

## **INCREASING KNOWLEDGE ABOUT FACTORS OF QUALITY OF EDUCATION**

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### **ABSTRACT**

*This article presents a study of an important attribute that influences students' perception of quality of education – their own study results. The influence of this attribute on the perceived quality of education is examined by formulating hypothesis and statistical processing of data acquired by means of a survey among graduates. The hypothesis consisted of two researched attributes – study results of students, and graduates' satisfaction with their studies. Questions concerning the second attribute were formulated using methods for calculation of the customer satisfaction index. Statistical examination proved dependence of these two attributes.*

**KEYWORDS:** quality of education, students' results, relation, university, survey

### **INTRODUCTION**

The quest for continued increase in quality of higher education in the EU has taken the form of various national and international legal measures – guidelines, directives and laws. As a part of the activities based on the Bologna declaration, the ESG (European standards and guidelines) were created in 2005. ESG rules and principles of quality are divided into three areas (ENQA, 2005) - ESG for internal quality assurance within higher education; ESG for external quality assurance of higher education; ESG for external quality assurance agencies.

Slovak republic (among others) adopted the ESG as a standard that has to be met by all higher education institutions that seek to be accepted into the category of “university“ (Slovak higher education system consists of

the following categories: college, vocational university, university) (NRSR, 2013). The adoption of the ESG is rooted in the basic higher education legislation – the Higher Education Act No. 131/2002 that became effective in January 2013.

An important part of the ESG stipulates that a higher education institution must create mechanisms that make possible the identification of areas for improvement of educational activities of the institution (HRNČIAR, 2012). These mechanisms must help measure, analyse and improve the quality of provided education. This article presents the results of a project that measured and analysed quality of education at a higher education institution.

## **1 PROBLEM DEFINITION**

Imbalance in the job market in Slovakia decreases the ability of university graduates to find a job (ZVALOVÁ, SRNÁNKOVÁ, & HRUŠOVSKÁ, 2008). Attempts to tackle this issue are primarily concerned with two areas: the job market with its needs and the structure of education and its quality (KLEŠTINCOVÁ, 2011). However, less attention is paid to finding reasons of low quality of education in the interanl environment of a university. If we realise that the customer of a university is the student who is co-producing the service (SANDMAUNG, 2013), then we may suppose that the student's attitude toward her study significantly affects how she perceives the quality of her education.

However, is there a provable relation between the “quality“ of students and the quality of education?

The answer to this question can be found by conducting a survey among graduates. Conducting a survey among students would carry with it a high risk of subjectivity stemming from the perception of their actual, not yet completed study. Graduates, however, are the most important interested party in the system of higher education because they occupy a position between the environment of a university and that of real-life working experience, and some time has passed since they left school so they can evaluate the quality of their education objectively. Information obtained from graduates is of the utmost importance for the faculty. On one hand, this information provides feedback on the faculty's previous efforts, on the other hand, it affects the course of education and the setup of its attributes.

## **2 METHODS**

### **2.1 Form and characteristics of research**

The survey was conducted as an electronic questionnaire. The questionnaire was structured in accordance with recommendations for conducting a survey presented in relevant literature (GAVORA, 2010). Nowadays, electronic questioning has become the most effective way of conducting a survey (GIDEON, 2012), therefore, our survey was conducted in this way, as well. An up-to-date database of graduates from the Faculty of Management Science and Informatics was used to approach the subjects.

### **2.2 Hypothesis**

Since this survey was sociological in nature, formulation of hypothesis followed the approach taken in sociological sciences that postulates two variables required to build a hypothesis (GAVORA, 2010). One variable consists of only two options (e.g., yes/no), the other can be measured using a nominal, ordinal or cardinal scale

(NENADÁL, 2004). Based on these rules, the following hypothesis was constructed in order to examine the influence of students' results on the quality of their education.

*Students with above-average results achieved during their study (A1) were more satisfied with the quality of their education (A2).*

### 2.3 Attributes of survey

The hypothesis consists of two attributes – A1 and A2. What follows is their description and division into questions.

