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APPLICABILITY OF TECHNOLOGY ADOPTION PROPENSITY INSTRUMENT FOR PUBLIC ADMINISTRATION STUDENTS

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Abstract

Understanding personal level technology acceptance contributes to improving social, business, and technological performance. The study deals with the technology adoption propensity (TAP) among public administration students. The goal is to explore their approach to new technologies and to test the instrument for further application. The responses show a moderate level of technology adoption propensity. Significant differences were found in the TAP index scores and the proficiency of technology use by gender, study level, and age categories. The analysis confirmed that the original factor structure of the instrument is suggested for further utilization of the model and allows international comparisons of the results.

Keywords: *technology adoption propensity, technology acceptance, factor analysis, public administration students*

1. Introduction

The diffusion of technological innovations largely depends on the acceptance of them by the users. The categories of Rogers (Rogers, 1995) describe users from early adopters to laggers. Obviously, the business goal of the producers is aiming to bring the use of the product or service forward in time; and to increase the number of users. It is to note that the mass of a novelty may lead to social benefits. Forcing the spread of new technology requires understanding the influencing factors on an individual level. Several models are available for predicting customer behavior and the acceptance of new technology (see *Table 1*). Quality evaluation models are presented in detail by Isaias and Issa (Isaias and Issa, 2016). A common limitation of the highlighted models is the focus on a given technology.
In a broader approach, the general approach to new technologies must be explored. Beyond the analysis of the technology readiness (Parasuraman, 2000; Parasuraman and Colby, 2014) by the TRI and TRI 2.0 methodology, a technology adoption propensity (TAP) index offers measures. TAP index is developed by Ratchford and Barnhart (Ratchford and Barnhart, 2012).
This paper uses TAP survey questions for analysis among Hungarian public administration students. Ratchford and Ratchford (Ratchford and Barnhart, 2021) used this scale to study 19 variety range of technology, including online travel, online purchase, online investment, online utility bill payment, video chat, and electronic security.

Table 1. *Models for evaluating technology acceptance (Based on Isaias and Issa, 2016)*

Model	Source	Details
Theory of Reasoned Action (TRA)	(Fishbein, 1967; Ajzen and Fishbein, 1980)	A generic model for the prediction and analysis of human behavioral choices. Relationships between beliefs and attitudes, attitudes and intentions Excessively compartmental view of behavioral intentions.
Theory of Planned Behavior (TPB)	(Ajzen, 1991)	Additions to TRA model. The concept of perceived behavioral control was introduced.
Task-technology Fit (TTF)	(Goodhue and Thompson, 1995)	The technology is more likely to be adopted the more compatible it is with the particular requirements of a task. TTF describes the relationship that exists between an individual's decision to adopt a technology and the extent to which the technology is adequate to perform the task that the individual needs to complete.
Technology Acceptance Model (TAM) & TAM2	(Davis, 1986; Venkatesh and Davis, 2000)	Framework for the study of user acceptance and its correlation with quality and system success. A description of relationships between the key subjective elements of user acceptance and behavior and objective (measurable) elements of use and adoption motivation is emphasized.
Unified Theory of Technology Acceptance and Use of Technology (UTAUT)	(Venkatesh et al., 2003)	A complex model that integrates other models' items and approaches.

The methodology defines four factors as motivators and inhibitors of technology acceptance (Ratchford and Barnhart, 2012):

- Optimism. The belief that technology provides a better life. It incorporates the perceived usefulness factor of TAM models. The index also refers to how technology enhances the respondent's life rather than how it enhances the lives of generalized others.
- Proficiency. The competencies to learn to use new technologies. Considering that performance depends on ability and intentions, proficiency can predict relevant information both to the technology developers and to the education system to find a focus.
- Dependence. The sense of being overly dependent on technology. Spending too much time with technology, especially info-communication tools, may have a harmful impact on personal life and contacts.
- Vulnerability. The belief that the use of technology can lead to harmful impacts, so increases distrust in it. Several forms of malicious activities are known; protection against these needs some skepticism.

2. Materials and methods

2.1. Research goal and methods

The aim of the study is to contribute to the knowledge base of technology management and understanding of technological diffusion by investigating the factor structure of the TAP index model. The research question can be formulated as whether the offered factor structure of the motivator and inhibitor factors (professionalism, proficiency, and dependence, vulnerability) can be confirmed among a selected sample.

