Analysis of Students' Experiences with Microsoft Dynamics NAV Solution Using Technological Acceptance Model

Simona Sternad Zabukovšek
Faculty of Economics and Business
University of Maribor
Razlagova ul. 14, 2000 Maribor, Slovenia
simona.sternad@um.si

Ruben Picek
Faculty of Organization and Informatics
University of Zagreb
Pavlinska 2, 42000 Varaždin, Croatia
ruben.picek@foi.hr

Polona Tominc
Faculty of Economics and Business
University of Maribor
Razlagova ul. 14, 2000 Maribor, Slovenia
polona.tominc@um.si

Samo Bobek
Faculty of Economics and Business
University of Maribor
Razlagova ul. 14, 2000 Maribor, Slovenia
samo.bobek@um.si

Abstract. *Enterprise Resource Planning (ERP) solutions are the most frequently used software tool in companies in all industries. The growing body of scientific literature about the acceptance of ERP solutions by users in companies reflects the growing percieved importance of ERP solutions for business management as well. The labour market requires the knowledge and skills for usage of ERP solutions from graduates – future employees. The main objective of our paper is therefore the identification of important 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 (1) students' personal characteristics and information literacy, (2) perceived system and technological characteristics of ERP solutions and (3) perceived support within the study process. The conceptual model formed was tested using the structural equation modeling. Research results revailed that several dimensions of the three 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, reforming and updating their study programs, as well as for educators in the field of economics and business sciences.*

Keywords: ERP solutions, TAM, economics and business' gruaduates, acceptance model

1 Introduction

The most widely used integrated solutions for business in companies from almost all industries worldwide are Enterprise Resource Planning (ERP) solutions. Number of ERP users within companies is growing very fast as well; employees are using ERP solutions daily at their work.

Therefore it is not surprising that the research studies regarding adoptions and acceptance of ERP solutions by users at different levels within companies are emerging (for example Costa et al., 2016). The most frequently used research approaches in these studies are (Awa et al., 2016): technology acceptance model (TAM) (Davis, 1989), theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), theory of planned behaviour (TPB) (Ajzen, 1991), innovation diffusion theory (IDT) (Rogers, 2003), stage model (SM) (Poon & Swatman, 1999) and technology-environment-organization (T-O-E) (Tornatzky & Fleisher, 1990). In this area, TAM proved to be the most efficient model to study adoption in information systems (IS) (Shih and Huang, 2009; Sternad et al., 2011; Costa et al., 2016) and therefore numerous IS researchers apply this method to study ERP acceptance as well.

Because of that, there is also no doubt that the knowledge and skills of ERP solutions usage are among important competences of graduates in the field of economics and business, for achieving a competitive position in the labor market. In past few years, selected

topics of ERP solutions have become an integrative part in curricula in the management and business studies, within courses, such as: Accounting Information Systems, Enterprise Resource Planning, Information Systems etc. On the other hand all leading ERP vendors such as SAP, Microsoft, Oracle etc. have university academic alliances such as SAP University Alliances (SAP, 2018), Microsoft Dynamics Academic Alliance (Microsoft, 2018), Oracle University (Oracle, 2018) etc. which help higer education institutions to use their ERP solutions in their curriculum and thus preparing students with hands-on experience in using modern business applications. Despite the recognized importance of the ERP solutions as a business management tool within companies and the importance of this knowledge for graduates, researches aimed at identification of factors shaping students' attitudes towards the acceptance of ERP solutions, are rather scarce (Davis & Comeau, 2004; Shivers-Blackwell & Charles, 2006; Scott & Walczak, 2009; Iriberri, 2015).

The main objective of our paper is therefore the identification of important 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 TAM. The key purpose of TAM within our study is to provide a basis for testing the impact of additional external factors on students' internal beliefs (perceived usefulness - PU and perceived ease of use – PEOU), attitudes (AT), intentions (behavioural intention - BI) and actual use (Davis et al., 1989) of the ERP solutions. Identified important multidimensional external factors refer to (1) students' personal characteristics and information literacy, (2) perceived system and technological characteristics of ERP solutions and (3) perceived support within the study process.

