Measuring intellectual performance

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CHRONICLE	ABSTRACT
	This paper presents an empirical investigation to study the status of intellectual capital at Islamic Azad Univeristy, Qods branch. The survey uses the questionnaire developed by Roos and Roos (1997) [Roos, G., & Roos, J. (1997). Measuring your company's intellectual performance. *Long range planning*, 30(3), 413-426.]. The results have detected that human capital, structural capital and physical capital are within desirable level although physical capital plays the most important role followed by structural capital and human capital. The survey did not find any evidence to believe that participants' personal characteristics had any impact on our survey. Finally, the study has detected positive relationship among three components of the survey. In terms of physical capital, our participants believed that university officials must increase the speed of internet.

1. Introduction

Intellectual capital is getting important measure of the organization's future performance. It is therefore necessary that indicators and measures would be developed, to help managers handle this variable more efficiently (Petty & Guthrie, 2000; Guthrie & Petty, 2000; Brennan, 2001; Beattie & Thomson, 2007). Roos and Roos (1997) reported the results and conclusions from a large study among small and medium sized enterprises in Scandanavia. Tai and Chen (2009) presented a new evaluation model for intellectual capital based on computing with linguistic variable. They proposed a suitable model for intellectual capital performance evaluation by combining 2-tuple fuzzy linguistic method with multiple criteria decision-making (MCDM) method. The method was feasible to manipulate the processes of evaluation integration and prevent the information loss, effectively. Based on the proposed model, its feasibility was shown by the result of intellectual capital performance evaluation for a high-technology company in Taiwan.

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Wagiciengo and Belal (2012) investigated the extent and nature of intellectual capital disclosures in 'Top 20' South African companies over the period 2002–2006. They applied content analysis method to scrutinize the patterns of intellectual capital disclosures and reported that intellectual capital disclosures in South Africa had increased with certain firms reporting substantially more than others had.

2. The proposed study

The proposed study of this paper considers all students, regular employees and regular employees who worked for Islamic Azad University, Qods branch. The proposed study of this paper studies the characteristics of three university capitals, namely, physical capital, structural capital and human capital. The study uses the questionnaire developed by Roos and Roos (1997) to measure firm's intellectual performance. The sample size of this study is chosen as follows,

$$n = \frac{N \times z_{\alpha/2}^2 \times p \times q}{\varepsilon^2 \times (N-1) + z_{\alpha/2}^2 \times p \times q}, \tag{1}$$

where N is the population size, $p = 1 - q$ represents the yes/no categories, $z_{\alpha/2}$ is CDF of normal distribution and finally ε is the error term. Since we have $p = 0.5, z_{\alpha/2} = 1.96$ and N=16685, the number of sample size is calculated as n=429. In our survey, 48.5% of the participants were single and 51.5% of them were married. In addition, 65.3% of the participants were male and 34.7% of them were female. Fig. 1 shows details of other personal charactersitics of the participants in our survey.
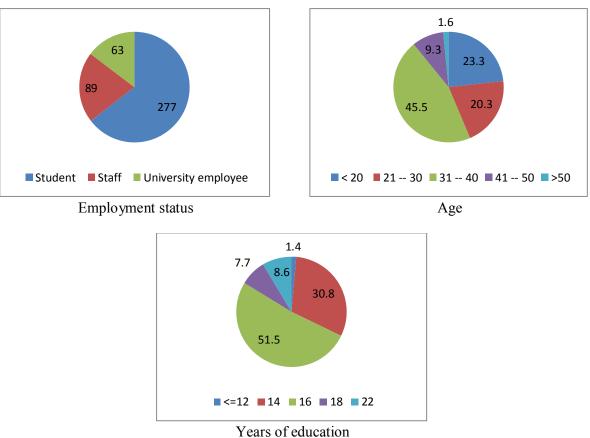

Employment status

Age

Years of education

Fig. 1. Components of the sample size

Based on the results of Fig. 1, most people were middle aged mostly students and maintained some university education.

3. The results

In this section, we present details of the survey on testing various hypotheses of the survey.

3.1. The first question: The status of different capitals

The first question of the survey studies the status of various components of capital at Islamic Azad University, Qods branch. Table 1 demonstrates the results of our survey.

Table 1
The summary of t-student on intellectual capital components

Intellectual capital	t	df	Sig.	Mean difference	95% confidence interval	
					Min	Max
Physical capital	13.890	428	.000	6.31304	5.1728	7.4532
Structural capital	11.041	428	.000	5.77971	4.9701	6.5893
Human capital	9.512	428	.000	3.90725	3.2930	4.5215

The results of Table 1 indicate that all components are within an acceptable level and we perform Freedman test to rank various components and they are summarized in Table 2 as follows,

Table 2
The summary of Freedman test

Hypothesis	Mean Rank
Physical capital	2.26
Structural capital	2.19
Human capital	1.54

Number = 429,   Chi-Square = 141.558,   df = 2, Sig. = 0.000

As we can observe from the results of Table 2, physical capital plays the most important role followed by structural capital and human capital.

