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MS DYNAMICS NAV ACCEPTANCE BY BUSINESS STUDIES STUDENTS

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Abstract:

The labour market requires the knowledge and skills for usage of Enterprise Resource Planning (ERP) solutions from graduates of business studies – future employees. Because ERP solutions are the most frequently used business software in companies in all industries, more and more schools are using them in their courses. Teaching and practical work with these solutions require suitable teaching methods and because of this schools need to know what are the attitudes of students toward these solutions. The main objective of our paper is, therefore, the identification of important personal external factors that contribute to the acceptance of ERP solutions by students in economics and business and that shape their intentions to use this knowledge in the future. The conceptual model of our research is based on the Technology Acceptance Model (TAM), extended by identified important multidimensional external factors that refer to students' personal characteristics and information literacy. The conceptual model formed was tested using structural equation modelling. Research results revealed that only two external factors play an important role in shaping the attitudes towards acceptance of ERP solutions by students. Results of the study have important implications for higher education institutions using these solutions in their courses.

Keywords:

ERP solutions, TAM, economics and business' graduates, acceptance model.

***JEL*:** A2, H4

1 Introduction

Basic software for support of business activities today is referred to as ERP solutions. ERP is usually typically a suite of integrated modules that an organization can use to collect, store, manage and interpret data from business transactions conducted in business processes/activities. ERP solution provides an integrated and continuously updated view of core business processes using common database which is single source of business data for all employees. The term ERP was defined by consulting company Gartner Group more than 25 years ago. A number of ERP implementations and because of that also a number of ERP users within organizations is growing very fast as well. While number of ERP solution user is growing, a lot of research studies regarding ERP user adoptions/acceptance are emerging (for example see Costa et al., 2016, Sternad Zabukovšek et al., 2019). On that point, technology acceptance is an important concept to adopt users' behaviour towards new IT/IS (Turan et al. 2015). In this area, TAM is one of the most suitable and widely used model to study adoption of information systems (IS)/information solutions (Shih & Huang, 2009; Sternad et al., 2011; Costa et al., 2016) and therefore numerous IS/IT researchers apply this method to ERP research.

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The importance of ERP solutions for companies has been researched in several studies as well as importance of user acceptance of ERP solutions. The importance of ERP solutions for study programmes has not been researched with similar intensity and also factors which influence acceptance of ERP solutions as teaching environments has not been researched. With this study we try to add to this gap.

Because of the increasing importance of ERP solutions and because of increasing demand for knowledge and skills about ERP solutions, on labour market is huge demand for students with knowledge of ERP solutions. All the above leads to the conclusion that acquiring a set of skills and knowledge of ERP solutions usage are among important competencies of graduates in the field of IS and economics and business, for achieving a competitive position in the labour market.

In the past few years, a lot of universities included topics about ERP solutions in their curriculums through different subjects such as Accounting Information Systems, Enterprise Resource Planning, Information Systems etc. The problem is that students of IS and economics and business are not familiar with business processes in practice. Conducting classes where students are using ERP solutions open same issues regarding ERP acceptance by employees in companies but at universities as ERP acceptance by students. One group of factors, which could influence ERP user adoptions/acceptance by students are personal factors, the same as for ERP users in companies (Sternad Zabukovšek et al., 2019).

There is a lot of researches regarding ERP user adoptions/acceptance in companies through different phases of ERP life cycles (for example see Costa et al., 2016, Sternad Zabukovšek et al., 2019), but the researches regarding ERP user adoptions/acceptance of students are rather scared. Students usually do not have experience with real business processes and information technology (i. e. ERP solutions) behind them. Besides that, students are representatives of younger generations, who grew up with computers. This leads to question: how to teach students this large part of business processes of a company through ERP solution. Shivers-Blackwell and Charles (2006) and Scott and Walczak (2009) researched students ERP acceptance through TAM model. Shivers-Blackwell and Charles (2006) also researched student readiness to use ERP technology through model TAM. Scott and Walczak (2009) examined cognitive engagement, prior experience, computer anxiety, and organizational support as determinants of computer self-efficacy in the use of a multimedia ERP system's training tool. They also examined the impact of computer self-efficacy on ERP acceptance. But both authors used small numbers of external factors.