2 Literature review

The organization Gartner Group first defined ERP as a concept more than 25 years ago (Montgomery et al. 2018). ERP systems initially focused on automating back office functions (functions which did not directly affect customers), while front office functions (functions which directly dealt with customers, e-business or supplier relationship management (SRM) became integrated later, when the Internet enabled the simplified communication with external parties. The organization Gartner Group (Ganly et al., 2013) in year 2013 introduced the term "postmodern ERP" (some call it also eXtended ERP – xERP). According to Gartner's definition of the postmodern ERP strategy, legacy systems of monolithic and highly customized ERP suites, in which all parts are heavily inter-dependent, should be replaced by a mixture of both cloud-based and on premise applications, which are more loosely coupled and can be easily exchanged if needed. The organization Gartner Group has evolved its definition over time and now defines ERP as an application strategy focused on several distinct enterprise application suite markets. They segment ERP into four major business process support areas: financial management systems, human capital management (HCM), enterprise assets management (EAM), and manufacturing and operations (Montgomery et al. 2018). Early ERP providers focused on large enterprises, but smaller enterprises are increasingly using ERP systems as well. The worldwide ERP market grew from 3.8% and 24.4B USD in 2012 to 25.4B USD in 2013. The global ERP software market is projected to reach $47.71 billion by 2022 growing at a CAGR of 7.0% during the forecast period (2016 to 2022). Company SAP is in market leadership position, follow by Oracle, Sage, Infor and Microsoft (SMRC, 2017). It is expected that ERP will remain the basic important software in the organisations.

Several theoretical approaches 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 resource-based view (Caldeira & Ward, 2003). 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 therefore it is most frequently used by IS/IT researchers (Davis, 1989; Davis et al., 1989; Amoako-Gyampah & Salam, 2004; Lee et al., 2010; Costa et al., 2016). TAM posits that two beliefs − perceived usefulness (PU) and perceived ease of use (PEOU) − are of primary relevance for computer acceptance behaviour (Davis et al., 1989). PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320). PEOU in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). The two central hypotheses in TAM state that PU and PEOU positively influence an individual's attitude towards using a new technology (AT), which in turn influences his or her behavioural intention (BI) to use it. Finally, intention is positively related to the actual use (U). TAM also predicts that PEOU influences PU, as Davis et al., (1989, p. 987) put it, "effort saved due to the improved perceived ease of use may be redeployed, enabling a person to accomplish more work for the same effort". The key purpose of TAM is to provide a basis for identifying the impact of external factors on internal beliefs, attitudes, and intentions (Davis et al., 1989). Original TAM is presented in Figure 1 by the grey rectangle. The original TAM is well established and tested and furthermore, a variety of extensions regarding external factors for

examining the antecedents of PU and PEOU have been developed such as TAM 2 (Venkatesh & Davis, 2000), UTAUT (Venkatesh et al., 2003) and TAM 3 (Venkatesh & Bala, 2008).

Even though TAM can be applied to a variety of technologies, the extensions and modifications of TAM are needed when analyzing specific information systems (Calisir et al., 2009). Although the number of studies analyzing the acceptance of ERP solutions by users in companies are emerging, they are still scarce and most of them investigate a very limited number of specific external factors (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). The researches aimed at analyzing factors influencing the ERP solution acceptance by students are even more scarce (see Shivers-Blackwell & Charles, 2006; Scott & Walczak, 2009; Iriberri, 2015). Shivers-Blackwell and Charles (2006) researched student readiness to use ERP technology using TAM, but they studied students' ERP acceptance in specific circumstances, namely, students read an online newsletter provided by the ERP communication, education, and training team entitled "What is ERP", first. Participants were then solicited by their professors to complete the survey, without any practical experience of ERP solution usage. 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. Iriberri (2015) researched the external factors' impact - training and teaching - on actual use.

