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Ph.D. Dissertation in Engineering

An empirical study on education management framework toward cloud environment

February 2018

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이 논문을 공학박사 학위논문으로 제출함

2018년 2월

서울대학교 대학원

협동과정 기술경영경제정책전공

SIMEON VENTSISLAVOV ARNAUDOV

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February 2018

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Abstract

An empirical study on education management framework toward cloud environment

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Academia has recently explored an efficient way to utilize information technologies for teaching and learning. Individuals and organizations have experienced different benefits of adopting digital technologies and their attitudes to use digital technologies have changed as well. This paper investigates project development success factors, which are aimed to carry out public education service built on a cloud environment

Depending on the purpose of technology use, literature identify two roots of behavioral studies on technology adoption, such as individual and organizational. Individual or hedonic purpose to adopt technology sought easiness and enjoyment. This believes is used to investigate mainly individuals' attitude to technology use. Utilitarian purpose of use, seek

efficiency and benefits of technology acceptance. Technology adoption in organizational level is described by utilitarian models, because such studies are only focused on efficient use of technology.

Research objectives are observing behavioral and information system success factors applicable to organizational level of technology adoption. Research ultimate goal had being to facilitate the implementation of cloud technologies into mandatory education service of regional organization only, such as European Union. A Baccarini' framework approach was utilized to analyze project goals and technology use of the 59 selected cases. The results are reported in term of four framework statements, describing project's goal, purpose, output and input, and influenced the Research model built on theory of technology acceptance in organizational level (DeLone & McLean, 2002; 1992).

The structural question modeling and confirmatory factor analysis confirms that customization, interdependency and peer influence have a positive impact on project and technology implementation in the organization. However, superior influence and self-efficacy of the school principal has an influence only on project implementation. Study implications and limitations, and future research are also discussed

Key words: technology acceptance success factors; collaboration and project development; behavioral economics; cloud technologies in public education;

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Chapter 1 Introduction

1.1 Overall introduction (cloud technology benefits)

Technology acceptance in education sector with individual or organizational behavior of information technology use had being influenced the digital technologies for better (Ketel, 2014). Vast adoption of Internet and technology diffusion, such as distributed computing and device portability engage individuals by using them to learn, create, disseminate instructions and learning content (Selim, 2007). Today, e-learning have many models and turned as useful tool for teaching and learning. E-Learning technologies can reduces class room and facility cost, training cost, travel cost, labor cost (Ruize et al., 2006).

The economic perspectives makes the digital technologies important, for example, management of distributed computing resources had offered different business opportunities and economic models. Cost model as pay per use had boost fast adoption of cloud computing in business and research organizations (Bañares et al., 2016; Gonzalez-Martinez et al., 2015). Implementing such model into public education, public schools might benefits from improving service efficiency and reduction of service cost. Such reform might provide to technology suppliers and technology owner access to new market of educational services.

The research goal is to reveal the success of public organizations as

components of project development and technology implementation.. First part of the research (Chapter 3) is focused on an analytical study of present accomplished projects in European Union member states. From the framework method analysis were accumulated knowledge of how those technologies were implemented to the domain of education, who is implementer, and what the purpose of use is. Thus, the analytical findings will provide motivation for quantitative study at Chapter 4 & 5. In Chapter 3also are reviewed present trends, opportunities and limitation of e-learning in the cloud technologies

Chapter 4&5 provide quantitative study on external factors that could have impact on e-learning in the cloud implementation to junior, middle and high school in Republic of Bulgaria. Discussion and implication are provided in Chapter 6&7.

1.2 e-Learning in the cloud

The infusion of distributed computing, open source software, automated systems and abilities to leverage economics of scale drive the cost efficiency of cloud computing and make them an attractive solution for educational institutions. The convergence between connectivity and intelligence into Ocean of Internet of Things (IoT) create new opportunities to every intellect for digital automation.

Even it is not completely new concept the literature did not show universal standard definition of cloud computing (Foster et al., 2008; Marston et al. 2011; Sultan, 2010). In other hand smaller education institution such as junior or middle schools do not have abilities and knowledge to make successful implementation and to maintain them (Ketel, 2014), or neither to have research and development team, who to develop their own cloud based solution. Security and data privacy is another issue (Mousannif et al., 2013), which we are not discussing in this paper..

1.3 Research motivation and objectives

Literature of e-learning technologies reported that learners are accepting faster than public schools. A number of academic studies claimed that digital devices, such as notebooks, smart phone, e-readers, tablet, and online social networks, such as Facebook, YouTube, and mobile application are wide accepted as individual e-learning solutions. However, academia did not do much to investigate the wide acceptance of e-learning technologies into organized public educational, especially in small organization such as junior or middle schools. In innovation diffusion theory Rogers (1995) argues that from innovative technologies individuals benefiting before organizations. This is because technology acceptance in individual level is result of individual preferences, but in organization is flow of process including project planning, development and implementation.

Academia proposed different methods, theories and frameworks to identify users behavior and users attitude to technology use in individual or organizational level, such as diffusion of innovation (Rogers, 2004), technology acceptance morel (Davis, 1989), Information system success model (DeLone & McLean, 1992), theory of planned behavior (Ajzen, 1985), social cognitive theory (Wood & Bandura, 1989) and Technology-organization-environment framework (Tornatzky et al., 1990)]. Rogers (1994) classified the two types of behaviors: hedonic as individual behavior of technology use; and utilitarian as organization behavior. Rogers (1994) divided individuals in five scales in mater of their stage of adoption from early adopter to late adopter. Individual attitude to adopt technology is drive by his/her easiness, joyfulness or playfulness to use that technology. In contrast, with technology adoption organizations seek usefulness and efficiency, such as cutting cost and maximizing output. In summary of above studies Petter et al., (2008) and Seddon (1997) commented that few studies on acceptance of information technologies are done in organizational level.

Public educational institutions are not technology developers; usually they purchase and implement technologies. Main goal of public education is not to develop digital technology, rather to provide quality education service to the community. Public education is organized network of junior, middle and high school, and universities, financially supported from government budget. Usually, in public sphere new technologies are adopted after upgrading government strategy for national development, project planning, procurement

and project development. National legislation framework and technology standards orchestrate such process. Strategy accomplishment, technology acceptance and project development in sphere of public education had being managed inefficient, because of poor project analyze or project management (Nikolaeva, 2011, 2012; 2006). Good practices of project development in public sector shows the positive impact of collaboration, where project product might be an output of customize commercial technology with inventing new engineering idea (Lyytinen et al., 2015; Yang, 2015).

In the data base of behavioral economics theories provide wide number of factors that describe user behavior in accepting or rejecting technologies, such as perceived usefulness, self-efficacy, social norm, task technology fit, net benefits and information system implementation success. In our knowledge, there were no single study applied this entire factor into organizational level. In summary, objectives of this research are to identify from previous studies factors that had impact on project development and technology implementation. Second is to compute them in single model. The results will be used to recommend appropriate factors that could be useful in measuring technology acceptance in organizational level.

1.4 Research question

According to the objective of this study are addressed two research questions:

Firstly, the research would investigate how collaboration in project development influence technology acceptance into in-class public education? What are accepted technology design and reason of use of cloud technologies into education domain? Expected results are to underline the way of project development in which educational system had accepted e-learning technologies and to understand e-learning in the cloud. In addition to discuss how authorities support technology adoption, and what technologies are accepted.

Second, the research would ask what heterogeneous success factors had impact on decision maker behavior in practicing information technology implementation projects.

Lastly, the research would answer the question, how this factors influence the organization net benefits with adoption education in the cloud technologies?

Based on research objective we build eight research hypotheses, described in Section 4.

1.5 Research contribution

Research goal is to provide comprehensive study on success factors that have impact on technology implementation from organizational point of view. According to Petter et al., (2008), there are few studies that consider such a relationship, and investigates organizational attitude to implement

technologies in organizational level. Another contribution is to deliver updated research on difference between utilitarian and hedonic use of information technologies.

Results of current research have to underline the way in which organized educational had understand e-learning in the cloud, and how authorities support technology adoption and project development in collaborative manner. Thus, based on results should be addressed policy recommendation with regional and international level. Those recommendations must be useful in developing appropriate policy framework that support information technology implementation and project development for small educational institutions.

Currently public education sector is unattractive to technology companies, because of its low profit characteristics. Motivated by this, outcomes of this research have to building an attractive academic background for knowledge exchange between public education and IT professionals; in aim this background to be use for consequent social innovation in the sector.

The theory background and the field which was applied here had influenced the methodology of collecting data. In behavioral economics studies is accepted survey as collecting method. The survey was built on adopted questioners from previous studies, and survey recipients were school principles (the reason why school principle is appropriate receiver is explained in Chapter 2, article 2.3.2). Survey's goal was investigate factors that measure decision maker influence in successful technology

implementation. The survey questioner was designed in the way that school principles answer from the point of adopter of information technology.

Research benefiters are public authorities, technology owner and public education as technology implementer. Research results would enhance more efficient implementation of cloud technologies in educational organization, with discussing organization net benefits from technology adoption. For example with implementing cloud based e-learning technology might be possible to create learning/teaching content in more easy way, and by thus it is likely to increase new skills of user behavior with creating learning content. In general, successful implementation of such technology can be basic factor for sustainable development, which directly results from the quality of junior, middle and high school education. Such digitalized education environment directly influences the expertise and skill of future labor power. Another issue, with development of public education is likely to prevent the case of students to drop school, with offering distance service, or out-class learning. Results of this topic could be beneficial not to public education sphere only, but also have to contribute to ICT industry as well.

1.6 Research organization

In Chapter 1, will be discussed research motivation and research objectives. Goal of the chapter is proposed the thesis research question, research limitation, and will be discussed research expectation, and contribution to literature. In figure 1-1, is proposed framework of thesis organization.

In chapter 2 is provided summary of previous literature on information system success model and planned behavioral studies. Provide theoretical explanation of different factors that determine information system project implementation success. In complementary will be discussed the relationship between different factors, which was observed from previous literature.

Chapter 3 is providing literature review on homogeneous and heterogeneous studies of digital technology adoption, collaboration practices and project development into education community. Chapter' goal is to provide case study analysis based of Baccarini (1999) logical framework method, and in addition to do investigation the purpose of e-learning in the cloud in schools located in single market; and provide comprehensive analyze of current e-learning technology generation. Findings of this chapter enhance quantitative research model design.

In chapter 4 are discussed exogenous and indigenous variables for Quantitative research model, and behavioral economic theories used to build our research concept.

In chapter 5 is discussed the whole process of data collection. Including literature supported explanation of Structure Equation Modeling (SEM), Confirmatory factor analysis (CFA) and Exploratory Factor Analysis (EFA). Here is proposed Quantitative research model with its research hypothesis. Disseminated survey questionnaires are shown in Appendix B.

In chapter 6 are discussed empirical result findings and local and global fit indexes. The reason of global and local fit index comparison is to prove evidence of data and hypothesis reliability. In the chapter are describe the data collection mechanism, and the process of survey development.

Chapter 7 provide summary of research results and discuss of most relevant and important findings. In the chapter are discussed what was solved from research question, and are point valuable research limitation. In recommendation part are offered policy recommendation.

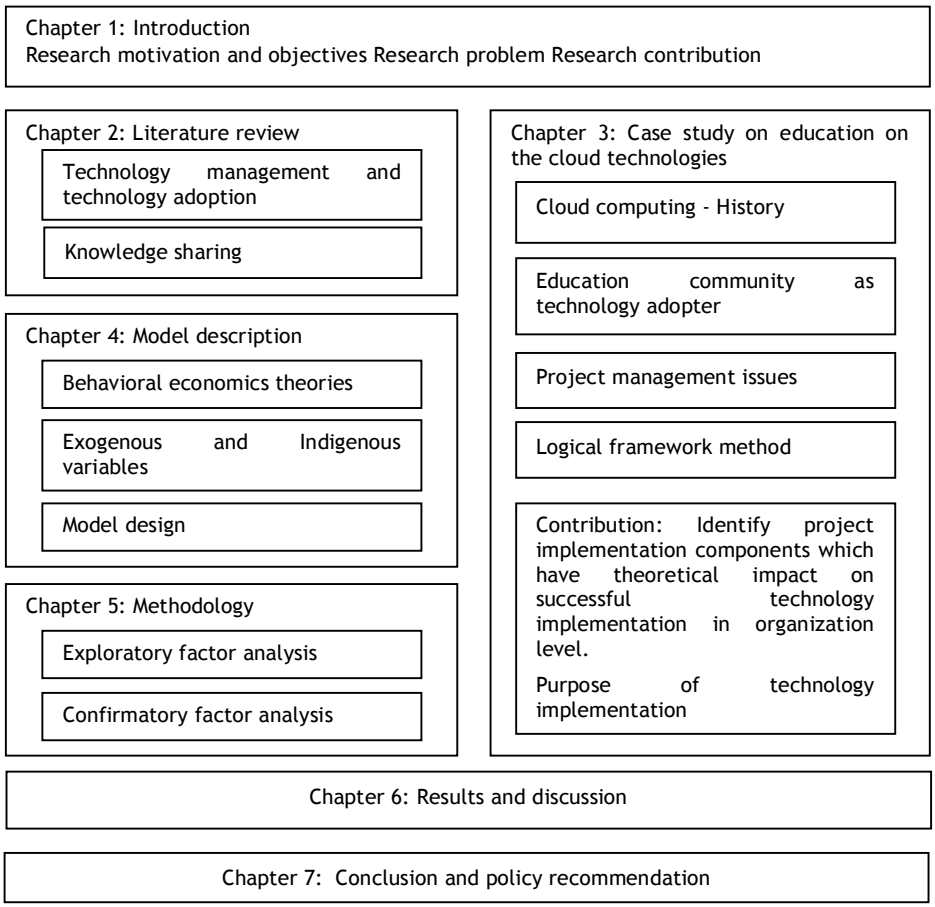


Figure 1-1: Research analytical framework

Chapter 2 Literature review

Individuals have become accustomed to the device portability. Accessibility to the Ocean of software applications, and broadband infrastructure reshape user's daily lives in different ways. Recently academia is focused to explore the barriers in utilizing e-learning in the cloud among teachers, learners, and teaching and learning practices in local communities. In economic and management literature distributed computing is used as resources of new business opportunities, and business models such as pay per use boost the fast adoption of cloud computing in the business and scientific research organizations (Bañares et al., 2016).