The main objective of our paper is, therefore, the identification of group of personal factors that contribute to the acceptance of ERP solutions by students in economics and business and IS and that shape their intentions to use this knowledge in the future. The survey was conducted among group of students, who do not have any knowledge regarding ERP solutions before. After description of ERP solutions acceptance literature review, research model is described in details and results of study are presented and discussed.

2 Literature review

Several theoretical models have been used to investigate the determinants of acceptance and the use of new information technology (IT), such as the theory of reasoned action (TRA; Fishbein & Ajzen, 1975), the theory of planned behaviour (TPB; Ajzen, 1991), the theory of the technology acceptance model (TAM; Davis et al., 1989), innovation diffusion theory (IDT; Rogers, 2003), stage model (SM; Poon & Swatman, 1999), technology-environment-organization (T-O-E; Tornatzky & Fleisher, 1990); and others. Compared to competing models, TAM is believed to be more parsimonious, predicative, and robust (Venkatesh & Davis, 2000; Lu et al., 2003; Liu & Ma, 2006), and so among the theoretical models is most widely used by IS/IT researchers (Davis, 1989; Davis et al., 1989; Amoako-Gyampah & Salam, 2004; Lee et al., 2010; Costa et al., 2016) and therefore numerous IS researchers apply this method to ERP research.

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To research ERP acceptance TAM needs to be extended by customizing factors related to this type of information systems (Calisir et al., 2009). Few studies, have investigated ERP user acceptance and usage utilizing TAM, and most of them investigate a small number of external factors (for latest researches see Calisir et al., 2009; Shih & Huang, 2009; Sun et al., 2009; Youngberg et al., 2009; Lee et al., 2010; Sternad et al. 2011; Sternad & Bobek, 2013, 2014; Mayeh et al., 2016; Costa et al., 2016; Sternad Zabukovšek et al., 2019). Shivers-Blackwell and Charles (2006) and Scott and Walczak (2009) researched students ERP acceptance through TAM model. But both authors used small numbers of external factors. Shivers-Blackwell and Charles (2006) also researched student readiness to use ERP technology through model TAM, but they researched ERP acceptance after students read an online tutorial. Participants were then asked to complete the survey, having no experience with use of ERP solution. Their research shows that gender and perceived ERP benefits are related to students' readiness for change, and readiness for change is a significant predictor of students' attitude toward usage of the ERP system. Scott and Walczak (2009) examined cognitive engagement, prior experience, computer anxiety, and organizational support as determinants of computer self-efficacy in the use of a multimedia ERP system's training tool. They also examined the impact of computer self-efficacy on its acceptance.

Although the number of studies analysing the acceptance of ERP solutions by users in companies is emerging, they are still scarce and most of them investigate a very limited number of specific external factors. The researches aimed at analysing factors influencing the ERP solution acceptance by students are even more scarce.

3 Research design

The focus of our research is to identify the factors, included into the extended TAM as external factors, that are significantly shaping the antecedents of students' attitudes toward ERP solution and future intentions of students to use the ERP solutions (Davis et al., 1989). The literature review revealed that the external factors, in general, can be divided into more groups of factors (Sternad et al., 2011, Sternad & Bobek, 2013, 2014). One of identified groups are factors of personal characteristics and information literacy (PCIL), which influence individuals' perceptions of ERP solution acceptance. We include five external factors in the research model (figure 1):

- Personal Innovativeness toward IT (PI) from the IT viewpoint means the willingness of an individual to try out any new IS/IT (Agarwal & Prasad, 1998, Lu et al., 2005; Yi et al., 2006; Thompson et al., 2006; Wei et al. 2013, Turan et al. 2015; Arsanti & Yuliasari, 2018).
- Computer Anxiety (CA) refers to individual fear of using the computer directly (Venkatesh et al., 2003; Hackbarth et al., 2003, Scott & Walczak, 2009, Simsek, 2011).
- Computer Self-Efficiency (CS) is individuals' belief of their capability to perform a specific computer task (Venkatesh & Davis, 2000; Venkatesh et al., 2003; Shih & Huang, 2009; Simsek, 2011, Wei et al. 2013).
- Individual Benefits (IB) means a benefit that someone receives from knowledge of IT/IS (Hsu et al., 2015; Rienzo & Han, 2011).
- Computer Playfulness (CP) defined as an individual's inclination to interact spontaneously, inventively and imaginatively with computers (Hackbarth et al., 2003, Serenko & Turel, 2007, Venkatesh & Bala 2008).