3 Conceptual model and hypotheses

The main objective 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 and future intentions of students to use the ERP solutions.

As already mentioned, the TAM intruduced by Davis (1989) and Davis et al. (1989), suggests the following relationships (this original TAM is presented by grey rectangle in Figure 1) among the multidimensional constructs, that are perceived ease of use – PEOU, perceived usefulness – PU, attitude toward using ERP system – AT, behaviour intention – BI, actual use – Use and in the case of our research refer to the ERP solutions:

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

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

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

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

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

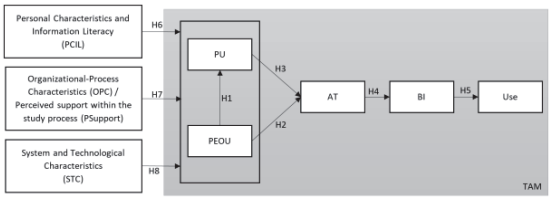

Figure 1. Conceptual Model

Even though TAM can be applied to a variety of technologies, it must be extended and modified for analysis of specific information systems (Calisir et al., 2009), as we already pointed out. The literature review reveiled that the external factors in general can be divided into three groups of factors: personal characteristics and information literacy (PCIL), system and technological characteristics (STC), and organizational-process characteristics (OPC) (see Sternad et al., 2011, Sternad & Bobek, 2013, 2014).

Personal characteristics and information literacy (PCIL), including personal characteristics that can influence individuals' perceptions of ERP system acceptance and usage, were analyzed in the past: personal innovativeness from the IT view-point (Yi et al., 2006; Thompson et al., 2006), computer anxiety (Venkatesh et al., 2003), computer self-efficiency (Venkatesh & Davis, 2000; Venkatesh et al., 2003; Shih & Huang, 2009) and perceived individual benefits (Hsu et al., 2015).

In contrast to the majority of researches regarding IT implementation which are very wide, the fact that ERP implementation research is focused on single technology-software solution, implies that the specific perceived technological characteristics should be examined. The literature review suggests that the following external factors are important within STC: system performance (Venkatesh et al., 2003; Kositanurit et al., 2006), user manuals (help) (Kelley, 2001; Kositanurit et al., 2006), quality of ERP system (Costa et al., 2016) and quality of information in ERP system (Hsu et al., 2015).

In the conceptual model of our research the modifications were implemented within the OPC construct, since the environment within the higher education institutions differs from the business environment in companies. Organizational-process characteristics (OPC) capture various social processes, mechanisms, and support organizations that guide individuals to facilitate the use of an ERP system. Since the students' acceptance of ERP solutions is in the focus of our research, the factors associated with their perceived support within the study process (during

course lectures and exercises regarding ERP solution) were taken into account; therefore the OPC construct was reshaped with the purpose to cover the educational organization view point. PSupport – Perceived support within study process includes perceived social influence (of teachers, other students and professionals participating in the educational process) (Venkatesh et al., 2003) and perceived characteristics of training and education on ERP system (Amonko-Gyampah & Salam, 2004; Bueno & Salmeron, 2008; Bobek & Sternad, 2011).

Therefore, the following hypotheses were formed:

H6: Personal characteristics and information literacy (PCIL) has a positive impact on the perceived ERP usefulness (PU).

H7: Perceived support within the study process (Psupport) has a positive impact on the perceived ERP usefulness (PU).

H8: Perceived system and technological characteristics (STC), has a positive impact on perceived ERP ease of use (PEOU).