Barriers toward educational technology use are addressed indirect to in room education practices as technical support, administrative support, accessibility and individual skills as computer self-efficacy. Academia observed number of problems that can be part of the process of education project management (Nikolaeva, 2011). Public projects suffered of inaccurate of poor project analysis, planning and implementation which lead to ineffectiveness of publicly funded education projects.

Acceptance of e-learning as teaching and learning practice introduced new individual and organizational behaviors (Petter et al., 2008). Diffusion of innovation theory (Rogers, 1995) had identified two groups of behaviors, divided by the way how individuals use technology: hedonic and utilitarian. Hedonic behavior of technology use define individual attitude to use driven by

easiness, joyfulness or pleasure of technology use. In contrast, utilitarian behavior study observed efficiency and usefulness from adopted technology.

Individual learning differs from the service offered by public institutions. Difference could be finding not only in the methodology applied to learning processes, but also of the way of using information technologies involved in that process. For example, individual adopts e-learning technologies based on his personal interest, and when he loses confidence on that e-learning service, he substitutes the service with its rival.

Public education is offered as mandatory service for all, and public e-learning technologies are easier to be rejected from learners than to be changed from them. Technology adoption in public education domain so far is marginal due to the difficulties of understanding the risk of information technology adoption with predicting the student behavior of technology use, for example if students accepted digital technologies for enjoyment rather than for studying, because individuals has hedonic behavior (Heijden, 2004).

In study of organizational learning was proposed organizational learning theory (Levitt & March, 1988), where main idea was to discuss how organizational experience enhances organizational learning. There, Levits and March claims that organizations can learn from others as well. The theory was used to build framework of implementing that knowledge (experience) into way beneficial for the organizations.

The concept to learn from others is not new, main challenge of this process is to accept that knowledge in appropriate and efficient way, otherwise complex ideas or solutions could corrupt the environment in which organization work efficiently. Investigating the field of cognitive behavior, Zmud (1979) built a novel concept, where individual's cognitive behavior observe inconsistence between internal and external environment, and observe individuals decision of what is perceived as transparent to the both sides. Naturally, organizations support decision making activities,, and Zmud proposed three independent variables which support this process: information perceived; decision aids perceived; decision interface. This concept is known as Information processing theory.

In information processing theory is applicable to research of individual attitude to innovations and technology adoption, because the theory explained different types of memory structure, and the way to utilize this memory. Memory utilization is function of how data is perceived, organized and retrieved. Another theory that supports decision making in personal level is behavioral decision theory, which concept is based on the process of incorporating beliefs and values into decision making.

2.1 Technology management in terms of education

2.1.1 Innovations, decision making and project management

Public organization are mainly from the demand side of innovation, and usually do not create innovations, and school' innovativeness is more

dependable of the behavior of their decision body. Among the critical success factor concept in public organizations, literature report additional factors that influence successful implementation of technologies (Bechor et al. 2010). According to Rogers (1995) and Mytinger (1968), there are three types of innovation-decision in the organization decision: optimal; collective and authority. Public schools as solid network of individuals who works to achieve common goals together with entire members of school network are weighted by hierarchy of ranks and division. Such network has authority innovation decision making process and their innovativeness depends on their size (number of students, number of classes, subjects, curriculums).

Academia has massive number of studies on the processes of project management and project effectiveness. Consolidated opinion claim that the projects suffered of inaccurate of poor analysis, planning and implementation. In aim to solve those boundaries (Butler & Fitzgerald, 1999) studied the critical success factors (CSF) concept of project development as generic. In project development of information system generic success factors are identified such as an appropriate level of vendor support; overcoming technical obstacles related to technology adoption; solving inter-team conflicts; project management with clear project goals; well planned project agenda, and responsible project development units.

Literature of defined the decision making of adopting desirable technology on which organizations could enforce its long term goals, activities and polices as strategic information system planning (Bechor et al.,

2010; Grover & Segars, 2005). Bechor et al. (2010) investigates the importance of three key success variables that had impact on information system implementation planning. First key factor is the level of individual participation, and high level of participation is recognized as effective factor for IS implementation into organization. Second factor is planning approach, which measure decision variables that had direct impact on the project map of technology adoption. Organization goals are the driver and technology is the executer of organization mission. Last factors are those related to the organization environment, such as business strategy, heterogeneity, dynamism and hostility, including goals and policy framework.

Grover and Segars (2005) discuss effectiveness of technology adoption as three steps of information system (IS) planning: preliminary, evolving and mature. In preliminary planning it is characteristic of decision makers with little experience in technology management. Here organizations make first steps of policy (internal) management. In next step planning activities are in stage of testing, decision makers gain first experience in information system planning and technology implementation. Last step accumulate all gained experience and acquired new skills as practice of long history of planning activities. Result is well developed policy (internal) and refines procedure of technology implementation.

2.1.2 Observation on project management

Richard Katz (2010) notice that IT experts in higher education are not highly skilled in management of technology risk and service performance, and this turn to threats the return of project investments and also affect after implementation period with unprofessional equipment maintenance and poor service support to system users. To avoid these issues, it is recommendable to education authority's to export complex solutions to project partner(Butler & Fitzgerald, 1999). Information technologies and in particular the concept of cloud computing (Bañares et al., 2016) has this feature with extending IT support to third collaborative party, and with addressing service support to external expertise.

Paraphrasing Simon (1973) and adapting his thoughts to the field of education and information technology project development, accordingly project developers are more sensitive to indirect causalities of educational system such as dropping school students, closing schools units, or level of school scores, than to direct consequences as project efficiency. In another research of Baccarini (1999) confirmed that project management success response to project completion in time or within budget as success. Indeed true for public sector projects. Project decision making process differ than the process contributing rather they are directly related, and the focus is in the final output, because it is tangible and it results the whole organization activities.

Research goals of this paper are not related to objectives that describe how to learn efficient via digital technologies, rather to accumulate knowledge of decision making during information technology implementation in public education, and to find measuring factors of successful implementation of information system into public education. However, Shenhar & Dvir, (1996) warmed that in analyzing the process of project implementation, project management success could mismatch product success, because even though the project has been managed efficiently (complete in time, or completed without to exceed the budget) it is possible the results not to meet customer or organizational expectations (Nikolaeva, 2011). It is also necessary to investigate variables that measure the degree of benefits which organization might gain with adopting e-learning in the cloud.

In Chapter 4 is underline the technology characteristics of digital education development and purpose of education on the cloud project development with conducting logical cross-analyze study of currently implemented e-learning in the clod projects with resuming organizational purposes, technology design and with visible collaboration settings.

2.1.3 Characteristics of public education service development

Developing cloud education services also consider investments in technology, for example hardware, software, licenses, learning materials, equipment, maintaining and training. For better implementing those services

into class room, academia proposed success factors that affect successful acceptance of this technology; there are varieties of factors because they differ on different objectives. Those variables was grouped to technology factors (ease of access, support interaction, design) instructor characteristics (attitude toward students, teaching style, technical competence, encourage student interaction) and student characteristic factors impact e-learning effectiveness (Volery & Lord, 2000). Later Selim (2007) extended those findings with adding additional factor of institution support. Institution support such as technical support, computer availability, learning materials, acceptability and printing had impact on individual perception of information technology as learning tool.

In contrast to them, Bhuasiri et al., (2012) grouped those success factors from organizational point of view. In that way was identified three main dimensions that affect successful acceptance of e-learning technologies in school, there are personal (instructor and learner characteristics and their intrinsic motivation), environmental (e-learning environment) and system (infrastructure and system quality; content and information quality; institution and service quality).

In chapter 4 will be discussed some factors that measure relationship between technology fit, interdependency, subjective norm (peer and superior), and self-efficacy to project implementation success, organization success and perceived net benefits of cloud technology.

2.2. Technology adoption theories

This paper investigates the concept of public educations (as organization) behavior of intention to use cloud technologies, with clear understanding in action (using); target (technology); context (all the time in class); time (during semester).

Behavioral theories are effective to investigate change of user attitude believe, and influence form others in making decisions. Behavior theories are used to investigate intention of use of information and communication technologies (ICT), or discuss the individual believe, skills and decision making on self-control and management of ICT (McAlister, Perry, & Parcel, 2008). The extension modelsas Trans theoretical model (Prochaska et al., 2001) identify factors of behavioral transition that depends on information, attitude, change and development of new personal abilities. In general, most of behavioral economics and technology adoption studies are based on individual level, and very few deliver comprehensive research on organization level (Petter et al., 2008; Seddon, 1997).

2.2.1 Theory of planned behavior

Theory of planned behavior (TPB) specifies the nature of relationship between individual beliefs and attitude. User attitude is determined by accessible belief of individual behavior, and individual belief as user subjective opinion, that individual will produce a certain outcome (Ajzen & Fishbein, 1975). Outcome expectation originates from expectancy-value-

model, and it is link between attitude, believe and expectation. In TPB positive evaluation of self-performance of the particular behavior is similar to perceived benefits, where perceived benefits are measuring the effectiveness of proposed preventive behavior in reducing vulnerability of negative outcome.

On study of how information system support creating firms employee's knowledge and storage firms knowledge with aim to increase firm efficiency (Benbya et al., 2004), the object of technology was investigated as tool for gathering data, transforming that data to information and managing this outcome as knowledge in firm's processes. The study recommended that technology use in such way is accepted as positive tool for increasing firms' effectiveness.

2.2.2 Cognitive theories

In the center of social learning theory, where the individual's learning abilities to established framework of self-learning in the boundaries of human social context. Bandura (1996) revamp that theory with defining social cognitive theory. In concept of cognitive psychology the novelty was to converge the growing understanding of interaction of human and information processing capacities with taking into account learning from experience, observation and communication. Later, in this context the theory embraced the adaptive capacity of social groups and society (McAlister et al., 2008).

Social Cognitive Theory (SCT) (Bandura, 1989) defined individual's values and self outcome expectation as subjective, because individual

behavior of consequence movements is influenced not only from the environment, but also from how individual understand it. Individual behavior is subjective, and individual outcome expectation it's held by its own believe, individuals decision is enhanced by their value of the subjective outcome expectation, that individual will perform a particular action to achieve that outcome. In academia similar idea is popular as value expectation theory.

In accepting cloud technologies as working environment, SCT is applicable as decision models, because the theory describes how individuals visualize and work for fulfilling long term goals, and to ignoring short term benefits. For example, in technology acceptance in organizational level, decision makers make decision to accept technology but employees who are forced to use the technology accepts or rejects the technology first. In literature of SCT factor as social outcome expectation is understood same as in the theories of theory of reasoned action and theory of planned behavior. This factors measure the degree of individual expectation in measuring others behavioral and willingness to be followed by them. This factor could be applied to community with existed hierarchy.

In studies of Bandura (1996) and Fernández-Ballesteros et al., (2002) the concept of perceived efficiency was extended to collective efficacy. Previously, collective efficacy was used to demonstrate how people work in organization and their political participation to achieve organizational goals. In another study was confirmed new model of individuals goals achieved only by working with others (McAlister et al., 2008). In the early application of SCT the models was developed to investigate the individual behavior

(Schunk, 1987), and later the theory was explained with evaluating the relationship in how factors as individual and environment behavioral influence each other (Bandura, 1989, 1996).

Into domain of education SCT was used to investigate the school principles outcome expectation and self-efficacy of adopting information technologies for educational purpose in developing countries. In another study the theory was used to extend the area of application with new factors as perceived impressionability, perceived difficulties, perceived benefits and perceived barriers (Glanz et al., 2008).

In this study factors as behavioral relationship was used to investigate individual factors as self-believe and self-outcome expectation in achieving organizational goals.

2.2.3 Information system success models

First DeLone and McLean model (D&M) was proposed as extension of technology acceptance model, and in second revision the model was updated with adding new variables which had impact on information system success implementation. In the original D&M model dependent variables are system quality, information quality, use, user satisfaction, individual impact and organizational impact.

In literature of successful implementation of innovations, Aubert and Hamel (2001) claim that innovations are ready to be adopted if factors as intended user value, norm, believes and perceived needs are observed in the environment where the technology is proposed. Cause of complexity of

innovations, the technologies which are easy to use, are more likely to be adopted successfully, rather than complex innovations.

Information quality is measuring user performance in using system information, and perceived usefulness measure an individual behavior intention to use e-learning system (Liu et al., 2009; Ong et al., 2004).

Taylor and Todd (1995) extended the theory of diffusion of innovation (Rogers, 1995) and discussed degree to which an innovation had impact on some economic factors. In Davis' (1989) technology acceptance model, factor of perceived usefulness were define as degree to which a person believes that using a particular system would enhance his or her job performance. Taylor and Todd (1995) recognized behavioral intention as mediator of attitude, subjective norm and perceived behavioral control.

2.2.4 Innovation theories

Today vision of digitalized learning is bundle of services provided by independent agents. Mobile Internet, popular online social networks, different mobile platforms drive the trend in digitalizing traditional education. Unfortunately, the current digital market did not provide a solution for fully digitalized school. However, is complex to justify the quality of digitalized education services it is far more complex to measure the quality of service in fully digitalized school (Roca et al., 2006), but is measurable to identify the key success factors of adopting e-leaning to public school (Bhuasiri et al., 2012).

e-Learning in the cloud is the e-learning solution which simulate all school patterns into virtual world. Individual acceptance of e-learning services is known as product of user intrinsic motivation (Deci et al., 1991). Individuals accept technology faster organizations.

e-Learning in the cloud is complex idea. In public schools digital technologies are accepted as tool for providing educational service, in the sense that such a service virtually simulates school activities (or school institution). Schools adopt this technology trough project implementation, and school as project developer and adaptor is understood as solid organization with self-representative function, delegated budget and decision making, which provide flatly accessible and qualitative service to local community. In this thoughts, Mulgan and Albury (2003) claimed that such school community is homogeneous, where the education service looks more like "one size fits all", because the services is same for all users (or subscribers/ students/ learners), which is true for traditional education, where in the past information technologies were not involved into service development, because there was no need, technologies were expensive, or technologies was not enough develop to make remarkable changed, and that time education service had based on knowledge banking concept (Freire, 2005).