3.2. The effect of personal characteristics on intellectual capital

In this section, we present details of our survey on investigating the effects of various factors on intellectual capital such as age, gender, marital status, etc.

3.2.1 The effect of employment status

The first question of the survey is associated with relationship between employment status of the people who participated in our survey and intellectual capital. Table 3 demonstrates the summary of ANOVA test.

Table 3
The summary of ANOVA test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	68.297	39	1.751	4.130	.000
Within Groups	164.953	389	.424		
Sum	233.249	428			

As we can observe from the results of Table 3, employment stats does not play important role on their responses on different question of the survey.

3.1.3. The effect of gender

The next question of the survey is associated with the effects of gender on intellectual capital. We first look at some basic statistics such as mean and standard deviation of the participants in term of their genders.

Table 4
The summary of mean and standard deviation of the participants in terms of their gender

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	280	1.08762	16.80048	1.00402
Female	149	1.17952	11.48285	.94071

Table 5
The summary of testing the effect of gender

		Levene's Test nces		t-test for Equality of Means					95% Confidence Interval	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Assumption	Equal variances assumed	10.898	.001	-5.978	427	.000	-9.19588	1.53830	-12.21945	-6.17230
	Equal variances not assumed			-6.684	401.1	.000	-9.19588	1.37586	-11.90068	-6.49108

As we can observe from the results of Table 4 and Table 5, there is no meaningful difference between gender and intellectual capital. In other words, gender does not play essential role in our survey.

3.1.4. The effect of marital status

Another question of the survey is associated with the effects of marital status on intellectual capital. Again, we first present some basic statistics such as mean and standard deviation of the participants in term of their marital status.

Table 6
The summary of mean and standard deviation of the participants in terms of their marital status

Gender	N	Mean	Std. Deviation	Std. Error Mean
Single	208	1.1441E2	12.77536	.88581
Married	221	1.0963E2	17.87015	1.20208

Table 7
The summary of testing the effect of gender

		Levene's Test nces		t-test for Equality of Means					95% Confidence Interval	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Assumption	Equal variances assumed	9.692	.002	3.170	427	.002	4.77998	1.50795	1.81605	7.74390
	Equal variances not assumed			3.201	398.816	.001	4.77998	1.49320	1.84445	7.71551

The results of Table 6 and Table 7 show that there was no meaningful difference between marital status and intellectual capital. In other words, marital status does not play essential role in our survey.

3.1.5. The effect of age

The other question of the survey is associated with the effects of age on intellectual capital and this is accomplished through the implementation of ANOVA test as follows,

Table 8
The summary ANOVA test on the effect of age on intellectual assets

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	253.111	39	6.490	14.398	.000
Within Groups	175.342	389	.451		
Sum	428.452	428			

The results of Table 8 show that age does not make any difference on this survey.

3.1.6. The effect of job experience

The last question of the survey in this part is associated with the impacts of job experience on intellectual capital and this is accomplished through the implementation of ANOVA test as follows,

Table 9
The summary of ANOVA test for job experience

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	257.239	39	6.596	21.639	.000
Within Groups	118.570	389	.305		
Sum	375.809	428			

As we can observe from the results of Table 9, job experience does not have any impact on this survey.

3.3. The relationship between different intellectual capital

In this section, we study the relationship between different components of intellectual capital. Table 10 shows details of our findings on relationship between various components.

Table 10
The summary Pearson correlation ratio

		Physical capital	Structural capital	Human capital
Physical capital	Pearson Correlation	1	.424[**]	.242[**]
	Sig. (2-tailed)		.000	.000
	N	429	429	429
Structural capital	Pearson Correlation	.424[**]	1	.497[**]
	Sig. (2-tailed)	.000		.000
	N	429	429	429
Human capital	Pearson Correlation	.242[**]	.497[**]	1
	Sig. (2-tailed)	.000	.000	
	N	429	429	429

**. Correlation is significant at the 0.01 level (2-tailed).

The results of Table 10 show that there are some positive and meaningful relationships between different components of the intellectual capital when the level of significance is one percent.

4. Conclusion and discussion

In this paper, we have presented an empirical investigation to study the status of intellectual capital at Islamic Azad Univeristy, Qods branch. The study has detected that human capital, structural capital and physical capital are within desirable level although physical capital plays the most important role

followed by structural capital and human capital. The survey did not find any evidence to believe that participants' personal characteristics had any impact on our survey. Finally, the study has detected positive relationship among three components of the survey. In terms of physical capital, our participants believed that university officials must increase the speed of internet.

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