4 Research design and methodology

The questionnaire was developed in three phases. In the first phase, we clarified the relationships between the constructs and the measurement scales for individual constructs, we reviewed the literature and resources. A questionnaire was employed. All items in the questionnaire were scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The research design consisted of five constructs arising from the TAM model (PEOU, PU, AT, BI and Use) and three external constructs (PCIL, STC and Psupport), that we formed and included into the expanded TAM model. The external factors are therefore included by the three second-order constructs, based on all manifest variables of the underlying lower-order factors. PCIL includes: personal innovativeness toward IT, computer anxiety, perceived computer self-efficiency and perceived individual benefits. STC is composed of: system performance, user manuals (help), quality of ERP system and quality of information in ERP system. Psupport includes: perceived social influence (of teachers, other students and professionals participating in the educational process) and perceived characteristics of training and education on ERP system. Our conceptual model includes 15 first-order factors and 3 second-order factors.

In the second phase the instrument was pilot tested with a group of 30 ERP users in an organization. Based on the results of the pilot testing, revisions and additions were made to the instrument.

In the third phase the survey was conducted. Our sample included a total of 87 Croatian students in the second (4th semester) year of undergraduate study programme "Economics of entrepreneurship". The survey was carried out at the end of semester after students' full interaction with Microsoft Dynamics NAV ERP solution (after 14 lecture hours), within the course that includes all together 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 every day activities). The Microsoft Dynamics NAV 2016 (NAV) was used. On the last lecture in the semester (June 2017) 87 questionnaires were properly filled out by respondents and used for the purpose of analysis. Respondents were 14.9% (13) male and 85.1% (74) female. The average age of students was 20.70 years.

Demographic data was analysed by SPSS. All other empirical data was analysed in two steps analysis using partial least squares (PLS) technique, with Smart PLS 3.2.1. 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). We utilized this approach because of the relatively small sample size combined with the second-order factors analysis. In the first step, measurement model was assessed, and in the second step, structural model. Path significance has been estimated using bootstrapping resampling technique with 500 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).

5 Analysis and results

All measurement scales were examined for their psychometric properties (reliability, convergent validity, and discriminant validity) prior to testing hypotheses. For external factors second-order procedure has been used. Because not all external factors met assessment requirements of the measurement model, they were excluded from further analysis. These factors are: computer anxiety from PCIL group and user manuals from STC group. Cronbach's alpha (α) and composite reliability (CR) as measures of reliability was examined, where $\alpha > 0.7$ and CR > 0.7 assures adequate reliability for confirmatory purposes. For convergent validity Fornell and Larcker's assessment criteria has been adopted: all item factor loadings should be significant and exceed 0.70, and the average variance extracted (AVE) for each construct should exceed 0.50. Discriminant validity between constructs was assessed following Fornell and Larcker's recommendation that the square root of AVE for each construct should be higher than its correlation with any other latent variable. Results of measurement model were satisfactory (results can be obtained by authors). The hypotheses testing rutilize bootstrapping (with 500 subsamples) to test the

statistical significance of each path coefficient, using *t*-tests, as recommended by Chin (1998). Results of this analysis are shown in Figure 2.

Our research partly confirms results of original TAM. PEOU has no significant effect on PU (H1; b = 0.070, p>0.05) and has a moderate significant effect on AT (H2; b = 0.403; p<0.01). PU has also moderate significant effect on AT (H3; b = 0.506; p<0.01). AT strongly influences BI (H4; b = 0.764; p<0.01) and BI moderately influences the Use construct (H5; b = 0.523; p<0.01). Hypothesis H1 was therefore rejected, but hypotheses H2 – H5 were not.

The hypotheses H6, H7 and H8 that refer to the extension of the TAM, were also partly confirmed. Second-order factor Psupport has strong significant positive effect on PU (H7; b = 0.576, p<0.01) and on PEOU (b = 0.624, p<0.01). PCIL has no significant effect on PU (H6; b = 0.172, p>0.05). STC has no significant effect on PU (H8; b = 0.138, p>0.05). Hypotheses H7 was not rejected, while hypotheses H6 and H8 were rejected.