Diffusion innovative theory shows that homogeneous communities were always late adopters. In contrast Simon (1973) pointed that in heterogeneous communities where knowledge is transformed from one to another and information is flow of data, which is easy to disseminate inside the community, makes them to have high degree of innovation diffusion

(Rogers, 1995). Rogers goes further with differentiation the groups of late and early adopters. Depends of technology adoption speed, he identified two groups of users: homogeneous and heterogeneous communities.

Homogeneous groups are formation of individual whose are share similar attributes such as belief, education or socioeconomic status (typical for later adopter groups). In contrast heterogeneous group members has degree of differ attributes. Innovation spread faster in heterogeneous groups, because decision of adopting technology is subjective and it is easier to imitated experience from other group members, where peers differ by experience, information and knowledge (typical for early adopter groups). Similar logic applied to project development team from single public organization (as solid organization of teachers and students, we take the school community of teachers as homogeneous group, and community of teachers and students as homogeneous community). Previous studies claimed that member's o homogeneous community experience lack of knowledge, which influence their ability to implement the strategic technological solutions. In this study, a project developed by such group, is considered as non-collaborative project (check 3.3.2). In contrast, same logic applied to collaborative project development between two different homogeneous communities such as public organization and technology developer, make a project team of heterogeneous peers, because in similar group the members would have differ attributes and there will be available virtual environment of information sharing, the project members are limited only to their own experience and knowledge and their own abilities to implement strategically appropriate technology solutions. For

example, if schools as homogeneous communities are not practicing technology adopting in time they are intend to increase its service cost (Mulgan & Albury, 2003).

Early education in the e-learning could gain level of competitive advantage among later adopting it. Knowledge and speed of information exchange in project development is critical in decision making, and project process flow "create-evaluate-analyze-apply-understanding-recommend" (Alexander & Golja, 2007) that would help project development, implementation and management. In addition (Yang, 2015) had offered development framework for original equipment under collaborative settings. In this case she has to hire external professional, such as professional designer to improve the product offered by local communities, because they as homogeneous group had limited experience, for example marketing or product design, and lack of knowledge for current technology and product trends. Her research confirmed some limitation of project development in heterogeneous group. For example complicated ideas of improving product design are not always suitable for commercialization. This result could devaluate the product impact in the community. Another is that complicated ideas do not bring immediately sustainable effect. She concludes that even though, collaboration could born creation of new social enterprise, small innovative ideas are difficult to be manufactured in single design product. In another example of heterophile collaborative project was involved pool of diverse knowledge and physical resources inside and outside of project team experts (Lyytinen et al., 2015). To design city car they involved experts from

different fields, such as urban planning, architecture, industrial design, material science, electrical engineering, mechanical engineering, software engineering, energy policy economics, and management.

2.3. Education development: Case of Bulgaria

Wide acceptance of Internet technologies for personal use influenced the effective implementation of digitalized into public services. For boosting technology acceptance in public organization simultaneously, while this broad acceptance of ICT is in progress there is need of development of appropriate policy, and open discussion with professionals in the field of IT infrastructure and IT technologies. IT professionals would handle those technologies and utilize them in relevant administrative public services.

In case of Bulgaria, ICT technologies are wide accepted and Ministry of education and science (MoES), which is the legal authority, that proposes legislation and regulatory acts for public education, had build national strategies and legislation for information technology implementation in national level. In addition, the ministry has to provide public available modern educational, which offer scientific content and information.

2.3.1. Strategy for effective implementation of ICT

In January 2014 MoES introduce national strategy for adoption of information technologies to Bulgarian junior, middle and high schools. The strategy was product of Ministry' analyzes of variety of processes done during

school digitalization. Results of this analyzes observed a number of serious problems that require quantitative and qualitative change in the approaches of technology adoption and technology use in teaching and learning practice. They also concluded that it is necessary to draw framework of appropriate legislation that support and manage whole process of school digitalization.

In summary the national strategy' goal was to achieve coordinate planning and implementation of ICT. Process of ICT implementation includes school principal projects development with national or European Union funding. To achieve this, MoES had being announced good will to attract all potential participants to support the strategy, such as parents, educational organizations, non-government organization, technology developers and entire education employers and employees.

In aim to support the strategy, MoES develop three documents. They had formalized two additional papers that describe and guide the efficient implementation of ICT acceptance strategy and update the National Act of Public education. Firstly, on September 2015 was published manual for implementation of e-learning during period 2015 – 17 year. With the paper the government had emphasized on the good benefits of ICT, and the benefits from ICT use. The paper just had updated the current strategy, and strongly supported ICT implementation through project development.

Secondly, on September 2016 was published Directive 12, which is the first legislative paper which drive framework of ICT implementation processes. In the Directive, were discussed the processes and disseminated

rules and define who could participate in the process. The Directive clearly shows that the School Principals are receiving public budget and they are the official authority to decide how this budget could be spent for fulfilling their organization needs. The school principals had authorized to plane and execute the ICT strategy, including emerging project development and project participation with other public of private organizations. The strategy encourage project partnership between different all potential participants, such as parents, educational organizations, non-government organization, technology developers and all education employers.

Lastly, the update of national law of public education will be summarized in next section.

2.3.2. School principles and The ICT implementation strategy

According to National act of public education of 2016 (Republic of Bulgaria), § 280, 3, 4d, page 103, to School authority, which is represented by the School principal, is delegated a government supported budget for fulfilling national strategies and programs for education development. In same act in § 280, 1,page 103, formalized that the source of financial support for public schools could be from government budget, municipality budget, European Union funds, donations and others.

In addition at National act of public education of 2016 (Republic of Bulgaria), § 289, 1, 3d, page 110, School Principle had the legal right to

dispose the financial budget of its school. Later in Directive 12, published together with National act of public education, was justified how school principals could dispose those financial resources. This was confirmed in § 7, 4d, page 6, where was confirmed that the school principal is organizing, coordinating and participating in whole project development processes.

National legislation framework formalized School principle as the decision maker who has to develop projects and has to implement them into education organization. The school principal has to decide what ICT solution could benefit and increase the efficiency of learning/teaching processes. School principles are the main actor and contributor of successful fulfillment of the national strategy of ICT implementation into education sector.

In summary, the School principal in Bulgaria is the main actor of accepting ICT solutions into school organization. According to research objectives the school principle would be the best respondent of our designed survey (Appendix C).

2.3.3. Education development among EU member states

Relatively recent study done by European SchoolNet, (initiatives funded by European Commission) shows that Bulgaria is one of the last places in Europe in term of available computers in class and opportunity to use computers in-class for teaching/learning. In the Bulgarian mainstream

schools, 11 students share one computer or terminal space, while the average for EU is five students per computer (Fig. 2-1).

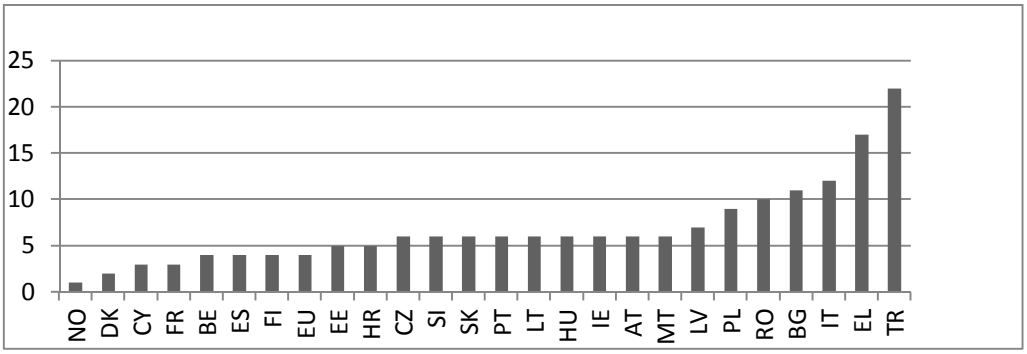


Fig. 2-1. Ratio computer per students in EU member states (Eurostat, 2011-12).

Analysis of Bulgarian education system done from MoES show that there are no integrated systems for process control in education and science, there is no real automation of administrative resource; digitalized teaching or learning; and in general the report shows lack of adequate policies for ICT development at local, regional and national level.

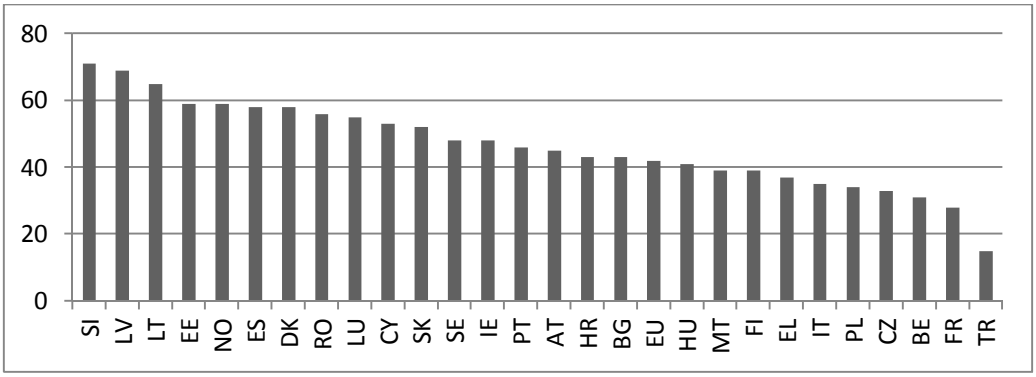


Fig. 2-2. Teachers participation in courses on the pedagogical use of ICT in teaching and learning (in % of students, grade 11, by country, 2011-2012, Eurostat)

Another results show that there is a significant shortage of qualified IT specialist who sharply felt in all sectors of education and science and is

necessary for paper functioning of constancy, but developing ICT infrastructure and services. Problem is lack of system for permanent qualification of education specialist for efficiency use of modern ICT technologies in school. Last observed problems is lack of sufficient quantity, quality, compatibility and interconnection online digital content to adequately conduct educational and scientific activities in line with the freight-defense dual trends and continuing education and lifelong learning (Fig. 4-2).

2.4 Knowledge transfer

Organization in its life cycle processes generate, track and stored useful knowledge and information (Spiegler, 2000). The organization as repository of knowledge and intellectual capital might use this sources as valuable input for decision making, organization management, project team work, and it is used to solve complex solutions. For example in aim to fulfill organization mission, decision makers or project team members could do knowledge exchange with other in-group or out-group (Petter & Carter, 2017) collaborators. To interoperate innovative activities, organizations could develop inbound processes of transferring external knowledge into their own practice (Tucci, et al., 2016). In aim to create reverse mechanism and communication channels for inflow and outflow knowledge organizations might export internal knowledge to third parties.

Literature define open innovativeness as distributed innovation process based on purposively managed knowledge forms across

organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization business model. The flow on knowledge may involve knowledge inflow (leveraging external knowledge sources through internal processes) to the focal organization, or knowledge outflow (leveraging internal knowledge through external commercialization process) or both (coupling external knowledge sources and commercialization activities). Organizations might uses external assist, from their partner in aim to develop new organization strategy, business model, project plan and etc. Such changes are considered as driver of internal, such as having impact on employee's behavior, organization structure, production, and external for the organization, related to industry or sector changes (Tucci et al., 2016).

The measurement of knowledge exchange, in information system success models was neither been totally clear or defined (J. H. Wu & Wang, 2006). The DeLone and McLean (2003) model was used to measure the effect of the technology on the behavior of the organization and its employees. Later, this model was extended to knowledge management success model (J. H. Wu & Wang, 2006) as mechanism to measure individual's work at building technological solution, and the impact of knowledge transfer on perceived benefits of those who are suing to adopted it.

2.5 Summary

The discussion of literature review confirmed Paul Mattesich (1992, p.8) claim that in behavioral economics studies are proposed construct

variables with same or similar name, they have different definition. Also, variables had being named differently, but are defined in similar way.

Another, there are variables which measure hedonic or utilitarian behavior of technology use (Heijden, 2004; Hirschman & Holbrook, 2017). Utilitarian behavioral variables had provided measurement of technology with its instrumental value to the user or adopter. The instrumental value imply to the external object related to the integration between user and system, such objectives are task performance, task technology fit and productivity use. Aim of those objectives is to measure adopter performance with promptly targeting system efficiency.

Diffusion of knowledge is complex process. Usually, knowledge dissemination starts with building a communication channel among members of organized social group (Rogers, 1995), and it is done in organized systematic way, where the successful knowledge acceptance is a measure for entire group environment success. Academia had offered massive number of research that explain the adopted knowledge and innovative technologies (Burt, 2000; Glanz et al., 2008; McAlister et al., 2008; Rogers, 1995).

Chapter 3 Case study on education on the cloud projects

The chapter will provide comprehensive literature review of project management and technology adoption in public education. Chapter' goal is to provide case study analysis based on logical framework method. The chapter provides a discussion on project purposes of e-learning adoption in public education, and to provide historical overview of e-learning development. Findings of this chapter enhance the qualitative research model design.

3.1 Education and digital technologies

Nowadays shape of e-learning as public education service is built on different ICT technologies, such as Web2.0 (Ouf, Nasr, & Yehia, 2011) (Ouf & Yehia, 2010) and mobile e-learning (Chen, et al., 2010). Convergence between variety of software application and hardware devices with the backbone of traditional education service had being the core framework of e-learning. For public education it's always had being goal to improve e-learning service for better, and for public authorities its being motivation to benefit from innovative technologies. Adoption of present ICT technologies gives opportunity to education to reduce service cost, and to make it online available. Thus, e-learning was forced for continuous evolution in both technology and legislative frameworks.

Broad concept of e-learning includes comprehensive number of open source Internet technologies, which allowed service personalization and

virtualization. With evolution of Internet and Wireless networks, mobility added new feature, such as service access anytime anywhere. Thereof, e-learning has been increasingly accepted in organized learning (Liaw, et al., 2007; Persico, et al., 2014). Advances in technology development have been influenced by rapid adoption of virtual leaning environment (Abbas, et al., 2016). In general, e-learning provide shell of tools that support digital learning content, delivery, maintenance, enrolment management, student performance management, and education administrative management. Depends of the complexity of these technologies, and the way how e-learning is organized is recognized three consequent generation of e-learning (Dagger, et al., 2007).

Since its emerging, first generation of e-learning technologies is still in use, and many standards were created to support its practicability, such as Dublin Core; IMS Learning Resource Metadata; IEEE learning Object Metadata and others. A common characteristics of first generation technologies are the manual service management and technical support. The generation was focused to designed learning content for particular course. These early e-learning simultaneously use Web ICT and Blackboards. Ability of the technology to share content in interoperability way makes them to be basic feature for further evolution, for example adding API interface to e-learning functionalities.