Data collection used the TAP index questions were used in a voluntary online survey. The respondents were asked to evaluate the statements on a five-point scale where a higher value means greater agreement with the content of the statement. TAP index factor scores are calculated by the original methodology of Ratchford and Barnhart (Ratchford and Barnhart, 2012). TAP index score includes the inhibitor factors (dependence and vulnerability) reversed. The survey questions are presented in *Table 3* with along with the descriptive statistics. The impact of the groping factor was tested by ANOVA analysis. Principal component analysis with Varimax rotation was performed for dimension reduction based on the 14 questions of the survey. IBM SPSS software supported the analysis. The analysis follows the instructions of Pallant (Pallant, 2020) and Sajtos and Mitev (Sajtos and Mitev, 2007).

2.2. Research sample and limitations

The research sample consists of the responses from Hungarian Public administration students at the Ludovika University of Public Service. 136 tests are available from the data collection period in the fall semester of 2021. The sample composition is presented in *Table 2*. It is to note that the traditional 5-year education period is relevant in public administration higher education.

The main limitation of the study can be derived from the sample selection. The representativeness of the sample is not checked even for public administration students, and it cannot describe other professions.

We consider the study a pilot investigation that can be repeated among business, engineering, or art students to explore the differences in the patterns of their approach. However, the results cannot be generalized; the experience of the results allows a better understanding of technology adoption.

Table 2. *Sample composition*

Grouping factor	Value	%
Gender	female	44.9%
	male	55.1%
Full- or part-time	full-time	57.4%
	part-time	42.6%
Study level	bachelor	8.1%
	master	40%
	5-year education	85%
Age category	under 24	41.2%
	25−29	27.9%
	30−34	9.6%
	over 35	21.4%

3. Results and discussion

3.1. TAP index scores

The propensity to technology adoption among public administration students is at a moderate level, the TAP index score for the total sample is 3.04, and the standard deviation of the indicator is 0.404. Vulnerability and optimism scores show the highest values. According to vulnerability, this result means that the respondents are aware of harmful impacts by companies or other people through technology. This may hinder the acceleration of the spread of new solutions. Building trust in protecting the privacy and personal interest should receive a particular emphasis.

The descriptive statistics are summarized in *Table 3* (n = 136, the standard error for skewness is 0.208, the standard error for kurtosis is 0.413). It is to note that the table and the analysis show the measures values of inhibitor factors, but TAP index score uses them reversed. The factor scores are shown in *Figure 1*.

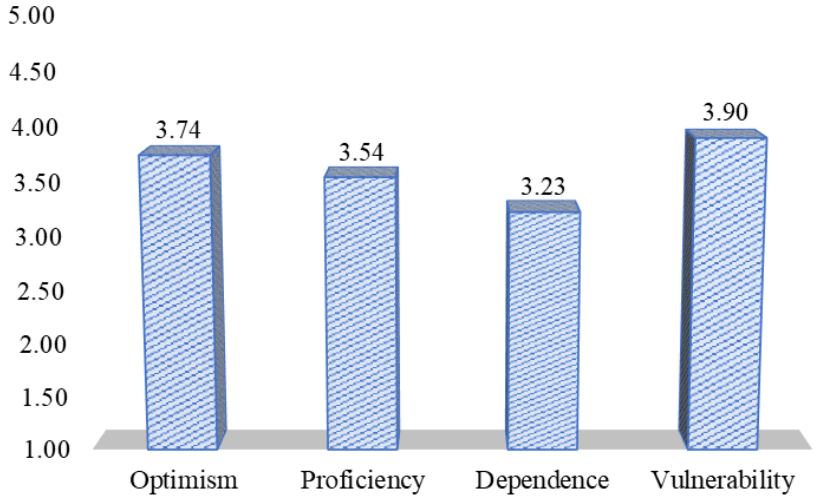

Figure 1. *TAP factor scores*

Table 3. *Descriptive statistics by TAP factors*

	Mean	Std. Deviation	Skewness	Kurtosis
Optimism	3.74	0.658	−0.122	−0.087
Technology gives me more control over my daily life	3.39	0.928	−0.123	−0.688
Technology helps me make necessary changes in my life	3.40	0.984	−0.084	−0.672
Technology allows me to more easily do the things I want to do at times when I want to do them	4.09	0.803	−0.860	1.129
New technologies make my life easier	4.10	0.739	−0.377	−0.404
Proficiency	3.54	0.804	−0.426	−0.231

	Mean	Std. Deviation	Skewness	Kurtosis
I can figure out new high-tech products and services without help from others	3.80	0.868	−0.707	0.348
I seem to have fewer problems than other people in making technology work	3.48	1.003	−0.497	−0.003
Other people come to me for advice on new technologies	3.01	1.183	−0.178	−0.799
I enjoy figuring out how to use new technologies	3.89	0.971	−0.564	−0.410
Dependence	3.23	0.829	−0.010	−0.564
Technology controls my life more than I control technology	3.35	1.098	−0.246	−0.764
I feel like I am overly dependent on technology	3.38	0.911	−0.240	−0.151
The more I use a new technology, the more I become a slave to it	2.95	1.150	−0.017	−0.912
Vulnerability	3.90	0.677	−0.142	−0.815
I must be careful when using technologies because criminals may use the technology to target me	4.14	0.879	−0.875	0.444
New technology makes it too easy for companies and other people to invade my privacy	3.96	1.017	−0.725	−0.202
I think high-tech companies convince us that we need things that we don't really need	3.60	1.028	−0.510	−0.451