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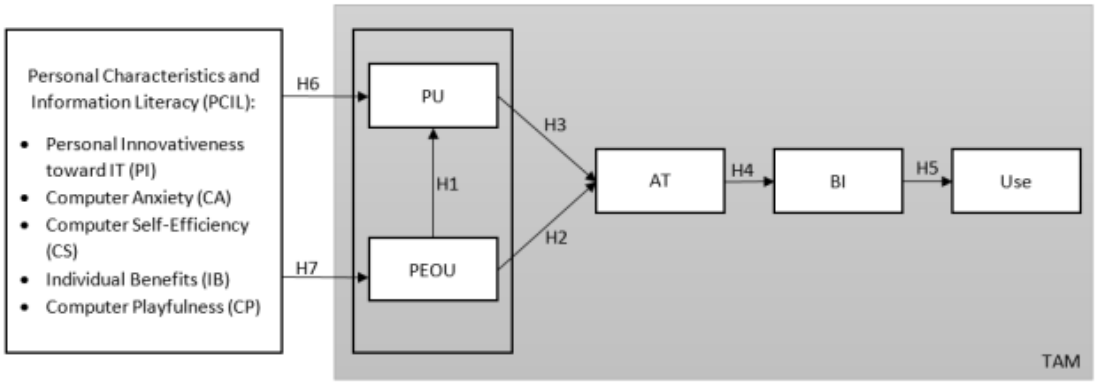
Figure 1: Research model



Because the purpose of the research is to highlight the group of personal characteristics and information literacy (PCIL) factors, which influence acceptance of ERP solution we extend basicTAM model (see Davis 1989: Davis et al. 1989) with five external factors. The following hypotheses were formed:

H1: Perceived ERP ease of use (PEOU) has a positive and direct effect on perceived ERP usefulness (PU).

H2: Perceived ERP ease of use (PEOU) has a positive and direct effect on attitude toward ERP system (AT).

H3: Perceived ERP usefulness (PU) has a positive and direct effect on attitude toward ERP system (AT).

H4: Attitude toward ERP system (AT) has a positive and direct effect on behaviour intention (BI).

H5: Behavior intention (BI) has a positive and direct effect on actual use (Use).

H6: External factors of PCIL group have a positive and direct effect on perceived ERP usefulness (PU).

H7: External factors of PCIL group have a positive and direct effect on perceived ERP ease of use (PEOU).

After development of the questionnaire according to the research model which consisted of five constructs arising from the TAM model (PEOU, PU, AT, BI and Use) and five external factors (PI, CA, CS, IB and CP), the performed pilot testing with a small group of students, who head ERP solution (20 students) as elective subject. Based on the results of the pilot testing, small revisions and additions were made in the questionnaire. Items in questionnaire for factors personal innovativeness toward IT (PI), computer anxiety (CA) and computer self-efficacy (CS) refer to IT/IS in general, while all other items in questionnaire refer to used ERP solution. All items scale were 7-point Likert scale from strongly disagree to strongly agree.

The research was conducted at the beginning of the semester because we want to explore which personal factors are the ones we need to give more attention to on lectures as teachers that acceptance of ERP solutions by students will be higher. Our sample included a total of 103 students in the second (4th semester) year of undergraduate business studies study programme. The survey was carried out at the beginning of semester after students' have introduction with Microsoft Dynamics NAV ERP solution (after 2 lecture hours, within the course that includes altogether 30 teaching hours of lectures of ERP topics with focus on selecting and implementing IS in methodological way and 30 hours in computer lab where students adopt the knowledge of the business processes functions in Microsoft Dynamics NAV (introduction, basic in finance and accounting process, purchasing process, sales process and some advance functionality simulating everyday activities). The Microsoft Dynamics NAV 2016 (NAV) was used. On the second lecture in the semester (October 2018) 103 questionnaires were properly filled out

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by respondents and used for the purpose of analysis. Respondents were 73.79 % (76) male and 26.21 % % (27) female. The average age of students was 23 years. They have an average of more than 14 years prior experience with personal computers, more than nine years prior experience with computer-based training and more than four years with business application software.