In term of technology evolution the second e-learning generation was built over modular architectural design under standards, such as SCORM and Moodle. The generation features are semantic exchange, sharing learning

content and information. Remarkable differentiation with previous technologies was that learning content was separated from class room tools with becoming more distance observable. However these generation are not fully learner-centric, the systems was still focused on course and content management rather than on the learner.

In next generation of e-learning service to the platform was applied multi modular design, where the system can not only share learning content but also exchange tools, functionalities, semantics, and control them seamlessly and dynamically. Now, e-learning user is allowed to customize its e-learning platform among wide range of technology features.

Adopting e-learning changed educational institutions. For example, technology allowed separation between organization management system and learner content management system. Education institution will no longer offer monolithic, one-size-fit all service. The service have interoperability feature to other public services. Next generation e-learning is based on standards such as service oriented architecture (SOA), which can been seen as part of old understanding of distributed computing (Bell, 2008) and currently this standard is related to software as a service (SaaS), mashups and cloud computing (Tsai, et al., 2010).

Generations are differentiated from the level of interaction between learner and technology user. For example cloud computing takes the customer to the center with fast and convenient data storage and networking. Current

development of the Internet technologies shifts individual to the center with transferring individual's workflows from desktop devices to mobile applications, and allow them to move to cloud based environment. Cloud technologies are scalable and elastic, and allow business model of pay-per use in similar nature as other utilities, such as water and electricity supply (Alabbadi, 2011; Bañares et al., 2016).

3.2. Cloud computing

Cloud computing provide to its clients a business opportunity to access massive computing power at neglecting cost (W. Wu, et al., 2011). With exporting IT functionalities as storage, business application, technical support to the cloud, organizations can reduce the overall cost of its ICT assets (Cervone, 2010; Marston et al., 2011). Thus, cloud computing offers monetary benefits that organizations and individuals can no longer ignore.

3.2.1. Cloud computing definitions

In literature review of cloud computing, academia reports some challenges and trends, such as no clear definition of cloud computing (Hofer & Karagiannis, 2011), lack of standardization in interconnection of cloud platforms (Kogias, et al., 2016), cloud service are available for mobile devices clients (Ketel, 2014), and cloud federation (Kogias et al., 2016). In contrast to clear usability, availability and accessibility of cloud technologies, discussion on cloud computing definition is not completed yet, and definitions abound.

Academia, public institutions and different enterprises are providing description of recently emerged cloud computing (Buyya, et al., 2009; Carolan, 2009; Chappel, 2008; Mell & Grance, 2011; Motta, et a;., 2012; Oberle & Fisher, 2010; Varia, 2008).

The most popular definition that describe cloud computing in business environment, and was proposed from Peter Mell and Timothy Grance, authors of The National Institute of Standard and Technologies (NIST) at U.S. Department of commerce (version 15, 10th April 2009), which definition became accepted generally (Motta et al., 2012):

"Cloud computing is a model for enabling convenient, on-demand network resources (e.g. networks, services, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".

In Mell and Timothy (2009) report were defined characteristics of cloud technologies, such as on-demand self service, broad network access, resource pooling; rapid elasticity, measured services; different cloud service models, such as Software as a Service, SaaS; Platform as a Service, PaaS; Infrastructure as a Service, IaaS; and deployment models, such as private cloud; community cloud; public cloud; hybrid cloud.

Later ETSI did initial analysis of requirements for cloud standardization (ETSI TR 102 997 v.1.1.1 from April 2010). In the report, the NIST definition was not "indispensable" rather than to assist users understanding of cloud computing. ETSI understand clouds as utility model,

where with acceptance of the technology different service processes are shifting from their closed private circuits to virtual private networks. Thus, lead customers of cloud to benefit from economic of scale, and to promote use of clouds. ETSI described dozen of requirements of different standards which will support the use of the technology, such as: portability; interoperability of clouds; closer integration of IT and Network resources; APIs to networking/data management functionality; data protection, privacy and security; software licensing and others.

In private sector, enterprises such as Amazon (Varia, 2008), Microsoft (Chappel, 2008) and SUN (Carolan, 2009) also provided definitions of cloud computing. Their definitions and standardizations of the technology direct describe their understanding and business spirit of utilizing clouds for their business oriented purposes.

Adopting cloud computing bring efficiency with use of scalable software and hardware resources (Marston et al., 2011), distance work and coordination among collaborative parties (Low, et al., 2011), and service availability and software updates (Dillon, et al., 2010), or cloud clients is benefiting from pay-per use and resource elasticity (Thomas, et al., 2009), or testing, maintenance and hosting over Internet (Oliveira, et al., 2014; Zissis & Lekkas, 2012). In general, cloud computing provide ability to organizations to deploy computing tool rapidly and to reduce capital investment in own assets and to response quickly to market changes (Marston et al., 2011). To its clients cloud computing provides a business opportunity to access of massive computing power at neglecting cost (W. Wu et al., 2011). With exporting IT

functionalities as storage, business application, and other digital supported services to the cloud, organizations can reduce the overall cost of its ICT assets (Cervone, 2010; Marston et al., 2011). Thus, cloud computing offers monetary benefits that education sector can no longer ignored. With introduction of cloud technologies to educational system, the public service could gain benefits with economic of scale and cost efficiency (Bristow, 15th May 2012). New technologies are opportunity to increase efficiency with reducing cost, for example with implementing new energy efficient technologies, or collaborative data sharing, and application sharing. Thus the service could bring scalability to the public domain.

3.2.2 Utilizing cloud computing

Adopting innovative technologies are opportunity to increase efficiency, such as low energy consuming technologies, collaborative data sharing, or exporting technical support. Another, with introduction cloud technologies to public education, the service could gain benefits with economic of scale and cost efficiency. Thus the technology could bring scalability to the public domain.

Development of hardware and software enhance service processes by making them better, faster and cheaper; information got automation and began transferred to external agencies; and distance between central and remote administrative systems was shortened. Thus, description was common to describe the necessity of implementing hybrid or automated software

architecture for the success of any organization. Such environment adapted to education ecosystem, might unfreeze the gap of distance learning in public schools. Digitalization of education is in long term process, in which cloud technologies could reducing the complexity of local IT configurations and address remote technical support.

In study of e-learning had being argued that e-learning is new learning trend which reshapes the way to storage digital content (Selim, 2007). In offline in-class education, knowledge storage is known as banking concepts of education, where instructor is assumed as knowledge owners and he/she does deposit learning knowledge in student's memory only if learner attends that lecture (Freire, 2005). With dissemination of digital technologies this concept undergoes change. Knowledge could be created, stored and shared in virtual space.

New individual skills of how to use; how to develop and implement; and how to solve the bunch of problems from adopting digital technologies, are going to reshape the digital market. In present days for technology users to benefits of adopted technology have to understand the reason of using that technology and technology developer have to understand the need of technology adopter. In such new environment, externalities as lock-in standards in public education required new policies and regulations.

Open source technologies allowed technology customization, and Somers and Nelson (2001) believe that customization of information systems increase product price. Customization is recognized to have long

implementation time, and to increase dependency from vendor's support and upgrades. They suggest organization management body to do minimal customization. Decision maker has to be very clear in his/her way of making decision to change the organization process to fit the system or system to fit to the process.

Factors that measure organization system quality, organization information quality and organization net benefits from adopting technology are important factors that measures technology adoption in organization level (Petter, et al., 2008). In Chapter 4 would delivered comprehensive knowledge on factors that could have impact on organization net benefits with accepting certain technology.

In summary, cloud computing is confluence of business development and innovative feature of existed information technologies, such as virtualization; network computing; utility computing and online web service. Clouds are beneficial of open standards, reducing the cost of broadband, wide availability and accessible wireless telecommunication, failing cost of storage and computing devices, development of handset minicomputer devices.

3.3. Education community as technology adapter

Currently are available massive number of academic studies on individual perception of technology acceptance of variety of self-study e-learning systems, such as Internet and computer use (Bhuasiri et al., 2012), mobile learning (Bhardwaj & Jain, 2015; S. Chen, et al., 2011), cloud e-

learning (Alabbadi, 2011; S. Chen et al., 2011; Fasihuddin, et al., 2012; Wang, et al., 2011), mobile learning based on cloud service (Li, 2010); digital media and self-learning (Prensky, 2011; Thompson, 2013), massive open online courses (Alraimi, et al., 2015). Academia provide good explanation of adopting mandated technologies as e-service (S. A. Brown, et al., 2002) such as learning management system (McGill & Klobas, 2009). Suchlike studies are the background of individual attitude toward digital learning. However in those comprehensive studied of technology adoption seldom was thought about what technologies are accepted in organizational level for use at school class room (Gurung & Rutledge, 2014; Oliver, et al., 2012) and how those technologies were brought to them and how they was developed.

In contrast to them development of public digitalized education services considers investments in technologies, for example hardware, software, licenses, learning materials, equipment, maintaining and training. According their features, purpose of adoption and use, those assets were divided to two objective groups of instructor's and student's characteristics (Volery & Lord, 2000). Instructor characteristics define the technologies which encourages student interaction and support teacher' attitude toward students, teaching style and require simple technical competence. Student characteristic grouped factors that investigate the impact e-learning effectiveness. Later, in research of organized education Selim (2007) concluded that institution had substantial importance to providing technical support, computer availability, learning materials, acceptability and,

accessibility of e-content and printed materials. Afterward, Wanasiri et al. (2012) decomposed institutional support, to three additional components of adopting e-learning technologies into public school, such as personal (instructor and learner oriented technologies), environmental (building an in-class e-learning environment) and system (building e-learning infrastructure). In studies of technology adoption in organizational level, institution support was measured with system quality; content and information quality; institution and service quality (Petter et al., 2008).

3.3.1 Individual participation to adopt technology

In other hand, technology adoption in organizational level is process of accomplishing organization's strategy, planning and it is result of individual participation of organization employees (Bechor et al., 2010), or just is product of organization learning from failures. Decision makers influence organization's strategy and they had draw the project map of technology adoption, where the project map goal is to implement technology that implement technology toward organization mission and successfully fulfills organization activities. Leading from individual their experience, team working and communication skills, knowledge exchange and leadership, the individual participation of project team members also is important. In research of decision making and organization's learning from failure of technology adoption was figure out three knowledge groups of individual that predict success or failure of technology implementation (Grover & Segars, 2005). Decision makers with little experience in project planning and technology

implementation are group in preliminary group; such organization also does first steps of internal policy planning. With gaining experience project planning activities are in stage of testing, and decision makers gain first experience in technology implementation. In course of time organization accumulate more experience, which acquired new skills from practicing of long history of planning activities. Result is well developed policy and refines procedure of technology implementation. For public organization is recommended to leapfrog first two stages, and to choose an implementation strategy which underline technology implementation with experienced professionals. Project development in collaborative way might result as good practice for creating social innovation or building social capital, or might emerge with new policy (Bennett, 1988; Dolowitz & Marsh, 1996; G. D. Schultz, et al., 1980), for example, international collaborative projects emulated with transfer of policy or standards between related organizations or even industries.

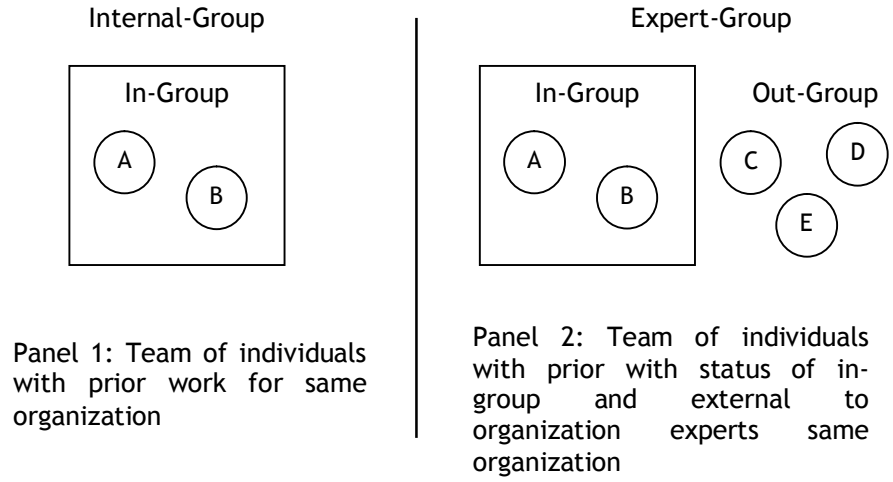
3.3.2 Collaborative project development

The literature on the process of project development has been conducted in the areas of diverse internal or external knowledge and physical resources (Lyytinen et al., 2015). Project experts are involved to ensure knowledge transfer in regards to policy, economics, commerce and industrial design, or that have had an impact on project development with knowledge related to technology acceptance and project management. The expert's goal is to investigate the process of internal and external team knowledge creation

and to show the complexity of integrating knowledge to project development. Prior to their shared history of collaboration, the literature divided project team to the in-group and out-group for the "perception on team by individuals with or with no prior work history" (Ellemers, et al., 2004; Petter & Carter, 2017). However, this sub-grouping, projects management process is performed with collaboration, knowledge sharing and team work between individuals. In this study, we extend the group categorization of Ellemers et al. (2004) to the internal-group of individuals with prior work for the same organization (Fig. 1, Panel 1). The characteristics of this group are similar to the original in-group, where individuals shared a positive work experience with employees in the same organization. The expert group is a project team group of individuals with prior work with the status of an in-group that collaborates with external and organization experts (out-group). The characteristics of such team formation are to deliver the necessary expertise for successful technology implementation (Panel 2).