The differences in results by the grouping factors were tested by ANOVA. Beyond the mean values of the factors and the TAP index scores, *Table 4* summarizes the significance test results. Proficiency and TAP index score *(Figure 2)* show significant differences by each grouping factor. Males, compared to females, and part-time students, who can be assumed to have more work experience compared to full-time students, are more proficient. According to the age categories, respondents between 30 and 34 years are the most proficient users, and their average TAP index score is remarkably highest than in other groups.

Table 4. *Descriptive statistics by TAP factors*

		n	Optimism	Proficiency	Dependence	Vulnerability	TAP
Total		136	3.74	3.54	3.23	3.90	3.04
Gender	female	61	3.79	3.25	3.28	3.92	2.96
	male	75	3.71	3.79	3.18	3.88	3.11
	F (sig.)		0.551 (0.458)	17.004 (0.000)*	0.453 (0.502)	0.138 (0.711)	4.708 (0.032)*
Full-time or part-time	full-time	78	3.79	3.32	3.32	3.99	2.95
	part-time	58	3.68	3.84	3.10	3.78	3.16
	F (sig.)		0940 (.334)	15.170 (0.000)*	2.209 (0.140)	3.116 (0.080)	9.158 (0.003)*

		n	Optimism	Proficiency	Dependence	Vulnerability	TAP
Study level	bachelor	11	3.68	3.48	2.82	4.06	3.07
	master	40	3.79	3.88	3.26	3.87	3.14
	5-year	85	3.73	3.40	3.26	3.89	2.99
	F (sig.)		0.182 (0.834)	5.139 (0.007)*	1.453 (0.237)	0.342 (0.711)	0.685 (0.189)
Age category	under 25	75	3.77	3.31	3.29	4.02	2.94
	25-29	19	3.62	3.72	3.25	3.75	3.09
	30-34	13	3.54	4.19	2.77	3.77	3.30
	35 or over	19	3.84	3.73	3.24	3.74	3.15
	F (sig.)		0.929 (0.429)	6.405 (0.000)*	1.503 (0.217)	1.876 (0.137)	4.313 (0.006)*

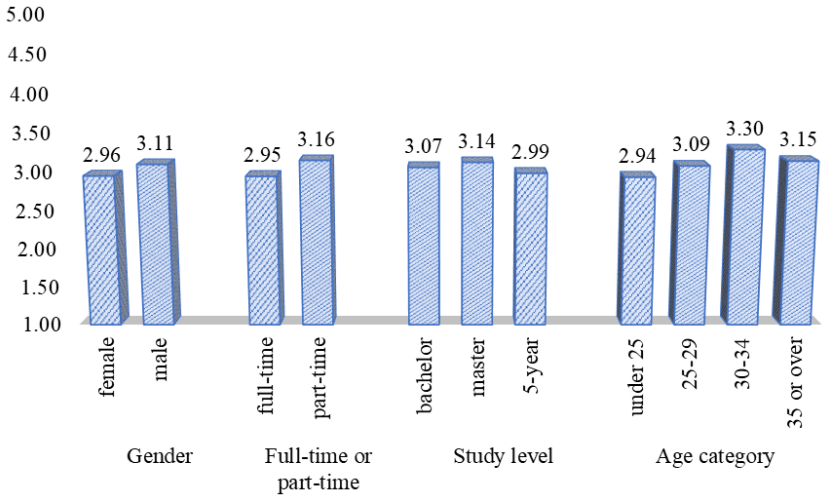

Figure 2. *TAP index scores by grouping factors*

3.2. Testing the factor structure

The study must be considered a pilot survey among public administration students. Interpretation of TAP index results and international comparison of the results can be ensured if the measuring instrument is valid. Of course, validation opportunities are limited based on this sample. According to the research question, the long-term utilization opportunities are at question. It is investigated to what extent the factors in the sample can represent the original factors. Principal component analysis was conducted for this purpose with Varimax rotation.

The reliability analysis confirmed (Cronbach's Alpha is 0.715 for 14 items) the applicability of factor analysis. KMO and Barrett's tests also support the analysis. KMO > 0.7 is average, and the significant value (0.000) in Bartlett's test shows that the correlation matrix is indeed not an identity matrix *(Table 5)*.