Demographic data were analysed by SPSS. All other empirical data were analysed in two steps analysis (1. step: measurement model and 2. step: structural model) using partial least squares (PLS) technique, with Smart PLS 3.2.8 (Ringle et al., 2015). PLS path modelling is a variance-based structural equation modelling (SEM) technique which is widely used in education, business and social sciences in past two decades (Henseler et al., 2016; Garson 2016). In the first step of PLS analysis, measurement model was assessed, and in the second step of PLS analysis, structural model was assessed. Path significance has been estimated using bootstrapping resampling technique with 5000 sub-samples as suggested by Ringle et al. (2015). While analysing data, we followed the guidelines specified by Henseler et al. (2016) and Garson (2016).

4 Analysis and results

All measurement scales were examined for their psychometric properties (reliability, convergent validity, and discriminant validity) prior to testing hypotheses (bootstrapping with 5000 subsamples) (Heseler, 2016). While all items did not meet the assessment requirements of the measurement model, it was excluded from further analysis. The final version of the model is presented.

Internal consistency reliability was examined by composite reliability (CR), where the value should be more than 0.6. For assessment of validity, two validity subtypes are usually used: the convergent validity and the discriminant validity. For convergent validity Fornell and Larcker's assessment criteria have been used: the average variance extracted (AVE) for each construct should exceed 0.50. Each of our ten factors had value CR above 0.6 and value AVE above 0.50 (Table 1). All factors loadings are significant at $p<0.01$ and all exceed 0.60 (Table 1). Our measurement scales meet the conditions for convergent validity. AVE is also used to establish discriminant validity by the Fornell and Larcker criterion. For our model values of the square root of AVE are higher than correlations between factors, which appear below it (Table 2). The value of standardized root means square residual (SRMS) measures the difference between the observed correlation matrix and the model. The model has good fit with SRMS is less than 0.10 (Garson, 2016). SRMR of our model is 0.082, which means that model is acceptable.

Table 1: Descriptive statistics

Factors / items	**Means**	**Std. Deviation**	**Loadings**	**CR**	**AVE**
Personal Innovativeness Toward IT (PI)					
PI1: If a new IT solution emerges, I will look for ways to experiment with it.	5.11	1.18	0.85	0.89	0.73
PI 2: Among my peers, I am usually the first to try out a new IT solution	4.24	1.38	0.85		
PI 3: I like to experiment with new IT solutions.	5.17	1.21	0.86		
Computer Anxiety (CA)					
CA1: When I use the computer, it makes me nervous.	2.17	1.57	0.89	0.89	0.74
CA2: I feel uncomfortable when I think I have to use my computer.	1.59	1.27	0.84		
CA5: When I use the computer, I feel uncomfortable.	1.51	1.08	0.86		

