INTERNAL CONSISTENCY DETERMINATION FOR QUESTIONNAIRES DESIGNED TO EVALUATE STAKEHOLDERS SATISFACTION IN TECHNICAL HIGHER EDUCATION

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ABSTRACT
The accelerate rhythm in which the society develops along with the new generations that leave their mark on it, bring on major changes in all fields. Do to the fact that education is the main supplier of „raw material” for a high ranking society, a particular higher interest should be upon how change is managed in higher education units.

The objective of this scientific paper is to determine if the questionnaires prepared to evaluate the stakeholders’ satisfaction in technical Higher Education are reliable and have good internal consistency. By validating these attributes, the results regarding the degree of satisfaction obtained based on the responses received, are used to establish the factors that require change in Technical Higher Education.

Keywords: quality, satisfaction, education

1. INTRODUCTION
For the higher education units to survive in this more and more unsecure, changing and challenging environment that it’s dealing with nowadays, universities should not only identify an achievable number of good ideas for change. They should also make them possible to achieve and sustain in case they remain viable. This will be the opportunity to bring together what must be changed and how it must be changed, fact that will decide each university’s future. [1]

In order to be able to find what changes need to be done in Technical Higher Education, 3 sets of questionnaires have been made in order to evaluate the stakeholders’ satisfaction towards the way things are going at the moment.
The questions found in the research tools refer to the satisfaction regarding the work environment, classrooms and laboratories equipment, financial resources, professional development opportunities, external environment and so on.

After establishing the eloquent questions the research tools need to have, they were sent to the teachers, students and employers from different places of the country.

When the answers have been gathered, an internal consistency test was requested in order to find out if the items of research tools were relevant.

For this type of research tools the most reliable and used way to determine the internal consistency is by calculating the value of the Cronbach-Alfa coefficient.

2. THE STRUCTURE OF THE QUESTIONNAIRES

In this study, a series of 3 questionnaires were developed and distributed directly to the stakeholders in the Technical Higher Education, represented by teachers, students and employers.

The questionnaires for teachers and students have been distributed to five Technical Universities from Romania, as it follows: Politehnica University of Bucharest, Politehnica University of Timișoara, Technical University of Cluj-Napoca, Transilvania University of Brașov and “Gheorghe Asachi” Technical University of Iași.

The structure of the questionnaires is presented in the table below:

<table>
<thead>
<tr>
<th>Questionnaire structure</th>
<th>Teachers</th>
<th>Students</th>
<th>Employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of questions</td>
<td>33</td>
<td>46</td>
<td>17</td>
</tr>
<tr>
<td>Number of questions with „Yes”/„No”/„I don’t know /I don’t answer” answers</td>
<td>23</td>
<td>35</td>
<td>9</td>
</tr>
<tr>
<td>Number of questions with different answers</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Number of questions regarding the respondent’s identification</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 1. Questionnaires structure

<table>
<thead>
<tr>
<th>3 answer option questionnaires</th>
<th>6 answer option questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>Students</td>
</tr>
<tr>
<td>Number of sent questionnaires</td>
<td>489</td>
</tr>
<tr>
<td>Number of answers received</td>
<td>147</td>
</tr>
<tr>
<td>Number of validated answers</td>
<td>136</td>
</tr>
<tr>
<td>Number of invalidated answers*</td>
<td>11</td>
</tr>
</tbody>
</table>

*the invalidation was due to the absence of answer to at least one question
Although the questionnaires were sent to a big number of recipients, only a certain percentage among them took their time to answer.

Table 3. Received answers percentage reported to the number of sent questionnaires

<table>
<thead>
<tr>
<th></th>
<th>3 answer option questionnaires</th>
<th>6 answer option questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>27.81%</td>
<td>13.49%</td>
</tr>
<tr>
<td>Students</td>
<td>24.59%</td>
<td>8.74%</td>
</tr>
<tr>
<td>Employers</td>
<td>26.81%</td>
<td>7.26%</td>
</tr>
</tbody>
</table>

3. CRONBACH-ALFA INTERNAL CONSISTENCY ANALYSIS

One of the required conditions of a research tool is to be consistent and reliable. Otherwise said, the items from which it’s composed (questions or statements as in the present paper) must correlate, each one, with the additional result of all the items (the scale, the global score).