#### 2.3.1 Attribute “A1” - students with above-average results achieved during their study

The questionnaire used a Likert scale ranging from 1 – very bad results during one's study, to 7 – very good results during one's study. Respondents used this scale to present the results they thought they had achieved during their study at the faculty. The values were made into per cent according to the following relation (GRAUZEL, 2003):

$$V_{\%} = (V_N - 1) * \frac{100}{D - 1}, \quad \text{where} \quad \begin{array}{l} V_N \text{ is the measured value on the scale} \\ D \text{ is the range of the scale (7 values)} \end{array}$$

#### 2.3.2 Quality of education – Satisfaction with education

The attribute of satisfaction with education and its division into questions were based on methods used to measure customer satisfaction (GRIGOROUDIS & SISKOS, 2010). Here it is necessary to know the essential factors that affect satisfaction of customers (in this case students) and then to formulate questions that ask not only about satisfaction with these factors but also about their importance. After obtaining the data it is possible to calculate an index of satisfaction according to the following formula (GRIGOROUDIS E. S., 2010):

$$CSI = \sum \left( \frac{w_i}{\sum w_i} * s_i \right), \quad \text{where} \quad \begin{array}{l} w - \text{weight (importance) of part of quality} \\ S - \text{satisfaction with part of quality} \\ i - \text{number of part of quality} \end{array}$$

7-level Likert scale with verbal interpretation was used for filling in the values for weight (importance) and satisfaction. Thereafter, the values were changed into per cent according to the relation described in the previous chapter. The attribute of satisfaction with study A2 was divided into seven questions where respondents were supposed to fill in the values of weight (importance) and satisfaction: atmosphere at the faculty, expertise of the teaching staff, pedagogical abilities of the teaching staff, technical equipment for the classes, support for creativity of the students, individual approach to students and structure of subjects.

## **2.4 Processing of data**

The data was processed using the SPSS Statistics statistical software. First of all, the two most often used tests - Kolmogorov-Smirnov and Shapiro-Wilk tests were carried out to test the distribution (SÁ, 2007). Based on the results of these tests, appropriate statistical approaches were chosen to test the hypothesis.

## **3 RESULTS**

243 valid questionnaires were obtained in the survey. Respondents consisted of graduates of the Faculty of Management Science and Informatics, classes of 1997-2012. The return rate was 54,4%. Average results of the graduates achieved during their study reached the level of 65,8% with standard deviation of 17,9. Index of satisfaction calculated according to the abovementioned method reached the value of 66,7%. The first assumption for testing the hypothesis was met: students with above-average results achieved during their study (more than 65,8% rate of success) were more satisfied with their study than students with below-average results achieved during their study – 70,8% vs. 79,1%. Examination presented in the following chapters will show whether this difference is statistically significant.

### **3.1 Test for normality of data**

In order to test the hypothesis, it was necessary to apply the right method with respect to data distribution – usually, normal distribution is presupposed. Good mentions the Kolmogorov-Smirnov and Shapiro-Wilk tests as two of the most often used methods for testing. Of course, only the data for attribute A2 CSI (Customer satisfaction index) was tested since it is „numeric“. The data for attribute A1 – results achieved during study – was changed into „string“ on two levels based on whether the case was above or below the calculated mean (65,8%). Results of the testing are presented in Table 1 and Figure 1.

The tests thus showed that the data has normal distribution. Therefore, as recommendations suggest (GOOD, 2005), the following examination is based on parametric methods. We chose Student's t-test. There are, however, two types of this test: Two-Sample Assuming Equal Variances and Two-Sample Assuming unequal Variances (SÁ, 2007). In order to choose one of them, it is necessary to conduct a variance analysis.