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Computer Self-Efficacy (CS)					
CS1: I could complete the task using any IT solutions if the software manuals or/and the built-in help for assistance are available	5.10	1.24	0.84	0.81	0.52
CS2: I could complete the task using any IT solution if I could contact someone for help if I need it.	5.01	1.33	0.75		
CS3: I could complete the task using any IT solution if I had a lot of time to complete the job.	5.50	1.21	0.65		
CS5: I could complete the task using any IT solution if I had used a similar IT solution before.	5.63	1.16	0.62		
Computer Playfulness (CP)					
CP2: I'm creative when I use computers.	5.61	1.18	0.60	0.75	0.61
CP5: I will learn much by using NAV.	5.15	1.26	0.93		
Individual Benefits (IB)					
IB1: The knowledge about NAV helps me better to understand my future work/job.	4.85	1.44	0.91	0.96	0.86
IB2: The knowledge about NAV will increase my effectiveness in the job.	4.70	1.41	0.95		
IB3: The knowledge about NAV will increase my productivity in the workplace.	4.67	1.38	0.95		
IB4: The knowledge about NAV will have a positive impact on my future career.	5.03	1.42	0.90		
Perceived usefulness (PU)					
PU1: Knowledge of NAV will enable me to accomplish tasks more quickly during the course.	5.08	1.03	0.84	0.89	0.67
PU2: Knowledge NAV will improve my work performance (the number of tasks I perform on a time unit).	5.10	1.13	0.80		
PU3: Knowledge NAV will enhance my effectiveness in learning.	4.61	1.18	0.85		
PU4: Using NAV will make to be useful to perform teaching assignments.	4.41	1.16	0.77		
Perceived Ease of Use (PEOU)					
PEOU1: Learning with NAV is clear and understandable.	4.51	0.89	0.82	0.89	0.66
PEOU2: I find NAV is easy to use.	4.55	0.87	0.81		
PEOU3: Interacting with NAV does not require a lot of my mental effort.	4.33	1.05	0.72		
PEOU4: I find it easy to get NAV to do what I want it to do.	4.48	0.93	0.90		
Attitude Toward Use of ERP system(AT)					
ATU1: Learning NAV I support.	5.22	1.27	0.81	0.86	0.68
ATU: I like the idea of using NAV to learn the topics of ERP during this course.	4.91	1.27	0.83		
ATU: I think that teachers should use the NAV (ERP) during their courses.	4.61	1.24	0.83		

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Behaviour Intention (BI)					
BI1: If I had access to the NAV, I intend to continue using NAV in courses.	4.50	1.25	0.95	0.96	0.89
BI2: Given that I had access to the NAV, I will always try to use NAV in my learning.	4.41	1.34	0.95		
BI3: I plan to continue using NAV frequently in my learning.	4.27	1.34	0.94		
Use of ERP solution					
Use1: In a period of learning about ERP, how likely it is for you to use most of the features of NAV?	4.95	0.99	0.85	0.90	0.75
Use2: In a period of learning about ERP solutions, how likely it is for you to use more features than the other students?	4.65	0.98	0.86		
Use3: In a period of learning about ERP solutions, how likely it is for you to use more obscure aspects of NAV?	4.53	1.07	0.89		

Table 2: Fornell-Larcker creteria of discriminant validity

	PI	CA	CS	CP	IB	PU	PEOU	AT	BI	Use
PI	0.85									
CA	-0.02	0.86								
CS	0.41	-0.03	0.72							
CP	0.35	-0.09	0.33	0.78						
IB	0.18	0.11	0.31	0.63	0.93					
PU	0.24	-0.05	0.30	0.43	0.45	0.82				
PEOU	0.26	-0.12	0.38	0.23	0.29	0.54	0.81			
AT	0.19	-0.06	0.31	0.40	0.53	0.57	0.53	0.82		
BI	0.16	0.10	0.18	0.32	0.52	0.53	0.44	0.68	0.94	
Use	0.26	-0.03	0.15	0.40	0.33	0.45	0.19	0.51	0.50	0.87

The structural model was examined to test hypotheses. Paths are interpreted as standardised beta weights in a regression analysis. The relationships testing results are based on bootstrapping (with 5000 subsamples) to test the statistical significance of each path coefficient using t-tests, as recommended by Chin (1998).

Our research confirmed all relationships in TAM model as statistically significant (Table 3, Figure 2). Perceived ERP ease of use (PEOU) has significant effect on perceived ERP usefulness (PU) ($\beta = 0.44$, $p<0.01$) and significant effect on attitude toward using ERP system (AT) ($\beta = 0.32$; $p<0.01$). Perceived ERP usefulness (PU) has significant effect on attitude toward using ERP system (AT) ($\beta = 0.40$; $p<0.01$). Attitude toward using ERP system (AT) has significant effect on behaviour intention (BI) ($\beta = 0.68$; $p<0.01$) and behaviour intention (BI) has significant effect on actual use (Use) ($\beta = 0.50$; $p<0.01$).