The questions and items of a research tool are designed to measure a certain attribute (attitude, factor, behaviour, knowledge). The internal consistency is defined as the property of the items to correlate with the „global score” of the research tool or scale they belong to. Since all the items must reflect a certain attribute, they have to develop a common way, correlate with each other and, at the same time individually correlate with the score that reflects that attribute. The correlation between an item and the total score, from which that item is omitted, gives us information regarding the relevance of that item to the global result of the test. When each item is relevant, we can allege that the research tool has „internal consistency”.

The Cronbach-Alfa internal consistency can take values between 0 and 1, where 0 indicates that the research tool only measures random errors, having nothing to do with the real score, and 1 indicates that the research tool measures only the real score, random errors being completely eliminated.

To be considered consistent, a scale must overcome the 0, 60 value which is accepted as lowest limit by most researchers.

One of Cronbachs’ Alfa coefficient formula is:

$$\alpha = \frac{n*r}{1+r(n-1)} \quad \ldots(1)$$

Where: n – number of items and r – average correlation coefficient between items. [2]

In the present paper, the Cronbach-Alfa internal consistency was determined using the SPSS (Statistical Package for the Social Sciences) software.

In order to use the software, numerical values have been assigned to the answer options as it follows:

„Totally disagree” - 1
„Partially disagree” - 2
„Totally agree” - 3
„Partially agree” - 4
„I don’t know” - 5
„I don’t answer” – 6

The variables must contain values that express the importance of the answer reported to the global scale and not to the actual response of the subject. For example, if the answer options are coded with 1 and 2, there can be questions for which „1” brings one point to the scale and „2” brings zero points to the scale. Conventional codes of the answer options will be transformed into values, depending on their contribution for building the global score.
After assigning a value to each answer, the obtained input was introduced into the SPSS software. After the necessary settings were made in order to determine the value of the internal consistency, the software offers us the following output:

![Figure 1. Cronbach-Alfa value for the teachers' questionnaire](image)

In figure 4 we see that the value of Cronbach-Alfa is 0.766, which puts it within the accepted limits and indicates that the designed research tool has internal consistency and its items are correlated.

Further, the software generates the following two figures:

![Figure 2. Value analysis for the teachers' questionnaire](image)

![Figure 3. Cronbach's value if items eliminated for the teachers' questionnaire](image)
In table 5 are presented the descriptive indicators, the average value and the standard items deviation. The value analysis highlights the central tendency as well as the answers spread area for each item.

Table 9 presents a set of descriptive statistic indicators, wide scale, that give information about the correlation between the item and the global score and Cronbach’s value if one item is deleted. Analyzing the table, we see that only one item (I4) has negative correlation with the global score. This shows that it doesn’t bring useful information regarding the measured attribute but rather goes in a different direction. First of all it’s necessary to check if the items values have been properly encoded. If so, the only possible solution is to eliminate the item. From this output we can also see that item 23 has very low correlation with the global score (0,021), indicating that this item neither hurts or helps.

The same procedure has been applied to the questionnaires distributed to students and employers for which the software provided the following Cronbach values:

![Figure 4. Cronbach-Alfa value for the students’ questionnaire](image)

![Figure 5. Cronbach-Alfa value for the employers’ questionnaire](image)

As shown in figures 4 and 5, Cronbach’s value overcomes the accepted lowest limit of 0,60.

Because all of Cronbach’s values overcome the lowest limit of acceptability, we can claim that all the questionnaires are well set and have good internal consistency, which makes them reliable for the research.

5. CONCLUSIONS

Using the questionnaire as a research tool, a relevant confirmation was required to be done regarding their construction, if they are constant and valid and if they can be use as base support. As a result of the internal consistency analysis, Cronbach’s value has been situated above the 0,6 limit of acceptability, for all the research tools designed to evaluate the stakeholders satisfaction in the Technical Higher Education, as it follows:

- Cronbach’s value for teacher’s questionnaire - 0,766
- Cronbach’s value for students’ questionnaire - 0,776
- Cronbach’s value for employers’ questionnaire - 0,654.

By all determinations, the degree of confidence regarding the questionnaires has been verified and that makes them safe to use in further research.
6. REFERENCES

7. ACKNOWLEDGEMENT
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