Developing digital services on the condition of a partnership between internal and external experts appears to have some cost constraint issues (Yang, 2015). Two examples are the improvement of product design and additional project cost from hiring external professionals. This could be an issue for public organizations with a minimal budget. Public organizations with few fiscal resources are willing to adopt a simple solution because a simple solution is easier to implement and costs less than complex technical solutions. Such decision making management planning is not attractive for

partners. Creating a partnership is not always a short-term process because successful collaborative projects might trigger consequent innovation and might emerge in new social enterprises. Collaboration is also important because successful technology implementation might revive traditional teaching practices that build and strengthen the e-learning industry. Collaboration could also deliver social, cultural, and business applications for digitalized public education (Janson & Subramanian, 1996; Somers & Nelson, 2001)



Panel 1: Team of individuals with prior work for same organization

Panel 2: Team of individuals with prior with status of in-group and external to organization experts same organization

Figure 3-1: Internal and Expert group perception based on prior of employment

Project team competence and inter-communication between project team members might impact positively successful technology implementation in organization (Slevin & Pinto, 1986). In other hand might result sharing, accepting and creating social innovation and building social capital (Austin,et

al., 2006; Bennett, 1988; Dolowitz & Marsh, 1996; G. D. Schultz et al., 1980) (Austin, et al., 2006). Such internationally collaborative projects might emulate of policy transfer between related countries (Dolowitz & Marsh, 1996)

Literary, as increasing number of people that had being using e-learning is more likely they to influence others opinion, which may result to promote technology use in mandated context (S. A. Brown, et al., 2002). Individuals adopt mostly hedonic technologies, such as text editing application, or application for creating presentation files, video tube channels, which are widely market available. In contrast, through project planning and collaboration public education might benefits from adoption customized e-learning technologies, which might fit better to unique in-class subject curriculum (O'Neill, et al., 2004) or such that support teaching strategies that improved students learning skills (Ngai, et al., 2007).

Unfortunately, customized technologies are expensive, and such technologies are recognized with long implementation time, and they also increase dependency of vendor's support and upgrades. To reduce technology and implementation cost it is suggested organization management body to do minimal customization (Somers & Nelson, 2001). Decision maker has to be very clear in his/her way of making decision to change the organization process to fit the system or system to fit to the process.

3.3.3. Knowledge sharing in homogeneous communities

Emerging technology enhance community attention (Tuomi, 2002), and communities that share similar patterns are more likely to imitate from each other (Brody, et al., 2003; Mahler & Rogers, 1999) Educational communities could learn or share experience between one another. Single successfully implemented technology project could be replicated to many other schools with similar tasks and needs.

Geoff Mulgam claim that in homogeneous society practice (same as school community), structure and culture of public services is defined as "one sized fit all", and one service even teacher's subjective norm is practiced in similar way in same school grade. In behavior homogeneous communities such as school are in danger. School communities are high likely to be late adopters and to replicate outdated technologies. It is very important the policy maker (in the face of MoES) to build education development strategy and to point desired innovative technologies, and to development of clear roles and policy guidelines on which local and national educational service to be based.

In research on collaboration was found that collaboration groups are focused on specific task, which is defining the team to accomplish groups (Mattessich & Monsey, 1992). This task usually is given by the project scope. Response of collaboration teams differ by the mission, goals of organization or by the approach of accomplishing that task. Ralph Katz (1982) shows that interpersonal communication between professionals in source of important

knowledge rather than reports, publication for performing collaborative projects.

During implementation stage there are different partners involved such as consultant and software or hardware vendor, and adequate partnership between them will lead to easy achieving previously defined project goals (Sousa, 2004). All stakeholders involved in the project should share their goals and knowledge and at the end when they have to analyze and again share their knowledge to finished the project with success.

In knowledge sharing trust between partners environment is important, and have to be build before project establishment. The aim of such consideration is to keep and promote relationship of cooperative and trust among stakeholders involve are internal and external. To accepted innovative idea before Rogers's prediction stage, external experts could have strong impact for catch up innovation in the stage of massive adoption. Thus makes internal experts to have high expectation from knowledge transfer.

To build a successful collaboration and knowledge transfer need to have a reasonable cooperation and trust between all stakeholders. Interdependency and communication between stakeholders is critical for task compulsion and team decision making. Because external experts are likely to be technology specialist, and for the minimum customization of the system, their effort will make the system go live (Benbya et al., 2004).

In another research of collaboration and knowledge exchange (Alavi & Leidner, 2001) observed that in knowledge based theory on the organization was built to be able to manage knowledge in efficient way rather

that to investigate as objective what knowledge for organization is. Proceeding from Watson (1999) view of knowledge (data, information and experience are stages of gaining knowledge) as tool that influence decisions, and Zack's (1999) view shows that knowledge increased individual abilities to make effective actions. He defines knowledge as “systemic and organizational specific process of acquiring, organizing and communicating knowledge of employees so that other employees can use of it to be more effective and productive in their work”. Others claimed that big IT organization learn knowledge from failures (Garvin & Kagel, 1994). In our research we are seeking successful implementation of information technologies from public sector, and indirectly to increase efficiency of spending government budget.

3.3.4. Issues of project development success

The logic-framework method was built on the idea that project success consist of two components: product success and project management (Munns & Bjeirmi, 1996). In defining project success is necessary investigator to have a clear understanding of project success objectives, such as: project goal; purpose; input and output (Baccarini, 1999) where project’ objectives predetermine project management success, which deal with project components as cost, schedule, and quality had impact on project (Shenhar, et al., 1997), and project’s goal and purpose influence final project product. To provide credible knowledge of project success, Baccarini (1999) recommended use of logic framework method (LFM) (check Figure 3-2).

In LFM, project goal describe the overall organization strategic orientation to which project will contribute. Project goal describe meaningful behind the project, organization long-term objectives and strategic plan of development. In contrast project purpose describes near term effects of use of project product, and measure the degree of user satisfaction from using final product. The credible knowledge of project goal and purpose explain the aim of developing such project, and Davis (1995) suggest that a single project have to have only one purpose, otherwise the project impact is divided over wide area and project output is waked. Project output and project input are objectives of project management success, where project output describe the immediate and tangible result from project activities, and project input describe the resource inputs that are used to produced final product. Those resources explain the dogma the project will be accomplished.

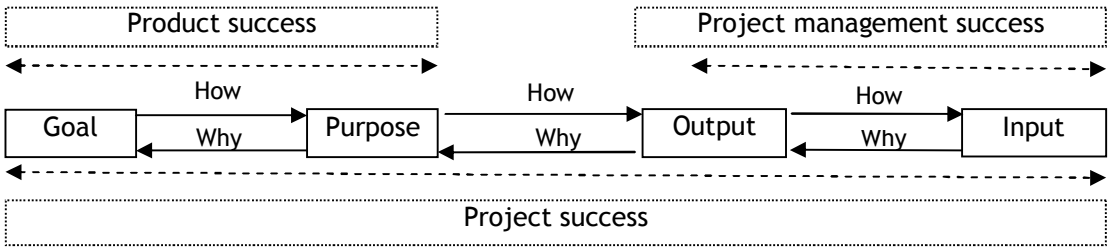


Fig. 3-2 Baccarini's logical framework method

In public education, aim of project management success is influenced by increasing the efficient use of cloud technologies as teaching and learning tool. Limitations of such process are in its nature, sometimes disregarding final project product, for example the project has been managed in project scope, but eventually could not meet end user expectation. Literature

highlighted another limitation to project success, where project management resulted with project failure (Wateridge, 1998), when the management has not meet budget and schedule. However, project success is evaluated by its users by meeting the requirement of time to response and reliability. Organization as social structure of individuals which have to pursuing a collective goal, where stakeholder satisfaction of project development is in combination of knowledge skills, tools and techniques of project activities in order to meet project expectation. Project stakeholders are individuals or organizations who are actively involved in the project, and they could be internal or external for the organization.

3.4 Logical framework method

Logic of multiple case analyze is determined by the factors that dictate single cases design. Benbasat, et al. (1987) identifies two criteria of determining these factors. First, determinant is identifying similar in nature factors, which are possible to be literally replicated. Second determinant of factors are used for theoretical replications. Compare the duty of project developer who has to have a clear understanding of project success objectives, in the process of analyzing project development is needed to build strong argumentation of project attributes. In building our methodology was taken into account the benefits and limitations of cross analyze methodologies (Bouchard et al., 2015). The methodology is based on logic-framework method (Baccarini, 1999) and cross analyze of multiple case study (Benbasat et al., 1987) with aim to describe the current situation in implementing

education on the cloud technologies. For that reason, are identified four project objectives related to product success and project management: goals; purpose; output and input (Baccarini, 1999; Munns & Bjeirmi, 1996).

In particular the successful project accomplishment within budget and time it is not only criteria. The manner in which the project management process was conducted is dealing with the effect of the final project product. In analytical framework model adopted technology design is recognized as object of project output. According to literature we understood, the design could have many different forms, and the core technology determine the features of the adopted technological solutions. The tangible project output is function of the technology features of adopted technology design, and the level of project output impact matters from the degree of individuals' participation. In sense that school authorities usually are building projects within or without (external) partnership (but always in-group collaboration between employees from the organization).

Project output is component that might be used to measure project impact over the entire local education community, if project were built of school members only, or in national level, if project is based on partnership between outside experts and organization's employees. Project output is figure out the tangible design of adopted technology. That design could have many different forms, and the design shape depend of core technology used to build those technological solutions.

Project input define the level of individual participation such as team collaboration. Project input is an amalgam of government policy and strategies, individual participation and knowledge exchange which have impact on decision making to perform successful technology implementation. Projects with high degree of collaborative behavior, mature project planning, individual skill are considered to have better impact on project accomplishment.

Project purpose defines the institutional reason to use digital technologies. In literature review were observed several groups divided by the institutional approach. Adopting Internet technologies that do individual support, such as learner and teacher, or was use to build learning management system. Different cloud platforms and cloud features determined project goals. Deference between project goal and project purpose could be find in next example. Project purpose is use to describe expected individual behavioral use of technology, where project goal explain organization net benefits after accepting that technology (Fig 3-3) (Arnaudov, et al., 2017a; Arnaudov, et al. , 2016)

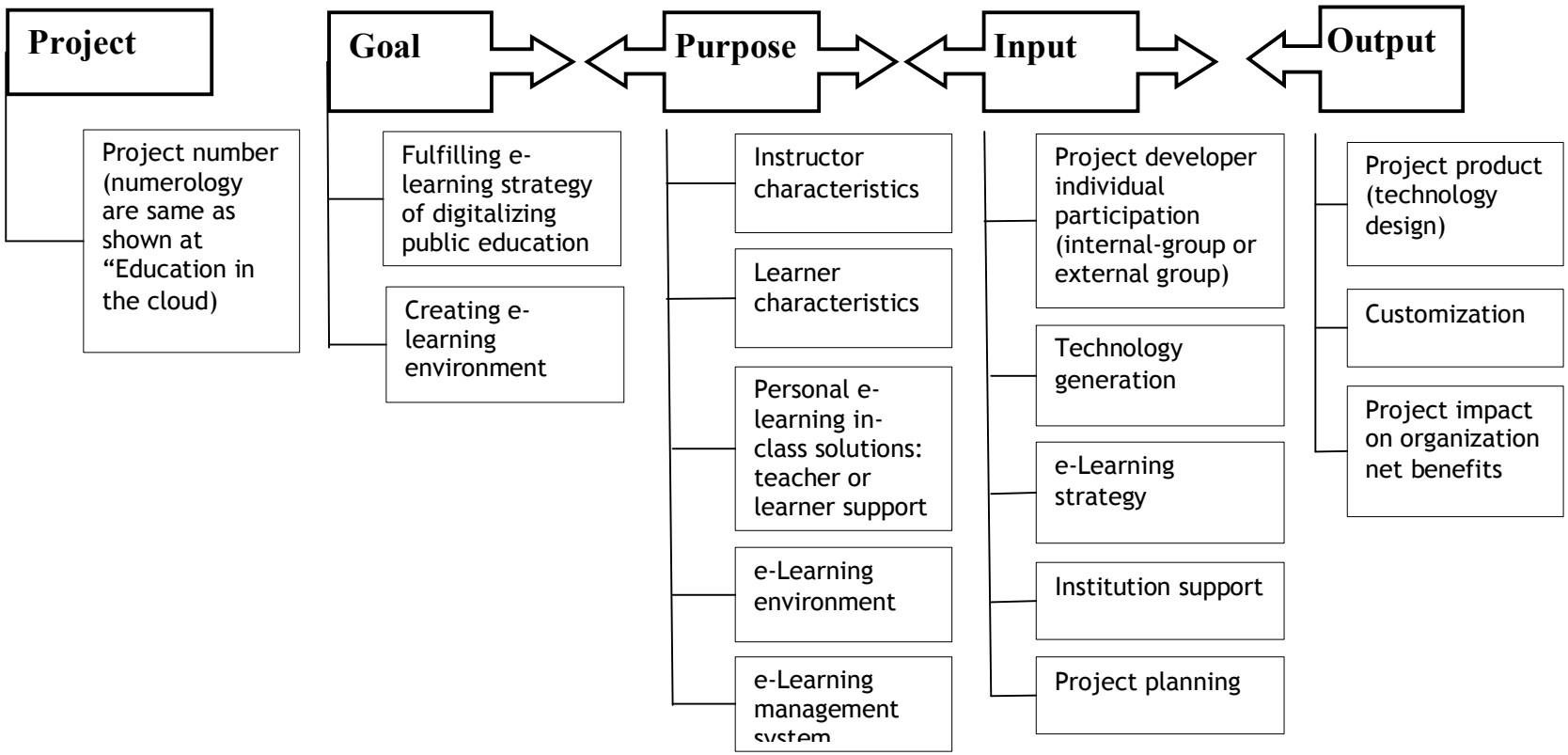


Fig 3-3 Qualitative methodology: Logical framework method

To avoid some limitations of cross-analyze studies Marie Bouchard (2015) had warm that the results of those studies often show the meaning of specific phenomena but do not formulate casual laws about the object of the innovation. For this reason that kind of methodology does not generalized knowledge. She claims that to conduct cross-analyses study need to built an appropriate data set, and it is needed all stored information to make sense , and to have logical guideline that shows the way how this information is related. In that paper logical cross-analysis model were as organizer of operational processes grouped by series of attributes. In current research those attributes are addressing the purpose of technology use, technology design and project impact as pattern of collaboration (or non-collaboration). Critics of such model would be that philosophical changes in large scale may lead to revision of the work done in early stage.

3.5 Qualitative study: data selection

The report published by European Union "Education on the cloud" (EC, December 27, 2015) is our reference of case study data se. . The report aim was to deliver a list of Listed projects were of current projects accomplished in the domain of public education, and information about case studies were designed to contain answers of how education have to respond to current e-learning generation, what impact technology generation practice over education stakeholders, and how e-learning might look like in future.