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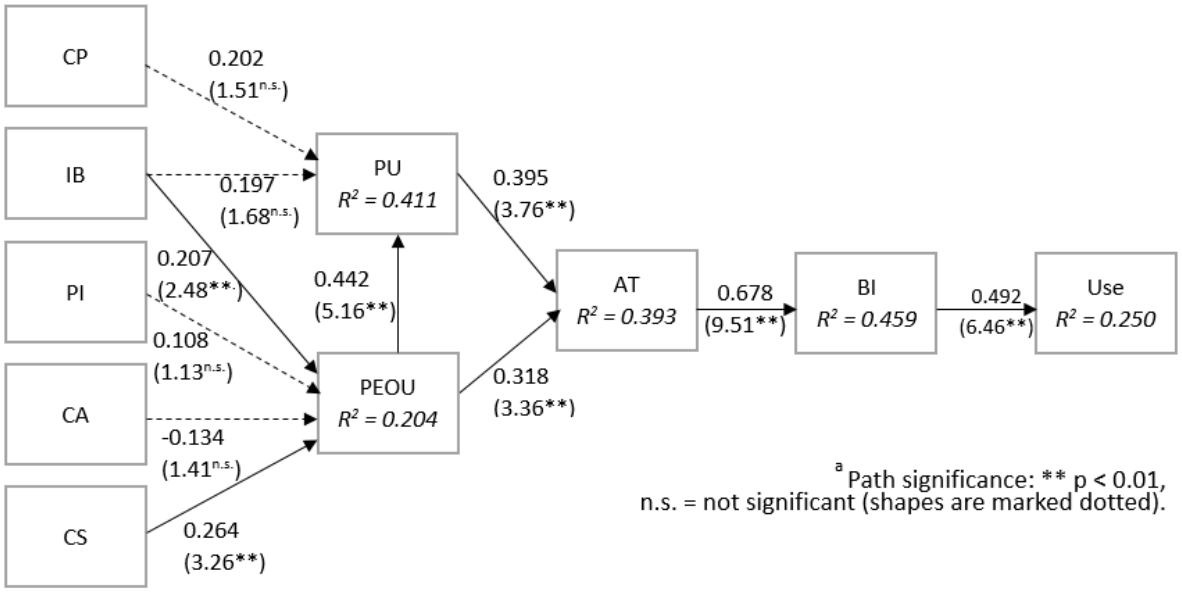
Table 3: t-test results

	Original Sample (*O*)	Standard Deviation (*STDEV*)	*t*-statistics (|*O*/*STDEV*|)	*p* values	Hypotheses supported
H1: PEOU → PU	0.44	0.09	5.158	0.00	Yes
H2: PEOU → AT	0.32	0.10	3.363	0.00	Yes
H3: PU → AT	0.40	0.10	3.898	0.00	Yes
H4: AT → BI	0.68	0.07	9.509	0.00	Yes
H5: BI → Use	0.50	0.08	6.457	0.00	Yes
H6_4: CP → PU	0.20	0.13	1.506	0.13	No
H6_5: IB → PU	0.20	0.12	1.677	0.09	No
H7_1: PI → PEOU	0.11	0.10	1.132	0.26	No
H7_2: CA → PEOU	-0.13	0.10	1.411	0.16	No
H7_3_CS → PEOU	0.26	0.08	3.262	0.00	Yes
H7_5: IB → PEOU	0.21	0.08	2.476	0.01	Yes

Figure 2: Results of structural model analysis



The focus of our research was to expose and verify the impact of external factors of personal characteristics and information literacy (PCIL) through factors personal innovativeness toward IT (PI), computer anxiety (CA), computer self-efficiency (CS), individual benefits (IB) and computer playfulness (CP). We cannot confirm, that any of five factors have impact on PU at the beginning of using ERP solution, but two of the individual benefits (IB) (β = 0.207, p<0.01) and computer self-efficiency (CS) (β = 0.264, p<0.01) have significant positive effect on perceived ERP ease of use (PEOU) and consequently on AT, BI and Use (see Table 3 and Figure 2).