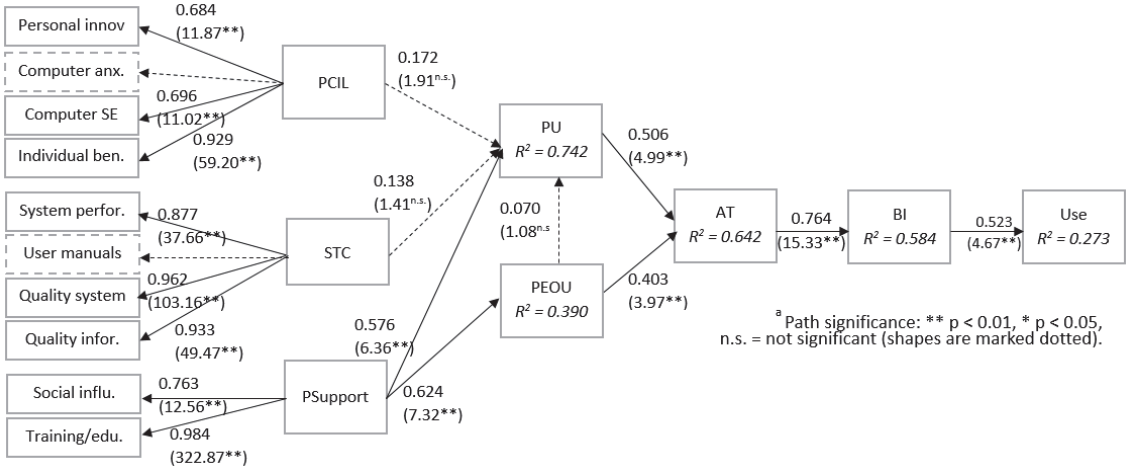

Figure 2: Results of the structural model analysis

6 Disscussion

Results of the present study regarding the hypotheses of original 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 no statistical effect on PU. Hypothesis H1 was rejected. 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 end of semester, where the ERP solution learning process took place, 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 indirect strong positive effect on Use, which is consistent with other researches (Pijpers & Montfort, 2006; Simon & Paper, 2007).

The main result of this research is the identification of external factors which influence students' ERP acceptance and have an impact on the antecdents of PU and PEOU.

The fact that ERP implementation research is focused on a single solution (technology) has enabled the possibility to study specific perceived system and technological characteristics. In the past, this external second-order factor (STC) was included into the research models of very few previous researchers (Sternad et al*.,* 2011; Sternad & Bobek, 2013, 2014). Without the second-order factor Psupport being included into the model, factor STC was showing a statisticaly significant impact on PU, through the following first-order external factors: system performance, quality of NAV system and quality of information in NAV system. At the same time factor STC had no statistical impact on PEOU, (because of that, this relationship is not included in the Figure 2). When the second-order factor Psupport was added in the model, factor STC was not statistically significant any more. Therefore hypothesis H8 was rejected. The only remaining first-order factor within this second-order factor STC, namely user manuals, is not statistically significant – this is very likely the consequence of the fact, that users' manuals themselves are not included into the pedgogical process.

Similarly, the second order factor PCIL had significant and positive impact on the PU as long as the second-order factor Psupport was not included into the model (see Figure 2). Therefore hypothesis H6 was not

confirmed. The first-order factors within PCIL – namely personal innovativeness toward IT (software tools and applications), computer self efficiency and individual benefits - had significant impact on PU, but not on PEOU. First-order factor Computer anxiety, is not statistically significant – this can be explaned 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.

Second order factor Psupport has strong significant and positive impact on PU and PEOU. This two relationships support hypothesis H7. As it was menitoned before, this factor was showing statistically significant impact on PEOU and PU through this two first-order factors: social influence and training and education. Factor social influence concerns opinions of teachers, other students and professionals participating in the educational process regarding students knowledge of ERP systems. It seems that students take into account the opinions of other (important) people for them.

The most important external factor is factor training and education. Therefore we suggest teachers to put an important effort into the preparation of excellent teaching materials and that try to explain ERP topics related content to students using simple routines, with the real business environment characteristics. To understand the ERP solutions is challenging for students, because they do not have practical experience of how ERP solutions are used in enterprises.

