables and may be ignore as redundant with more important factors



PHASE 4

MODEL TESTING

b1. Extraction (cont.)

Total Variance Explained						
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10,763	37,114	37,114	10,367	35,747	35,747
2	3,156	10,881	47,995	2,809	9,685	45,432
3	2,137	7,370	55,365	1,826	6,296	51,728
4	1,193	4,113	59,477	,786	2,712	54,440
5	1,055	3,638	63,115	,671	2,315	56,755
6	1,019	3,515	66,631	,527	1,817	58,572
7	,870	2,999	69,630			
8	,824	2,843	72,472			
9	,742	2,560	75,032			

•••

Kaiser criterion – drop all factors with eigenvalues under 1.0

PHASE 4

MODEL TESTING

b2. Factor Rotation

Once the number of factor have been determined the next step is to interpret them.

In this step, factors will be “rotated”. Rotation maximizes the loading of each variable on one of the extended factors while minimizing the loading on all other factors (Andy Field 2009, p. 653).

This step will make more clear **which variables relate to which factors.**

PHASE 4

MODEL TESTING

b2. Factor Rotation

Varimax – most common choice



Orthogonal method of rotation – produce factors that are **uncorrelated**

After orthogonal rotation, one should apply oblique rotation just to be sure that the factors are truly uncorrelated (results should be nearly identical)

(Osborne and Costello, 2005)

Rotated Factor Matrix^a

	Factor					
	1	2	3	4	5	6
Initiative for problem resolution	,765					
Responsibility in decision	,734					
Auto confident and determine	,680					
Resolution of problems with creativity	,675					
Open communication	,666					
Principles of Ethical Conduct	,658					
Share information and knowledge	,640			,578		
Organization task ahead	,592					
Information critical analysis	,579					
Use of equipment with knowledge	,559			,500		
Integration in team works	,510					
To be listen an taken into account						
Potential implication of problem resolution						
Conducting activities autonomously						
Physical Science		,937				
Radiobiology and Radiation Protection		,769				
Medical Science		,708				
Electronics and Clinical Instrumentation		,675				
Exams protocols		,610				
Projects and activities execution			,834			
Internal quality assessment measures			,769			
Rationalization measures			,746			
Innovative solutions proposal			,718			
Take measures in useful time						
Adherence to innovations and technology				,649		
Availability for research projects				,506		
Communication and Behavioural Sciences					,713	
Information Technologies					,543	
Management and Administration						

Factor loadings less than 0,5 are not displayed since they were suppressed.

The variables are listed in order of size of their factor loadings.

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 13 iterations.

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**Personality
Characteristics**



Knowledge



Management



Pro-activity



**Complementary
Knowledge**

Extraction Method: Principal Axis Factoring.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 13 iterations.

PHASE 4

MODEL TESTING

c) Reliability Analysis

Sub-scales	Cronbach's alfa	Internal Consistency
1. Personality Characteristics	0.918	Excellent
2. Knowledge	0.899	Good
3. Mangement	0.873	Good
4. Pro-activity	0.707	Good
5. Complementary Knowledge	0.746	Good



Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.7 \leq \alpha < 0.9$	Good

PHASE 5

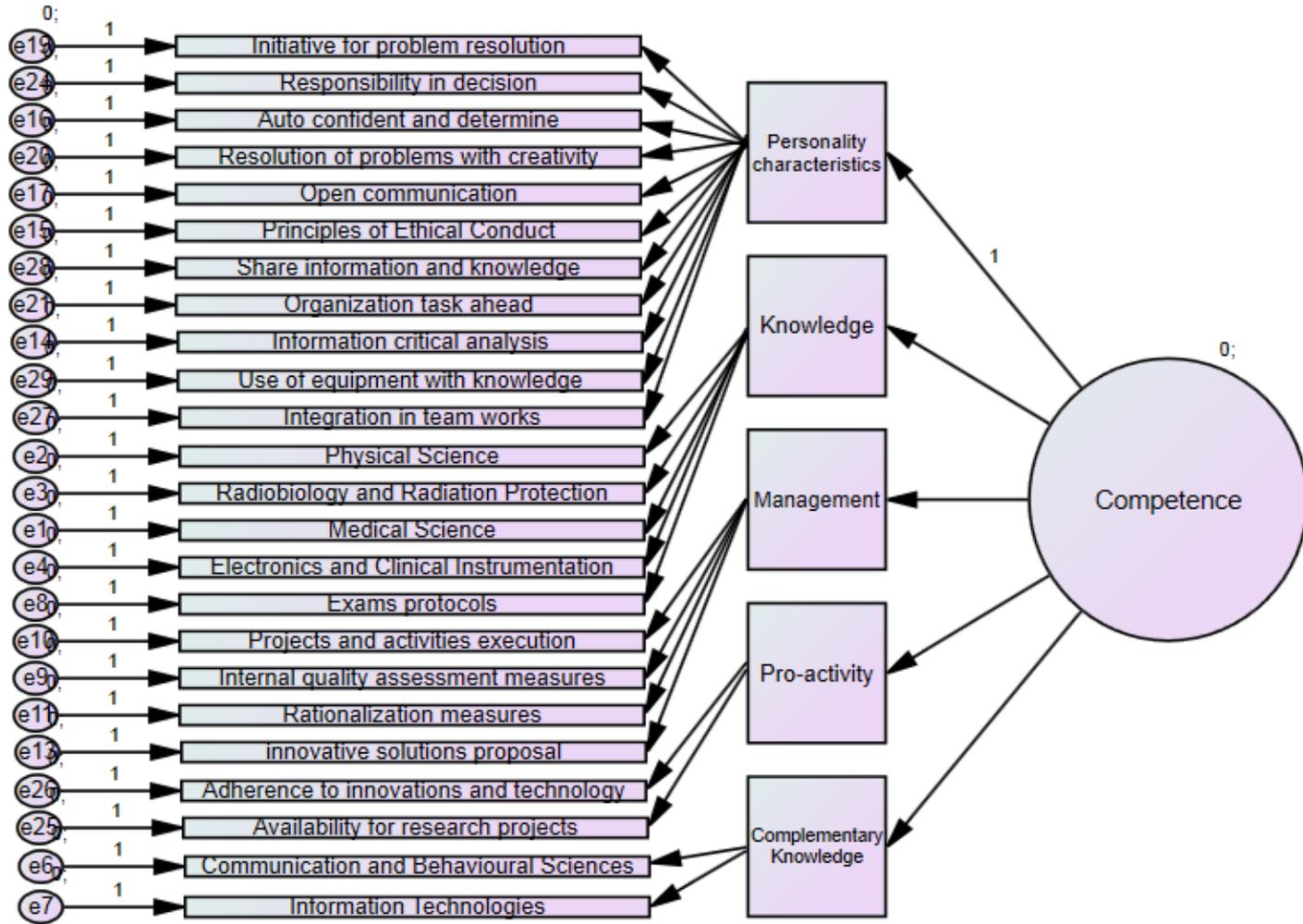
RESULT – NEW MODEL

5 variables that actually measure “competences” and the 5 ε -variables (measurement error of the item in question).

24 items - questions



Confirmatory
Factorial
Analysis



Conclusions

- SEM is a collection of tools for analysis connections between various concepts in cases where these connections are relevant either for expanding our general knowledge or for solving some problems.
- Factor analysis technique reduces the large number of variables into few underlying factors to explain the variability of the group characteristics. The concept used in factor analysis technique is to investigate the relationship among the group of variables and segregate them in different factors on the basis of their relationship.
 - ✓ From a TA point of view, it might be interesting to develop a questionnaire that could “measure” the respondents “competences” for a *possible* connection to the decision-making process characterization.

Conclusions

Different applications:

- Social Sciences (assess personality, motivations...)
- Economics (analyse productivity, profits, workforce...)
- Politics (factors affecting decision-making....)
- Health Sciences (relation between stress and low birth weight...)
-



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Questions ?

Thank you.....

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