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The R^2 indicates the exploratory power or variance explained of the latent endogenous variable, and it is the most common effect size measure in path models (Garson, 2016). The PCIL factors (namely CP and IB) could explain 41.1 % variance in PU (R^2 = 0.411) and PCIL factors (namely IB, PI, CA and CS) could explain 20.4 % variance in PEOU (R^2 = 0.204). PU and PEOU together explain 39.3 % of the variance in AT (R^2 = 0.393). The AT explain 45.9 % of variance in BI (R^2 = 0.459) and BI explain 25.0 % of Use (R^2 = 0.250) (Figure 2).

5 Discussion and conclusion

The development of ERP solutions in past years emphasise their ability to integrate business processes and recently also their ability to enable integrated management. These developments are very important for higher education institutions while using ERP solutions in their courses better and more holistic understanding of business can be presented to students. It is very important that higher education institutions achieve higher acceptance of ERP solutions by students. The findings from our study can help in this aim.

Results of the present study regarding the hypotheses of TAM model are consistent with several other research results regarding the IT/IS acceptance (Davis, 1989; Davis et al., 1989; etc.). Both PEOU and PU have strong positive effect on ERP usage, with the relationship of PU being a bit stronger. Therefore, hypothesis H2 and H3 were confirmed. Also, PEOU has statistical effect on PU. Hypothesis H1 was also confirmed. The findings about the importance of PEOU and PU in the literature are vague; Davis (1989), Davis et al. (1989) and Simon and Paper (2007) exposed that PU has stronger positive effect on IT/IS usage as PEOU, while PEOU has weaker or even no statistical effect on IT/IS usage after some time of usage. Since students were surveyed at the beginning of semester, where they did not know the ERP solution, this could be the reason for the results obtained.

Hypotheses H4 and H5 were confirmed. Factor AT is vital in the TAM model and has very strong positive effect on BI and through it also an indirect strong positive effect on Use, which is consistent with other researches (Pijpers & Montfort, 2006; Simon & Paper, 2007).

The main aim of this research is the identification of external factors which influence students' ERP acceptance and have an impact on the antecedents of PU and PEOU at the beginning of the ERP course. None of observed five external factors has significant impact on the PU as shown in Figure 2. Therefore, hypothesis H6 was not confirmed. Only two factors exposed in group PCIL – namely computer self-efficiency (CS) and individual benefits (IB) - had significant impact on PEOU. Hypotheses H7 is confirmed. We can not have, as teachers, many impacts on computer self-efficiency (CS) which refer to individuals' belief of their capability to perform a specific computer task. But we can have high impact on factor individual benefits (IB) which refers to benefits that students have from knowledge of ERP solutions and business processes in practice. It is important that teachers at the beginning of class put a lot effort to explain students, why is important to know how to use ERP solutions and what individual benefits they will have of knowledge on that are. Because ERP solutions are widely used in organizations students did recognize individual benefits (IB) of ERP knowledge after two hours of lectures.

Factor computer anxiety (CA) is not statistically significant – this can be explained by the fact that the computer anxiety is probably a state of fear that is not known any more to the young population who grew up with the computers included in all (or at least many) aspects of the everyday' s life. As mentioned in the previous section they have on average more than 14 years prior experience with personal computers. Factor Personal Innovativeness toward IT (PI) captures characteristics of students regarding using new software tools and applications in general. We can speculate that this generation of students is not early adopters of new software tools and applications. Computer playfulness (CP) includes claims how ERP knowledge can increase student's effectiveness and productivity and have impact on regarding future job.

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This research results can provide information to schools about the importance of building positive perceptions and positive attitudes in their students towards ERP learning in our case learning of Microsoft Dynamics NAV. We suggest lecturers put an important effort into the preparation of ERP lectures and that try to explain ERP topics related content to students using simple routines, with the real business environment characteristics. To understand ERP solutions is challenging for students because they do not have practical experience of how ERP solutions are used in enterprises.

In many ways, digital transformation requires an adaptable platform or system of record like modern ERP or what Gartner refers to as Post-Modern ERP - x-ERP. These modern ERP platforms embrace digital disruption through agility, mobility, customization, real-time visibility, adaptability, and by embracing the multi-cloud world to increase functionality. Modern ERP solutions are adaptable enough to embrace disruptive innovation and technologies. Digital transformation is not primarily focused on implementing IT; it is an overarching cultural change within an organization for which business studies students have to be prepared.

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