Table 5. *KMO and Bartlett's Test (SPSS output)*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.709**
Bartlett's Test of Sphericity	Approx. Chi-Square	580.152
	d_f	91
	Sig.	.000

The scree plot *(Figure 3)* suggest 4 or 5 factors, but the fifth factors eigenvalue is lower than 1. The total variance explained of the 4-factor solution is 63.14%, the 5-factor solution could give moderate increase in this vale at 69.01%. Based on the results, the 4-factor output can be accepted.

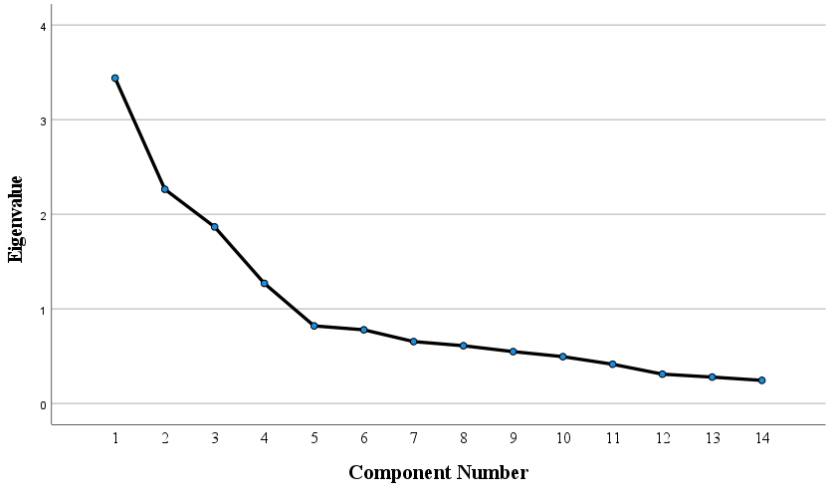

Figure 3. *Scree-plot of the analysis (SPSS output)*

The component matrix and factor structure are summarized in *Table 6*. The results clearly confirm the original factor structure; no deviation was found for any element:

- Component 2 covers Optimism,
- Component 1 covers Proficiency,
- Component 3 covers Dependence,
- Component 4 covers Vulnerability.

Table 6. *Rotated component matrix and factor composition*

Component:	**1**	**2**	**3**	**4**
Optimism				
…gives me control…	0.300	**0.664**	0.068	−0.016
…helps me make…changes…	−0.076	**0.78**	0.192	−0.079
…more easily do…things…	0.001	**0.804**	−0.157	0.241
…make my life easier	0.267	**0.685**	0.082	−0.126

Proficiency				
I can figure out…	**0.760**	0.191	−0.067	−0.005
…fewer problems…making [it] work	**0.871**	0.036	0.003	0.078
…people come to me for advice…	**0.881**	−0.032	0.052	0.034
I enjoy figuring out how to use…	**0.585**	0.368	0.116	−0.169
Dependence				
…controls my life…	−0.099	−0.001	**0.677**	0.430
…I am overly dependent…	0.113	0.349	**0.704**	−0.093
…I become a slave to it	0.037	−0.052	**0.857**	0.159
Vulnerability				
…criminals may…target me	0.051	0.368	−0.1	**0.693**
…invade my privacy	−0.007	−0.073	0.106	**0.63**
…things that we don't really need	−0.007	−0.174	0.295	**0.673**

4. Conclusion

In the era of fast-growing new technology, acceptance of new technology has become a hot topic of discussion among researchers and practitioners. This study examines the propensity for technology acceptance among 136 public administration students at the Ludovika University of Public Service. The TAP model, which consists of contribution factors (optimism and proficiency) and inhibiting factors (dependence and vulnerability), was used as a theoretical instrument. The study found that the technology acceptance propensity among public administration students is moderate. Meanwhile, vulnerability and optimism factors recorded the highest values.

The result also points out differences in proficiency between gender, modes of study, and age. Its shows that males student are more proficient than female students. The part-time groups are more proficient than full-time students, and those aged between 30−34 are the most proficient users. The findings will provide a valuable basis for policymakers and academicians to tailor the education system in line with the current industry needs.

According to the research question whether the original factor structure can be, the analysis shows a completely identical pattern to the official structure. Factor loadings of the questions are remarkably higher in the belonging factors than in others. Based on results, the applicability of the TAP index and the opportunity for international comparison of the results is confirmed.

The limitation is also made in this study because it only took a sample of 136 public administration students. Further studies should include students from another field of studies from another university around Hungary. Another direction that can be considered is to evaluate the public employee's technology acceptance propensity, allowing more intriguing findings.

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