### **3.2 Variance analysis**

The sample dataset was divided into two sets according to mean values for achieved results. The first group (variable1) consisted of students with below-average results, the second group consisted of students with above-average results. A Two-Sample F-Test for Variances was used to analyse the variance of these two sets showed on Table 2. Since  $F < F_{\text{Critical}}$ , we can say that both sets are equal with respect to their variance and so we can use the t-Test: Two-Sample Assuming Equal Variances.

### **3.3 Hypothesis testing**

After conducting the above analysis, we could test the hypothesis using Student's t-test. The hypothesis was: *“Students with above-average results achieved during their study (A1) were more satisfied with the quality of their education (A2).”* Results of hypothesis testing are in Table 3. Since  $t_{\text{Stat}} > t_{\text{Critical}}$  (one-tail or two tail), we can say that the difference between the two sets is marked and so the hypothesis is proved.

## **4 DISCUSSION AND RECOMMENDATIONS**

Our assumption that the results achieved during one's study affect the perceived quality of one's education (through satisfaction) was proved. In areas devoted to management of quality of services, it is necessary to know the unique characteristics of those services and then to adjust the processes providing those services. In the field of education, the unique characteristic of customers' participation on creating the value of the service is substantial. Therefore, if someone speaks about students' satisfaction with their study – i.e., the quality they perceived, it is necessary to also bear in mind the “structure“ of those students. Students who achieved worse results during their study tend to perceive a lower quality of their education.

Every analysis of a university's performance should pay attention not only to mean values obtained by analyses or surveys, but also to the degree of variability of the examined sign of quality. If the degree of variability is too high, it may be a consequence of a substantial feature that was not taken into account – for instance, the effect of study results achieved by students, participation in student mobility, the study programme, etc. A well structured examination (analysis) of a university's performance may provide valuable information needed to plan improvements that should increase the satisfaction of all interested parties of the university.

## **CONCLUSION**

The aim of this article was to prove the relation between results achieved by students during their study and the perceived quality of education, using the customer satisfaction index (CSI). Taking into account recommendations from relevant literature, we specified the problem to be solved and prepared the structure of the research. Statistical examination proved the effect of results achieved by students during their study on the perceived quality of the education they received.

Every organisation providing services is part of a close and a distant external environment (HITTMÁR, 2006). By analysing the close environment with the customer as its part, one can obtain information that may be useful from the phase of designing a service through to the phase of its realisation. Analysis of unique characteristics of concrete services is seldom made as a means to increase quality of services, even though the potential of this type of analysis for an organisation is very big (DUDINSKÁ, 2009). However, this approach makes it possible to find areas for improvement also in the field of education.

## **REFERENCES**

- [1] DUDINSKÁ, E. B. (2009). *Analýzy v marketingovom plánovaní*. Prešov: Vydavateľstvo Michala Vaška.
- [2] ENQA. (2005). *Standards and Guidelines for Quality Assurance in the European Higher Education Area*. Helsinki: ENQA.
- [3] GAVORA, P. K. (2010). *Elektronická učebnica pedagogického výskumu*. Bratislava: Univerzita Komenského.
- [4] GIDEON, L. (2012). *Handbook of Survey Methodology for the Social Sciences*. New York: Springer.
- [5] GOOD, P. I. (2005). *Permutation, Parametric, and Bootstrap Tests of Hypotheses*. New York: Springer.
- [6] GRAUZEL, J. H. (2003). *Kvalita a jej miesto v organizácii*. Žilina: EDIS.
- [7] GRIGOROUDIS, E. S. (2010). *Customer Satisfaction Evaluation*. New York: Springer.
- [8] GRIGOROUDIS, E., & SISKOS, Y. (2010). *Customer Satisfaction Evaluation*. New York: Springer.
- [9] HITTMÁR, Š. (2006). *Manažment*. Žilina: EDIS.