Conclusion

The aim of this research was to identify which external factors have impact on students' acceptance of ERP within study programme, while they are exposed to ERP solution (in our case Microsoft Dynamics NAV). We want to know how to motivate students to take course dealing with the ERP solution Microsoft Dynamics NAV, with all due seriousness and importance. That is why we studied 10 external factors which might have an impact on students' ERP acceptance. Studying the influence of the system of external factors on constructs not only contributes to the theory development, but also helps in designing teachers' curriculum.

Our research shows that most important external factors are especially two: training and education about ERP and social influence (of people - teachers, students, professionals - who have influence on students' perception regarding NAV/ERP). Factor training and education about ERP is more important than factor social influence. Therefore teachers have to put an important effort into the preparation of excellent teaching materials and that try to explain ERP topics related content to students using simple routines.

External first order factors within PCIL, namely personal innovativeness toward IT (software tools and applications), computer self-efficiency and individual benefits (regarding future job), were important personal factors, while computer anxiety was not important. Among important first order factors of STC were three: system performance, quality of ERP system and quality of information in ERP system, while factor user manuals was not important. As can be seen from Figure 2, all first order factors included into the second order PCIL and OPC became insiginificant, if the first order factors (training and education, social influence) forming the second order factor Psupport were included into the model.

Several implications for researchers and practitioners arise from the results of the extended version of TAM. Findings indicate that students have positive perception on the PU, PEOU, AT, BI and Use and that they understand the usefulness of ERP systems and their relevance as the support, important for their current or future jobs. These findings can help business schools assess students' engagement as they develop ERP software skills desired by employers. By many organizations, a big concern is whether students understand business processes (also process flows, subprocesses, etc.) behind ERP system. ERP system is very complex system and no single factor alone influences student's use of ERP. Our research showed that most important external factors are teaching and education of ERP system and social influence for students to understand the functionality of the system, its usefulness, and ease of use.

This study has certain limitations which are at the same time the opportunities for further research within this important and comperhensive topic. Since the respondents were limited to one group of students in Croatia, the study could be extended to other countries. Further research is needed to explore the importance of external factors included in different time frames (after introduction of course, at the end of course) as well as inclusion of additional external factors. Another limitation is also that research was conducted for one ERP solution only –namely for Microsoft Dynamics NAV; the importance of external factors may be different, when other ERP solutions are taking place (SAP, Infor ERP etc.).

References

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179–211. DOI: 10.1016/0749-5978(91)90020-T.

Amoako-Gyampah, K., & Salam, A. F. (2004). An extension of the technology acceptance model in an ERP implementation environment. *Information & Management*, 41, 731–745. DOI:10.1016/j.im.2003.08.010.

Awa, H. O., Ukoha, O., & Emecheta, B. C. (2016). Using T-O-E theoretical framework to study the adoption of ERP solution. *Cogent Business &*

Management, 3, 1–23. DOI: 10.1080/23311975.2016.1196571.

Bueno, S. & Salmeron, J. L. (2008). TAM-based success modelling in ERP. *Interacting with computers*, 20 (6), 515–523. DOI: 10.1016/j.intcom.2008.08.003.

Calisir, F., Gumussoy, C. A., & Bayram, A. (2009). Predicting the behavioural intention to use enterprise resource planning systems—An exploratory extension of the technology acceptance model. *Management Research News*, 32(7), 597–613. DOI: 10.1108/01409170910965215.

Chin, W. W. (1998). Issues and opinion on structural equation modelling. *MIS Quarterly*, 22(1), 7–16.

Costa, C., Ferreira, E., Bento, F. & Aparicio, A. (2016). Enterprise resource planning adoption and satisfaction determinants. *Computers in Human Behaviour*, 63, 659–671. DOI: 10.1016/j.chb.2016.05.090.