Recently were published a supplementary report “A very real cloud” (Gaver, Fiorentino, & Slitni, 2016) which accumulate comprehensive knowledge over past years of project management of cloud computing in higher education. The report highlight current key issues that raises in the sector, such as cloud deployment; personal security; economics and financial impact of e-learning in the cloud In contrast to that report, “Education on the cloud” accumulate knowledge and information of 59 project, which are accepted in European member states after implementation of EC’s strategy “Unleashing the potential of cloud computing in Europe” in September 2012. In Gaver et al, (2016) report were accepted NIST definition, but in “Education on the cloud” was accepted ETSI definition of cloud computing, but both reports deliver overview of processes of current e-learning acceptance into domain of public education.

The “Education on the cloud” report was selected, because it contents multiple cases, and describe technology implementation and observe how public education respond to the cloud based learning tools and technologies. From the report it is possible to draw a picture of technology impact has on education stakeholders and give some future vision of public education development. The report was data set for previous academic studies of (Bosse, et al., 2016; Koutsopoulos, 2016; Koutsopoulos & Sotiriou, 2015; Koutsopoulos & Economou, 2016), where aim were to figure out a concrete measure of e-learning types, and to gain stakeholder attention to technology development as inevitable digitalization of public education and had explored

technology impact on learners and teacher as value added component of proper technology use for in-class education. In contrast to them we examine the perspectives of researchers who did not participate in case study collection, and contribute or ever had been in professional relationship with any of investigated projects.

3.6 Discussion of case study analyze

Analyzes of project input and individual participation into project team had identified participation of different experts. Project developer developed by expert-group team could be: municipality, school, university, library, museum, non-government organization, developer, infrastructure service provider, e-content provider. Project developed by internal teams are developed by schools, university, municipality, non-government organization, infrastructure service provider and technology developer. Comparing project partners by their source of budget, there are several collaborative projects formations: public, non-government and private. In public project's partnership formation was monitored between public partners (school collaborating with another school; or university with university; library with school; museum with school), public and private (application developer collaborate with school; municipality with ISP; technology developer with school); public and non-government organizations (school collaborate with non-government organization) or non-government (non-government organization collaborate with non-government organization).

In Table 3-2 are shown percentage of collaborative and non-collaborative projects and their impact to local education community. Briefly, 41% of observed cases are result of partnership, and rest of the projects are developed and implemented from organization team. Organizational team projects might not have broad impact on education community, but twelve percent of those cases which were being product of collaboration between organizations might have broad impact over education community because of their project outcome features. For example, case 21 (number represent the case number from "Education on the cloud" report) it is project developed between non-government organization and schools from several EU state members. This project introduced web based e-learning system which content and services are online available in different languages. If implemented technology is distributed in several languages we assume this service could have broad impact on different ethical education communities. In contrast if e-learning service is provided in single language, the service could have impact only to community whom can spoke this language. Our findings show that there is no project developed from organization's in group team to have impact on multi ethnical community.

Result of implementation of all those technologies, is to migrate face-to-face education to its virtual replica for example with implementing web based or app platform with user-friendly interface. Another is to create a new individual behavior in the field of public education, where educational organizations, such as teachers and education institutions, are willing to give

up the service control to third party in aim to gain advantages as redirecting resources, with focusing on long-term strategic development. In point of view of private firms, to increase efficiency from technology adoption, were accepted employers to use their own personal device as working device, such as tablet or smart phone (Dowd, 15th of May 2012). However the benefits of such initiatives some limitations could occur. For example with accessing sensitive data such as customer information, nonpublic financial data, intellectual property and corporate strategy from devices other than work laptops and desktops. In small educational organization as elementary or middle school, such problem does not occur, but it could escalate afterward with forming an individual technology culture. It is obvious that public education is on its journey between innovation technologies and traditional teaching and learning, where technologies adoption is emerging issue, and cutting cost with accepting students owned hand size computing devices is a way to accept innovative technologies to in-class education.

Development of hardware and software enhance service processes by making them better, faster and cheaper; information got automation and began transferred to external agencies; and distance between central and remote administrative systems would be shortened. Thus, for the success of any organization it would be necessary to implement hybrid or automated software architecture. In term of public services, digitalization of education is long term process, in which cloud technologies could reducing the complexity of local IT configurations and address remote technical support. Availability of

different e-learning generation also leads to misunderstanding what technology to implement. To avoid such behavior, authorities have to provide centralized strategy, basic science and technology framework and law, and to practice decentralization in aim to interoperate national or regional research laboratories and encourage collaboration between universities, private research laboratories and middle schools. Expected results of such policy framework could be better technology implementation, new patents, spin-off of venture technology companies.

e-Learning is new learning trend which reshapes the way to storage digital content (Selim, 2007), in near past instructor were knowledge owners and they do deposit educational knowledge during class time, and students could benefit of it, if they attend the class only (Freire, 2005). With disseminating digital technologies this concept undergoes change. Today knowledge is created and stored in virtual space, and digitalized learning reshapes digital technology market. Technology developers with entering the digital education market technology do disseminate new IT skills; it is nature by proposing e-learning technologies they to get more engage in education process, but is necessary they to understood school curriculum. In such new market space policy regulation are recommended if firms developed strategies as first-in gets. Thus, firms' lock-in standard e-learning in the cloud corrupt the technology transparency.

Good example for collaboration practice is case 41, where was built in-class digital environment for teaching and learning on several humanitarian

subject at middle schools. Project aim was to encourage electronic device use and electronic content to substitute previously used hardcopy books. This to happen, digital devices was involved into teaching process, teacher's table display was connected to digital board and all in the classroom could follow teacher's lecture. Students were allowed to use tablet in-class as well. Project was product of wide collaboration between application developer, education authority, school, cloud service provider, and content publisher.

Case 16 was developed by municipality with aim to introduce province school in-campus cloud technology. Project developer's aim was instead of investing in hardware with low inerrability , such as isolated hardware and software solution, to built own cloud computing infrastructure build on big number of connected personal devices. Under cloud computing infrastructure they understood connecting tablets, notebooks, and whiteboards via wireless network. Project limitation, is to implement not flexible commercial product, for example to increase the use of notebook, it is necessary to invest in additional appliances as headset, dock stations, monitors, keyboards, mouse and etc. Another is their project technology resemble more first generation of e-learning. In aim to develop a customized learning environment, it is necessary to do product re-engineering, and instead hardware to be in center of the technology, have to develop user friendly application. Examples of digital crafting such as open source coding or re-inventing hardware component and assembling them to new product it is not

new for individuals with garage type of laboratories, but it is still untypical for public organization.

There are different purpose of project approach, and they differ in their objectives too (Benbasat et al., 1987; Selim, 2007). Bhuasiri et al. (2012) and Selim (2007) concluded that in e-learning project, project purpose had described individual, environmental or system objects. In this research the cases are divided based on their purpose of technology use, and relevant subgroups. For example personal purpose of technology use group all project which aim to build experimental e-learning environment, and goal was to accumulate additional knowledge for in class digital technology use. Our logic analyze identify three separate subgroups of personal purpose of technology use experimental studies of in class technology user behavior; measure degree of influence of cloud technologies to into instructional learning (instructor characteristics); Projects that built experimental digital education environment; and measure degree of interaction between teacher and learner into digital environment. For example in case 17, non-government organization was studying student behavior reaction and attitude to use multimedia lecture instead of conventional lecture.

Characteristics of institutional support project are to focus their goals to implement learning e-content, e-learning application and e-learning in-class environment. For example case 42 had designed digital learning environment based web portal technology. Project goal was to apply web school management application, and to be used as one stop cloud solution capable to

organize school information flows. Developer believed with adopting an easy to use web portal, school might offer a better access of school processes to parent and teacher, to digitalized internal administration processes. Goal of the application was to transfer some administrative school management services to the cloud, such as grading, attendance management, engagement analysis across subject curriculums, and never the less to open a direct communication between school community and school data base.

In another case 18, organization investigates the interaction between teacher and learner in digitalized environment. Project was theoretical study of peer-to-peer application that allows learner and teacher to interact from distance. In System environmental project goal was to solve particular school management needs; developing in-class team learning skills; developing digital service management system. For example case 24 represent collaborative project between developer and university. Project aim was to educate students on digital behavior and improve their competitive skills. With implementing web based technology was facilitating students to direct their learning in mathematics and to challenge them by creating competitive digital environment and encouraging students from different school to challenge knowledge v one another.

Practice shows that implementing new technologies is moderated by its implementer; it is mean that technology implementation is goal which differs by scale, and by processes.

3.7 Summary

Adopting e-learning into organized education is still ongoing process, and massive number of e-learning generation availability might lead project developer to confusion of what technology and how to implement. From analysis we confirm that discussed projects vanquished the characteristics of first generation e-learning systems, and described by NIST the cloud models was applied, and also was used variety of cloud functionalities observed by ETSI.

The case study analyzes confirmed that projects observed user behavior limitations, such as learner isolation, lack of education feedback, lack of team work between students, and reasons of none sharing e-content between student (Ouf et al., 2011). With development of personalized e-learning environment moved learners at the center of the education activities.

However the positive impact of Internet technologies, education authorities need to improve their performance in adopting such technologies. Education authorities need to improve their performance in adopting technologies in utilitarian way through customization; collaborative project collaboration (Yang, 2015); implementing cloud computing (Bhuasiri et al., 2012). The LFM analyzes shows importance of individual participation.

Technology implementation in public education is driven by government strategy and decision maker's knowledge. Literature reports that technology misunderstanding, lack of experience of project management, lack of skills of technology support might be overcome with collaboration. In this

study had found evidence of equal distribution of project with Internal-group's and Experts-group's team formation, where expert-groups projects imply knowledge exchange, and we assume that such project have better technology utilization than project developed by internal-groups. Based on these findings, we might build a new hypothesis of collaborative project development and technology implementation is significantly important for successful technology implementation in public education. This believes will be discussed in Chapter 4 and 5.

The case study analyze proved that individuals and organization adopt market available commercial product (in internal team developed projects). Only, government leaded projects might afford and purchase non-commercial information technology solutions. In controversial to get maximum efficiency from commercial product, small organization needs to do minimum customization in aim to fit better organization needs. This is less costly than to developed their own hardware or software.

To avoid technology misunderstanding, authorities have to centralized strategy, basic knowledge of science and technology (with providing online courses to teachers) and legislation framework, and to practice budget decentralization in aim to interoperate national or regional research laboratories and encourage collaboration between universities, private research laboratories, middle schools authorities and technology developers.

Chapter 4 Model design

In this chapter are discussed heterogeneous variables that might have impact on successful project development and technology implementation in organizational level. Section 4.8 proposing the research model and section 4.9 is proposing the research hypothesis.

4.1 Task technology fit

DeLone and McLean model addressed the importance of technology system functionality that provides little distraction as possible to adopted information system. In this model factor as technology compatibility was used to measure individual readiness of accepting innovation occurs from working with adopted technology (Tornatzky & Klein, 1982). In aim to measure technology functionality fit Goodhue and Thompson (1995) introduced factor task technology fit (TTF), which was successfully approved in individual (McGill & Klobas, 2008) or organization performance (Lin & Wang, 2012; McGill & Klobas, 2008). The TTF was defined as technology or information system factor, which provide information about the distraction impact that adopted technology had on organization performance, such as measuring productive use (Goodhue, 1995) or the degree of efficient use.

Dale and Goodhue (1995) assumed that there is not such a technology that could provide perfect fit in solving a complex task, without technology implementers to do any expenditure of effort. The TTF have to be used to

measure organization's efforts on technology utilization. Theoretically the factor investigates the link between technology implementation and bunch of consequences from adoption period including system use. In technology adoption models of Davis (1989) and DeLone and McLean (1992) TTF had played a supportive role as factor that predicts perceived usefulness and technology utilization.

The literature informed the new demand of newly developed customized products that fits better to unique subject school curriculum (O'Neill et al., 2004) or technologies that support teaching strategies with the aim to improve students' learning skills (Ngai et al., 2007). Goodhue and Thompson (1995) assumed that there is no technology that could provide a perfect fit in solving a complex task. Factor, such as TTF is predicting the impact of technology utilization into organization. In this case, TTF was extended to its patterns of technology customization and team work collaboration:

H4: Technology performance of (a) interdependency and (b) customization positively enhance project implementation success

H5: Technology performance of (a) interdependency and (b) customization positively enhance organization implementation success

4.1.1 Task Interdependent Fit

However the complexity of implementing ICT, the Internet technologies has positive impact in organized learning. The discussion of process of implementing new design technologies, involves a pool of diverse knowledge and physical resources (Lyytinen et al., 2015; Yang, 2015). Due to

the de facto scarcity of economic resources, an organization is recommended to consider sufficient resource allocation, competent project team members and adequate communication (R. L. Schultz, Slevin, Pinto, & Hall, 1987). In comparison to the wide range of available technologies that are designed to meet special purposes of use, need partnerships between the developer and consumer. In the proposed model (Figure 4-1), task interdependent fit (TIF) measures the effect of collaboration between internal and external experts during the implementation of technology with a necessity task requirement and minimal distraction. TIF, as extension of TTF, also is focuses on investigate uncertainty of quantity and quality, which varies between internal and external organization team members (Goodhue & Thompson, 1995). In measuring TIF is important to understand team work predictability, the level of interdependence between team members and how organizational tasks are subdivided between team members (Gattiker & Goodhue, 2004). For this reason, the organization has to build a set of information processing mechanisms such as hierarchy. However hierarchy is not the focus of this study. Instead, we measure the impact of interdependent knowledge exchange between internal and external technology implementers

4.1.2 Task Customization Fit

In project development is necessary to evaluate technology customization as factor that had impact on successful project accomplishment and technology implementation into organizational level. At this point e-learning customization is not considered as general term (for example

overwriting the software re-code of some application) but the effective way of communication between project team members in order to customized particular technology design in such way that fit organization needs and had positive impact on organization task efficiency in minimum cost.

The concept of task customization fit (TCF) responds to the lack of fit between technology features and personalized settings that meet particular organization needs. Customization was employed as a control variable in order to measure the changes that are made in an information system during technology implementation (Gattiker & Goodhue, 2004). However, such customization at the organizational level has two inevitable side effects. First, as a consequence of the decision to adopt a particular information technology, the decision maker has to perform further efforts such as performing the ultimate choice to adopt a technology by changing the internal organization process or performing a full technology fit to the organization needs. Second, full customization is costly and increases the time of implementation, and makes the organization dependent on technical support and technology upgrade at a later stage. To avoid such boundaries, it is necessary for organizations to perform minimal customization (Somers & Nelson, 2001).