- [10] HRNČIAR, M. (2012). Quality of education - a condition for the employability of graduates. In V. M. TAMÁŠOVÁ (Ed.), *Quality Management System of Universities and the Quality of Education* (s. 161-167). Baja: Eotvos Jozsef College.
- [11] KLEŠTINCOVÁ, L. (2011). *Spájame vysoké školy s trhom práce*. Bratislava: Inštitút hospodárskej politiky.
- [12] NENADÁL, J. (2004). *Měření v systémech managementu jakosti*. Praha: Computer Press.
- [13] NRSR. (2013). *Zákon č. 131/2002 Z.z. o vysokých školách*. Bratislava: IURA EDITION.
- [14] SÁ, J. P. (2007). *Applied Statistics Using SPSS, STATISTICA, MATLAB and R*. Berlin: Springer Berlin Heidelberg.
- [15] SANDMAUNG, M. K. (2013). Quality expectations in Thai higher education institutions: multiple stakeholder perspective. *21*(3).
- [16] ZVALOVÁ, M., SRNÁNKOVÁ, Ľ., & HRUŠOVSKÁ, J. (2008). *Uplatnenie absolventov vysokých škôl v praxi*. Bratislava: ÚIPŠ.

Table 1 Results of normality test

		Kolmogorov-Smirnov	Shapiro-Wilk
<b>A2 – CSI</b>	Critical value	0,025	0,023
	Calculated value	0,075	0,981
	Result	0,025 < 0,075 = Data shows NORMAL distribution	0,023 < 0,981 = Data shows NORMAL distribution

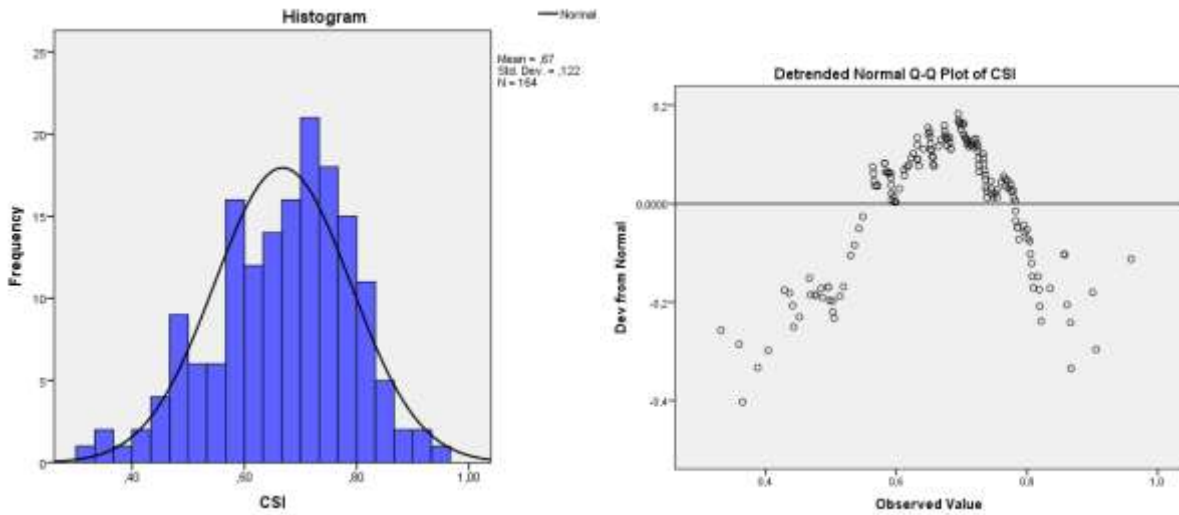


Figure 1 Graphical interpretation of normality test

Table 2 Two-Sample F-Test for Variances

	Variable 1	Variable 2
Mean	70,77809	79,08084
Variance	271,1704	251,55
Observations	64	90
df	63	89
F	1,077998	
P(F<=f) one-tail	0,368648	
F Critical one-tail	1,459628	

Table 3 Student's t-test

Pooled Variance	259,682
Hypothesized Mean Difference	
df	15
t Stat	3,15102
P(T<=t) one-tail	0,0009
t Critical one-tail	1,6549
P(T<=t) two-tail	0,0019
t Critical two-tail	1,97569