Davis, C. H. & Comeau, J. (2004). Enterprise Integration in Business Education: Design and Outcomes of a Capstone ERP – based Undergraduate e-Business Management Course. *Journal of Inforamation Systems Education*, 15 (3), 287-300.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. DOI: 10.2307/249008.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003. DOI: 10.1287/mnsc.35.8.982.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Ganly, D., Kyte, A., Rayner, N. & Hardcastle, C. (2013). Predicts 2014: The Rise of the Postmodern ERP and Enterprise Applications World. Gartner Group. Retrieved March 10, 2017, from https://www.gartner.com/doc/2633315/predicts--rise-postmodern-erp.

Garson, G. D. (2016). *Partial Least Squares: Regression and Structural Equation Models*. Asheboro, NC: Statistical Associates Publishers.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS Path Modeling in New Technology Research: Updated Guidelines. *Industrial Management & Data Systems*, 116(1), 2–20. DOI: 10.1108/IMDS-09-2015-0382.

Hsu, P.-F., Yen, H. R., & Chung, J.-C. (2015). Assessing ERP post-implementation success at the individual level: Revisiting the role of service quality. *Information & Management*, 52(8), 925–942. DOI:10.1016/j.im.2015.06.009.

Iriberri, A. (2015). Integrating an ERP into the curriculum at a busienss school: the students' perceptions of SAP. *Academy of Ecucation Leadership Journal*, 19(2), 99- 108.

Kelley, H. (2001). *Attributional analysis of computer self-efficacy: dissertation*. (Unpublished doctoral dissertation). London, UK: Richard Ivey School of Business.

Kositanuri, B., Nqwenyama, O. & Osei-Bryson, K. M. (2006). An exploration of factors that impact individual performance in an ERP environment: an analysis using multiple analytical techniques. *European journal of information systems,* 15, 556–568. DOI: 10.1057/palgrave.ejis.3000654.

Lee, D. H., Lee, S. M., Olson, d. L., & Chung, S. H. (2010). The effect of organizational support on ERP implementation. *Industrial Management & Data Systems,* 110(2), 269–283. DOI: 10.1108/02635571011020340.

Liu, L., & Ma, Q. (2006). Perceived system performance: A test of an extended technology acceptance model. *Journal of Organizational and End User Computing*, 18(3), 1–24. DOI: 10.1145/1161345.1161354.

Lu, J., Chun-Sheng, Y., Liu, C., & Yao, J. E. (2003). Technology acceptance model for wireless internet. *Internet Research: Electronic Networking Applications and Policy*, 13(3), 206–222. DOI: 10.1108/10662240310478222.

Mayeh, M., Ramayah, T., & Mishra, A. (2016). The role of absorptive capacity, communication and trust in ERP adoption. *The Journal of Systems and Software*, 119, 58–69. DOI: 10.1016/j.jss.2016.05.025.

Microsoft. 2018. Microsoft Dynamics Academic Alliance. Retrieved May 20, 2018, from https://dynamics.microsoft.com/en-us/academic/

Montgomery N., Anderson R. P., Kostoulas, J. & Woodyer, A. 2018. High-Tech Tuesday Webinar: Best Opportunities and Bets for Growth in Enterprise Resource Planning. Retrieved May 20, 2018, from https://www.gartner.com/doc/3640429?ref=SiteSearch&sthkw=postmodern%20erp&fnl=search&srcId=1-3478922254.

Oracle. 2018. Oracle Univrstiy. Retrived May 20, 2018, from http://education.oracle.com/pls/web_prod-plq-dad/db_pages.getpage?page_id=3.

Pijpers, G. G. M. & Montfort, K. (2006). An investigation of factors that influence senior executives to accept innovations in information

technology. *International journal of management*, 23(1), 11–23.

Poon, S., & Swatman, P. (1999). An exploratory study of small business internet commerce issues. *Information & Management*, 35(1), 9–18. DOI:10.1016/S0378-7206(98)00079-2.