4.2 Subjective norm

In technology acceptance literature subjective norm is factor that measure the individual participation of particular behavior influenced by the judgment of significant others (Ajzen, 1991). In contrast to perceived behavior control variable, which measure individual behavior of easiness or

difficulties to perform particular behavior, subjective norm is used to measure individual behavior intention to reject or accept that technology. In TBP subjective norm is individual factor, which measure the social pressure to perform or not to perform particular behavior. It is used as normative believe of individual motivation that individual would comply a certain task (Kukafka, et al., 2003).

Subjective norm had being a measure for user participation in the processes of information system use. where user involvement in the process of information system implementation mediate between individual participation and system use (Hartwick & Barki, 1994). This factor also underline that subjective norm is more important in prior to early stage of technology implementation when user have only limited knowledge and experience from which to develop attitude to use. To measure expected outcome of technology implantation literature underline the impact of superiors and peers influence result of technology use (Taylor & Todd, 1995).

In extension of TRA and TBP, Alfred McAlister (2008) introduced social impact on individual behavior, as social norm measuring "how different individuals will evaluate our behavior and willingness to be guided by their assessment.", such self evaluated outcome of social norm is needed when individual efforts influence total social outcome, and consumption of this benefits differ by individuals. Thus behavior can be conducted by measuring the feel of individual if they do or do not a certain behavior practiced after achieving the formal goal.

Research on social norm in the context of the domain of e-learning reported mixed results (McGill & Klobas, 2009; van Raaij & Schepers, 2008; Venkatesh & Davis, 2000). In our understanding of social norm, influential individuals such as colleagues at school and education authorities (Ministry of education through government development strategies and other development agenda and policy) are believed to perform a particular behavior. The literature reported two related factors of superior and peer influence (Taylor & Todd, 1995) that could measure this influence, where superiors and peers outcome expectations of technology use influence individual subjective norm (Hartwick & Barki, 1994).

H2: Subjective norms of (a) peer and (b) superior had positive influence on project implementation success

H3: Subjective norms of (a) peer and (b) superior had positive influence on organization implementation success

4.2.1 Superior influence

In literature was defined that superior influence is individual perception about the particular behavior which is influenced by the judgment of supervisor, such as mother office (Taylor & Todd, 1995).

4.2.2 Peer influence

In literature was defined that peer influence is individual perception about the particular behavior which is influenced by the judgment of significant colleagues (Taylor & Todd, 1995).

4.3 Self-efficacy

Academia had show strong interest on studying individual behavior. In TBP, Ajzen (1991) state that in the theory observed knowledge of perceived behavioral control came from Bandura's concept of self-efficacy. In extension of the theory Fishbein and Cappella (2006) and Ajzen (2002) stated that self-efficacy is same as perceived behavioral control.

Bandura et al., (1997) used self-efficacy as perceived behavioral control variable to measure individual perception of ease or difficulty to perform particular behavior. It is linked to control beliefs, which refers to beliefs about the presence of factors that may facilitate or impede performance of the behavior. In determinism belief all events including human action are ultimately determined by causes external to the will (McAlister et al., 2008; Rogers, 2004) understanding of user behavior practice hedonic or utilitarian behavior when they adopt technologies.

In literature of TPB is monitored a significant difference between self-efficacy and self-efficacy expectation (Bandura, 1996). Self-efficacy is latent variable which measure individual "conviction that one can successfully execute the behavior requirement to produce the outcome". Self-efficacy expectation is the given behavior that leads to achieving certain outcome.

Literature knowledge of self-efficacy did not fulfill completely requirement of individual performing and certain behavior to achieve expected outcome that is beneficial for the organization which he/she represent. In literature of project management or organization management

another factor is acknowledge as factor that could have influence on expected outcome but in organizational (or team working level), it is factor is known as project champion.

Anna Parr and Graeme Shanks (2000) found project champion as important factor in project planning and project set up, and had minor importance on project re-engineering, design configuration and installation. Wixon and Watson (2001) argued that there is a relationship between project champion and high level of organization implantation success poor project implementation success. Project champion was defined factor which measure behavior which supports project team to meet project goals (Wixon and Watson, 2001); as transformational leadership behavior that leads and shield project implementation resistance that may arise within organization (Howell and Huggins, 1990); as technology promoter in the process of adopting new information system (Anna Parr and Graeme Shanks, 2000); as subject that advocate the processes of adopting new information technologies and build balanced environment (Mare Summer, 2003). Balanced team is team with right combination of experts, for example team with business analysis, financial director, operating manager, experts from implementation organization and/or external technical experts from technology vendor (Frederic Adam and Peter O'Doherty, 2003). It is important to notice that balanced team does not have impact on project planning rather very important rule on project set up and project re-engineering, and considered important on project design and configuration. Unfortunately, this factor was used in

technology implementation studies, which did not support the expectation that could replace the self-efficacy. (Wixom & Watson, 2001).

Technology implementation in schools is not result of student perception and student preference to use particular technology. Technology implementation in an organization is the result of school authority decision making; government strategy; public education development framework. Our expectation in investigating the purpose of technology adoption is to outline factors that could measure school principal expectation, and can the school principal design a project with the main goal to implement e-learning technology that fulfills in-class teaching/learning needs. In contrast to Bandura (2001), in this paper, self-efficacy is used to measure principle utilitarian behavior and project management competence (Sayles, 1999), which in decision making performance, maximizes organization benefits of technology implementation through project management. The area of project management acknowledges the "project champion," which influences individual expected outcome (Beath, 1991).

H1: Self-efficacy positively enhance (a) Project implementation success and (b) organization implementation success of education on the cloud technology

4.4 Project implementation and Organization implementation success

Technology acceptance is successful when it is fully implemented into an organization (Wixom & Watson, 2001). Technology implementation in an organization attempts to improve the efficiency and effectiveness of its

processes (Seddon, et al., 2010). Adopted technology might have dvantages to organization, but the implementation itself is a source for internal organization changes. This shows that not only the employee but also an organization adopts the technology. In the processes of optimal technology adoption in an organization, organizational leaders have to do several activities. First, organization efficiency is the outcome of gained experience from reconfiguration of its internal processes. Second, collaboration with a key partner (i.e., client, and organization's employee or technology implementer) has an aim to improve, standardize and integrate the technology. Third, the validity of technology implementation with utilization such as reducing the difficulties in incorporating technology in an organization and ensuring that the chosen technology really supports the management of internal processes. The organization and project implementation success have been suggested as predictors of successful technology adoption. Technology implementation in public schools has caused organizational changes, such as internal management changes and policy changes. Users of public education also tend to accept or reject the technology.

Organization implementation success is designed to investigate necessary changes that have been managed efficiently. In the process of collaboration with an external partner, the acceptance of a new system in an organization shifts the responsibilities of technology use to the organization rather than to the technology developers. The implementation of the technology refers to the project deadline, costs and the functionalities that the technology is supposed to provide. Project implementation success measures

how well a project implementation team meets its project agenda (Constantine, 1993; Waldrop, 1984).

Implementation of new system into organization shifts the responsibilities' of system use to its users, rather than to its developers and implementers (T. Nguyen; et al., 2017). Thus it is needed to investigate the relationship between project management, technology adopting and observed net benefits in individual and organizational level.

H6: Project implementation success positively enhance (a) perceived usefulness and (b) organization net benefits

H7: Organization implementation success positively enhance (a) perceived usefulness and (b) organization net benefits

4.5 Perceived usefulness and net benefits

Organization performance is influenced by the level of fit between the information processing systems in an organization context. Organization benefits occur through the impact of technology implementation, product customization and task technology fit (Gattiker & Goodhue, 2005). In the information system success model, organization benefits are affected by the gained satisfaction of the system and are measured by the weight of technology enhancement from organizational performance. Thus, we have to measure the advantages of implementing e-learning in public schools and how beneficial these technologies are to the education community. We already understand that an organization has utilitarian behavior in the concept of technology use, which means that an organization acts to maximize benefits

and minimize costs (McAlister et al., 2008). Net benefits can be used as a control measure of organization performance in the post acceptance period. In perceived usefulness, cost is less important than gained benefits (Seddon, 1997). Perceived usefulness measures organization behavior through technology use.

Net benefits of an information system are able to deliver an important facet of the overall value of the system to its users or to the underlying organization. In information system success model net system benefits are affected by user satisfaction with the system. In their own right, system benefits are posited to influence both user satisfaction and users intentions to use the system. Organization has utilitarian behavior in the concept of technology use, it is mean organization acts to maximize benefits and minimize cost (McAlister et al., 2008), and net benefits will be used as control measure of organization performance in post acceptance period.

H8: Perceived usefulness positively enhance perceived net benefits

4.7 Research model

Academia proposed different methods and theories to measure users behavior and attitude to technology use, such as technology acceptance model (Davis, 1989); diffusion innovation theory (Rogers, 1995); information system success model (DeLone & McLean, 1992); theory of planned behavior (Ajzen, 1991); social cognitive theory (Bandura, 1989); technology organization-environment framework (Baker, 2012; Tornatzky et al., 1990).

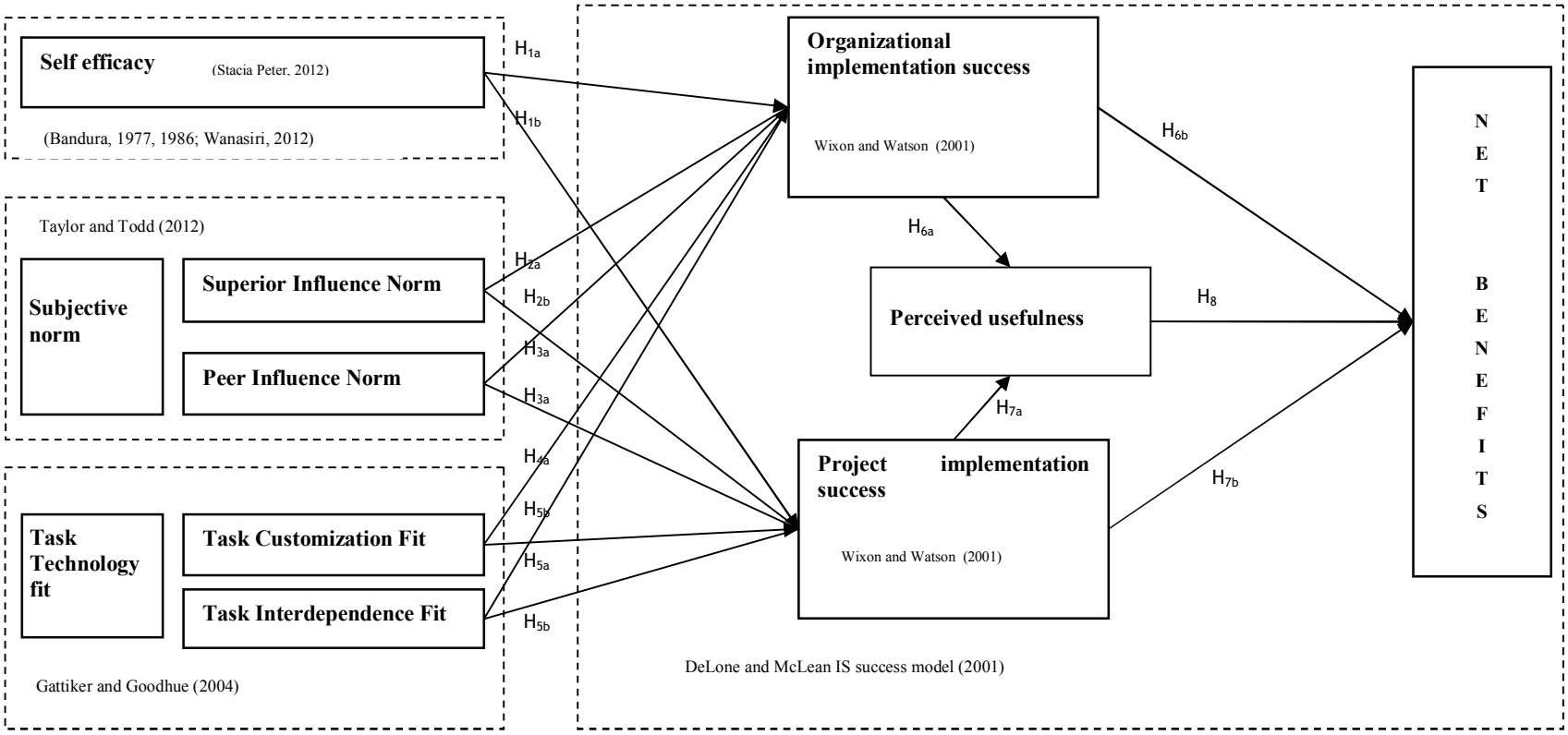
Even though they have the same origin and they cite each other, they differ in the reason of investigating technology adoption with using different factors which are having impact on intention to use innovative technologies. All of them use quantitative approaches (and survey data collection) and mostly as methodology is used structural equation modeling and confirmatory factor analysis (Alraimi et al., 2015; Ketel, 2014; Wixom & Watson, 2001), and less partial least square (Oliveira et al., 2014) and ordinary least square (Han & Shin, 2016).

Research model concept (Figure 4-1) (Arnaudov, et al., 2017; Arnaudov, et al., 2017b) was influenced by previous work of Wixon and Watson (2001), who extended DeLone and McLean (1992) information system success model, which strongly had being influenced by David's Technology acceptance model. In study of cloud technology adoption Oliveira et al. (2014) did not consider the frameworks of TAM, TBP and UTAUT because they believed that those theories are pertain to an individual choice only. In another research was investigated the decision making impact of technology implementation in university level, where was confirmed impact of factors over decision maker, but did not consider technology adoption as process of project accomplishment (Sabi, et al., 2016) (Sabi, et al., 2016). However, Stacie Petter et al. (2008) and Seddon et al, (1997) summarizing prominent studies on behavioral intention theories and had commented that the technology acceptance theories and models had gained knowledge and provide knowledge on acceptance frameworks and variables which can

explain technology implementation in technological, organizational and environmental context

In contribution to the literature, the model had investigated the impacts of collaborative project development and technology customization in organization processes during technology implementation, subjective norm and self-efficacy expectation of school principle in performing certain task. Also was examined the success changes in organizational processes in another angle. For the consequent research results, we have opened a future discussion on effective management of those changes and subjective norm impacts on those processed.