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). SmartPLS 3. Boenningstedt: SmartPLS GmbH. Retrieved February 8, 2016, from http://www.smartpls.com.

Rogers, E. (2003). *Diffusion of Innovations* (4th ed.). New York: The Free Press.

SAP. 2018. SAP Universty Alliances. Retrieved May 20, 2018, from https://www.sap.com/training-certification/university-alliances.html.

Scott, J. E., & Walczak, S. (2009). Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance. *Information & Management*, 46, 221–232. DOI: 10.1016/j.im.2008.10.003.

Shih, Y. Y., & Huang, S. S. (2009). The actual usage of ERP systems: An extended technology acceptance perspective. *Journal of Research and Practice in Information Technology*, 41(3), 263–276.

Shivers-Blackwell, S. L. & Charles, A. C. (2006). Ready, set, go: Examining student readiness to use ERP technology. *Journal of Management Development*, 25(8), 795–805. DOI: 10.1108/02621710610684268.

Simon, S. J. & Paper, D. (2007). User acceptance of voice recognition technology: an empirical extension of the technology acceptance model. *Journal of organizational and end user computing*, 19(1), 24–50.

SMRC. (2017). ERP Software Market Report 2017, Trends, Analysis, Share, Estimates and Forecasts to 2022. Statistics Market Research Consulting. Retrieved June 5, 2018, from http://www.mynewsdesk.com/us/pressreleases/erp-software-market-report-2017-trends-analysis-share-estimates-and-forecasts-to-2022-2287038.

Sternad Zabukovšek, S., Gradišar, M., & Bobek, S. (2011). The influence of external factors on routine ERP usage. *Industrial management + data systems*, 111(9), 1511–1530. DOI: 10.1108/02635571111182818.

Sternad, S., & Bobek, S. (2013). TAM-based external factors related to ERP solutions acceptance in organizations. *International Journal of Information Systems and Project Management*, 1(4), 25–38. DOI: 10.1016/j.protcy.2013.12.004.

Sternad, S., & Bobek, S. (2014). Comparative analysis of acceptance factors for SAP and Microsoft Dynamics NAV ERP solutions in their maturity use phase: enterprise 2.0 issues. In M.M. Cruz-Cunha, F. Moreira, & J. Varajao (Eds.), *Handbook of research on enterprise 2.0: technological, social, and organizational dimensions* (pp. 389–415). Hershey, New York: Business Science Reference, IGI Global.

Sun, Y., Bhattacherjee, A., & Ma, Q. (2009). Extending technology usage to work settings: The role of perceived work compatibility in ERP implementation. *Information & Management*, 46(6), 351–356. DOI:10.1016/j.im.2009.06.003.

Thompson, R., Compeau, D. & Higgins, C. (2006). Intentions to use information technologies: an integrative model. *Journal of organizational and end user computing,* 18(3), 25–46. DOI: 10.4018/joeuc.2006070102.

Tornatzky, L., & Fleisher, M. (1990). *The process of technology innovation.* Lexington: Lexington Books.

Venkatesh, V. & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, 39 (2), 273–315. DOI: 10.1111/j.1540-5915.2008.00192.x.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science,* 46(2), 186–205. DOI: 10.1287/mnsc.46.2.186.11926.

Venkatesh, V., Morris, M. G., Davis, F. D., Davis, G. B. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–479.

Yi, Y. M., Fiedler, K. D. & Park, J. S. (2006). Understanding the role of individual innovativeness in the acceptance of IT-based innovativeness: comparative analyses of models and measures. *Decision Sciences*, 37(3), 393–426. DOI: 10.1111/j.1540-5414.2006.00132.x.

Youngberg, E., Olsen, D., & Hauser, K. (2009). Determinants of professionally autonomous end user acceptance in an enterprise resource planning system environment. *International Journal of Information Management*, 29(2), 138–144. DOI:10.1016/j.ijinfomgt.2008.06.001.