Fig 4-1 Research model



Chapter 5 Methodology

5.1 Survey data

Survey was used for data collection; and formative questioners were adapted from previous studies (Gattiker & Goodhue, 2005; Goodhue & Thompson, 1995; Seddon, 1997; Wixom & Watson, 2001).The survey addressed 28 questions that refer to nine construct variables. The survey answers were organized by file-level Likert agreement scales (Flamer, 1983; Likert, 1932) from strongly disagrees to strongly agree as prominent measure for behavioral economics variables (Hsu & Lin, 2008). Survey questioners were dispatched by Ministry of education and science, Republic of Bulgaria through internal ministry communication by emails to random selected principles of junior, elementary and middle schools in Bulgaria. Survey was built with Google Forms application. During seven days period out of 285 sent emails, were collected 230 answers, because of zero mean value 5 questioners was excluded, and 225 questionnaires were valid only. Principle component method in exploratory factor analysis was used for data analyzes, confirmation of factor validity, and refining construct variables in the research model. Software used for data analyzes was SPSS 22 and AMOS 20. As appendix are attached demographic data (Appendix A), survey questionnaires (Appendix B).

5.2. Demographic data

Collected demographics ranked schools to Junior high school (57.28%); Junior school (20.89%); High school (15.21%); Middle school (7.39%); and Others (4.34%). Source of budget could be Municipality in 78.26% of the cases or Ministry, including ministry of education and science, ministry of culture or ministry of sport (18.69); and 3.04% answers were collected from private schools. According to urban or remote location, schools were divided to: located in capital city (15.69%); other city (54.78%); village (21.17%); and 7.39% did not answer to this question.

The control question of "Do you understand the definition of e-learning technology based on cloud environment?" School principles promptly answer "Yes" with rate of 99.13%; only one school out of all answered "No" or 0.87%. Demographics shows that school principles had experienced in developing e-learning projects (41.3%); where without experience was 58.7%. Another question related to project implementation shows that 33.47% of school principles colleagues' participation to project development, and 66.53 did not participated. School principles had collaborated with external expert groups while technology implementation in 50.44% of received answers. Where 39.56% of all, did not implement e-learning project at school, and 33.91 implemented at least one project in last 3 year; two projects (11.3%); three projects (3.47%); and more than three in 11.3% of cases.

5.2. Structure equation modeling

Academia proposed different methods and theories to measure users behavior and users attitude to technology use, such as technology acceptance model (Davis, 1989); diffusion innovation theory (Rogers, 1995); information system success model (DeLone & McLean, 2002; 1992); theory of planned behavior (Ajzen, 1991); social cognitive theory (Bandura, 1989); technology organization-environment framework (Baker, 2012; Tornatzky et al., 1990). Even though they have the same origin and they are interlinked, they differ in the reason of investigating technology adoption. The models used different factors that have had impact on intention to use innovative technologies. All of them use quantitative approaches with survey data collection, and as methodologies mostly used structure equation modeling and confirmatory factor analysis (Alraimi, et al., 2015; Ketel, 2014; Wixom & Watson, 2001), partial least square (Oliveira et al., 2014) and ordinary least square (Han & Shin, 2016). Compared to the covariance based structural equation modeling techniques, PLS provides a better explanation for complex relationships. However, both might minimal sample size and sample distribution (Chin, 1998; Fornell & Larcker, 1981). Another difference, PLS is widely adopted by business researchers (Ringle, et al., 2012), and SEM test the measurement model behavioral economics studies (Wixom & Todd, 2005).

This study employed the principal component method in exploratory factor analysis to examine factor validity and refine construct variables in the proposed research model (Fig. 4-1.).

The Global fit indexes test results shows the Kaiser-Meyer-Olkin value for sampling adequacy is 0.813 (with p=0.01). The model constructs were confirmed by the sample, explaining 71.34 per cent of variance (Hair, et al., 2010). Literature recommended that to evaluate the originality of the design of questions is to measure the indicator of path loading (Chin, 1998). In Structure equation modeling (SEM) all items are tested with common variance method test using Harmans' one-factor test (Podsakoff, et al., 2003), which test is design to load all items to one factor with recommended threshold level of 0.50 per cent. (Table 5-1). The goal of this test is to show covariance between the variables. In tested items only four items (NB1, SE1, OrgIS2, TIF1) out of 28 are under this level, but their value is still close to the thresholds, and results from factor loading does not show correlation with other factors' items (or correlation values was less than 0.2), and those four items are accepted for further model test.

Common method biased test was made to compared unconstrained common method factor model (Table. 5-1) to the fully constrained zero constrained common method factor model. The chi-square test came to be insignificant. They have difference in chi-square and degree of freedom a p-value is zero. We had significant shared variance, which let is to retain the CFA analysis.

Pattern Matrix[a]

	Factor								
	1	2	3	4	5	6	7	8	9
NB1	.426								
NB2	.871								
NB3	.863								
NB4	.738								
TCF1		.591							
TCF2		.912							
TCF3		.792							
TCF4		.560							
SE1			.498						
SE2			.637						
SE3			.812						
SE4			.758						
ProIS1				.828					
ProIS2				.886					
ProIS3				.538					
OrgIS1					.699				
OrgIS2					.437				
OrgIS3					.548				
OrgIS4					.781				
PU1						.767			
PU2						.586			
PU3						.782			
PIN1							.697		
PIN2							.946		
TIF1								.428	
TIF2								1.048	
SIN1									.632
SIN2									.708

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.[a]
a. Rotation converged in 6 iterations.

Table 5-1 Factor's and Item's loading matrix

Next step was to test global and local goodness to fit indexes. Fornell and Larcker (1981) created average variance extracted (AVE), and constitute the AVE threshold of .50 (Chin, 1998; Hair et al., 2010), which indicates that the observed factors have to have index greater than 50%. The factor value of AVE least square should be greater than the square of the correlations among other factors least squares. Thus it is show that more variances are shared between the least square of single component, and by that are measured the structure of component and its items, the threshold indicator is blocking noise from items of another component. In tested model we have a convergent validity of AVE, and we have reliability all CR coefficients are all above .7, and discriminate validity based on square root of AVE had being greater than any interacted correlation (Table 5-2). It is mean that the tested data had convergent validity as evidence of AVE all above .5, and we have reliability all CR coefficients are all above .7.

Discriminate validity test of factors cross-loading obtained the correlation between least square component scores and other indicators beside its own blocks structure. If an indicator loads higher with other least squares than the one it is intended to measure, the research may wish to reconsider its appropriateness because it is unclear which construct or constructs it is actually reflecting (Table. 5-2).

Table 5-2 Average variance extracted (AVE) cutoff index table.

	CR	AVE	MSV	MaxR(H)	TIF	NB	TCF	SE	PISS	OISS	PU	PIN	SIN
TIF	0.733	**0.594**	0.215	0.881	**0.771**								
NB	0.835	**0.572**	0.446	0.938	0.455	**0.757**							
TCF	0.813	**0.526**	0.300	0.953	0.323	0.548	**0.725**						
SE	0.748	**0.521**	0.143	0.974	0.088	0.280	0.378	**0.722**					
PISS	0.829	**0.619**	0.370	0.977	0.361	0.441	0.463	0.284	**0.787**				
OISS	0.750	**0.607**	0.226	0.980	0.391	0.475	0.404	0.244	0.246	**0.779**			
PU	0.807	**0.582**	0.446	0.981	0.464	0.668	0.534	0.298	0.608	0.343	**0.763**		
PIN	0.805	**0.682**	0.243	0.985	0.234	0.184	0.196	0.077	0.276	0.217	0.230	**0.826**	
SIN	0.711	**0.554**	0.243	0.986	0.247	0.381	0.264	-0.021	0.353	0.133	0.357	0.493	**0.744**

Correlations: (Group number 1 - Default model)

			Estimate
Net Benefit	←→	Task Customization Fit	0.548
Net Benefit	←→	Self Efficacy	0.280
Net Benefit	←→	Project IS Success	0.441
Net Benefit	←→	Organization IS success	0.475
Net Benefit	←→	Perceived Usefulness	0.668
Net Benefit	←→	Peer Influence Norm	0.184
Net Benefit	←→	Task Interdependency Fit	0.455
Net Benefit	←→	Superior Influence Norm	0.381
Task Customization Fit	←→	Self Efficacy	0.378
Task Customization Fit	←→	Project IS Success	0.463
Task Customization Fit	←→	Organization IS success	0.404
Task Customization Fit	←→	Perceived Usefulness	0.534
Task Customization Fit	←→	Peer Influence Norm	0.196
Task Customization Fit	←→	Task Interdependency Fit	0.323
Task Customization Fit	←→	Superior Influence Norm	0.264
Self Efficacy	←→	Project IS Success	0.284
Self Efficacy	←→	Organization IS Success	0.244
Self Efficacy	←→	Perceived Usefulness	0.298
Self Efficacy	←→	Peer Influence Norm	0.077
Self Efficacy	←→	Task Interdependency Fit	0.088
Self Efficacy	←→	Superior Influence Norm	0.021
Project IS Success	←→	Organization IS success	0.246
Project IS Success	←→	Perceived Usefulness	0.608
Project IS Success	←→	Peer Influence Norm	0.276
Project IS Success	←→	Task Interdependency Fit	0.361
Project IS Success	←→	Superior Influence Norm	0.353
Organization IS Success	←→	Perceived Usefulness	0.343
Organization IS Success	←→	Peer Influence Norm	0.217
Organization IS Success	←→	Task Interdependency Fit	0.391
Organization IS Success	←→	Superior Infl. Norm	0.133
Perceived Usefulness	←→	Peer Influence Norm	0.230
Perceived Usefulness	←→	Task Interdependency Fit	0.464
Perceived Usefulness	←→	Superior Influence Norm	0.357
Peer Influence Norm	←→	Task Interdependency Fit	0.234
Peer Influence Norm	←→	Superior Influence Norm	0.493
Task Interdependency Fit	←→	Superior Influence Norm	0.247

Table 5-3 Correlation test between dependent and independent variables.

In testing local fit indexes, all were in the recommended thresholds of good fit. Literature discussed that CFI index range between zero and one (Bagozzi & Yi, 1988; Hu & Bentler, 1999), the tested model had CFI cutoff value of 0.999, which is indicator of superior fit (Bagozzi & Yi, 1988; Hsu & Lin, 2008; Hu & Bentler, 1999), TLI were .993 where literature recommends TLI to be close to 0.95 (Hu & Bentler, 1999).

Baseline comparison	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.991	.948	.999	.993	.999
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 5-4 NFI and CFI index table

For sample size less than 250, Hu & Bentler (1999) concluded goodness to fit threshold of RMSEA to be less or equal to 0.06(Browne & Cudeck, 1989; Hu & Bentler, 1999). RMSEA values less than 0.05 are indicator of good fit, values under 0.10 indicate average fit, and values larger than 0.10 are used to measure poor fit(Browne & Cudeck, 1989; Hsu & Lin, 2008) Recommended that for RMSEA values less than 0.05 as indicative for close fit, and suggested that values between 0.05 and 0.8 as indicative for fair fit, and those values greater than 0.1 as indicative for poor fit. Our results show value of .026 which is indicator of superior fit. Further information of local goodness to fit indexes is provided in Table 5-5

RMSEA	RMSEA	LO 90	HI 90	PCLOSE
Default model	.026	.000	.094	.635
Independence model	.310	.291	.328	.000

Table 5-5 RMSEA

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	39	6.938	6	.327	1.156
Saturated model	45	.000	0		
Independence model	9	805.859	36	.000	22.385

Table 5-6 Chi-square and degree of freedom index

Absolute fit measures		Recommended goodness-to-fit indexes	Model results
Root mean square	RMS	Close to 0	.008
Standard RMS	SRMS	<0.05	0.00
Root mean square of approximation	RMSA	<0.06	0.026
Goodness-of-fit index	GFI	>0.9	.993
Adjusted goodness-of-fit	AGFI	>0.9	.949
Normed fit index	NFI	>0.9	.991
Comparative fit index	CFI	>0.9	.999
TLI	TLI	>0.9	.993
Chi-square/Df		<2	1.156
Incremental fit index	IFI	0 to 1	.999
Parsimonious normed fit index	PNFI	0 to 1	.165
Parsimonious goodness-of-fit index	PGFI	0 to 1	.132

Table 5-7 Summary of goodness to fit indexes.

Chapter 6 Empirical results and discussion

6.1. Results

All estimated variables had significant impact on project implementation. School principles as project developer perceived others opinion such as colleagues, IT experts and regulator opinion and sector development strategies as strong predictor of successful technology implementation in organizational level. Nevertheless, from the results cannot be promptly confirmed that the project developer opinion is influenced in the way described from (McAlister et al., 2008), because the individual action are not ultimately determined and fully described by whole causes external to the will. Independent factor self-efficacy, which refer an individual believe in their own abilities (Bandura, 1989) also had strong influence, and factors with collaborative patterns as interdependency and task-technology fit with its customization, shows that project development and its successful implementation is influenced from many exogenous factors, including collaboration.

The data did not show significant relationship between project development of cloud in the education success on time, budget and expected functionality with perceived net benefits of the organization. Perceived usefulness is proved to be successful mediator between project implementation success and organization benefits. Completion of project on time, in budget with planned functionality had positively enhanced technology

use by organization. Final results show that project success had impact on student's performance and efficient fulfillment of organization mission.

To implement cloud in the education, it is important to understand school principle behavior, because results shows that his/her abilities to perform a given task are not significant to successful implementation of the same task, it is because of the remarkable difference between individual and organizational interest, very well described in literature of hedonic and cognitive behavior of technology use.

The design of the survey questions and collected responses did not show significant relationship between superior influences and successful technology implementation to organization, because superior authority such as Ministry of education and science (MoES), Republic of Bulgaria does not participate directly in the implementation process. MoES influence the process indirectly with creating regulations in the field. Another explanation could be that MoES as policy maker and regulator in education with its policy frameworks constitute proper management activities in the public education.

Finally, and very important for organization technology implementation success are colleagues opinion, the degree of coordination between project partners, to employ system functionality with task requirement, and to response well to the lack of fit between organization process and ready to use technologies provided from technology designer.

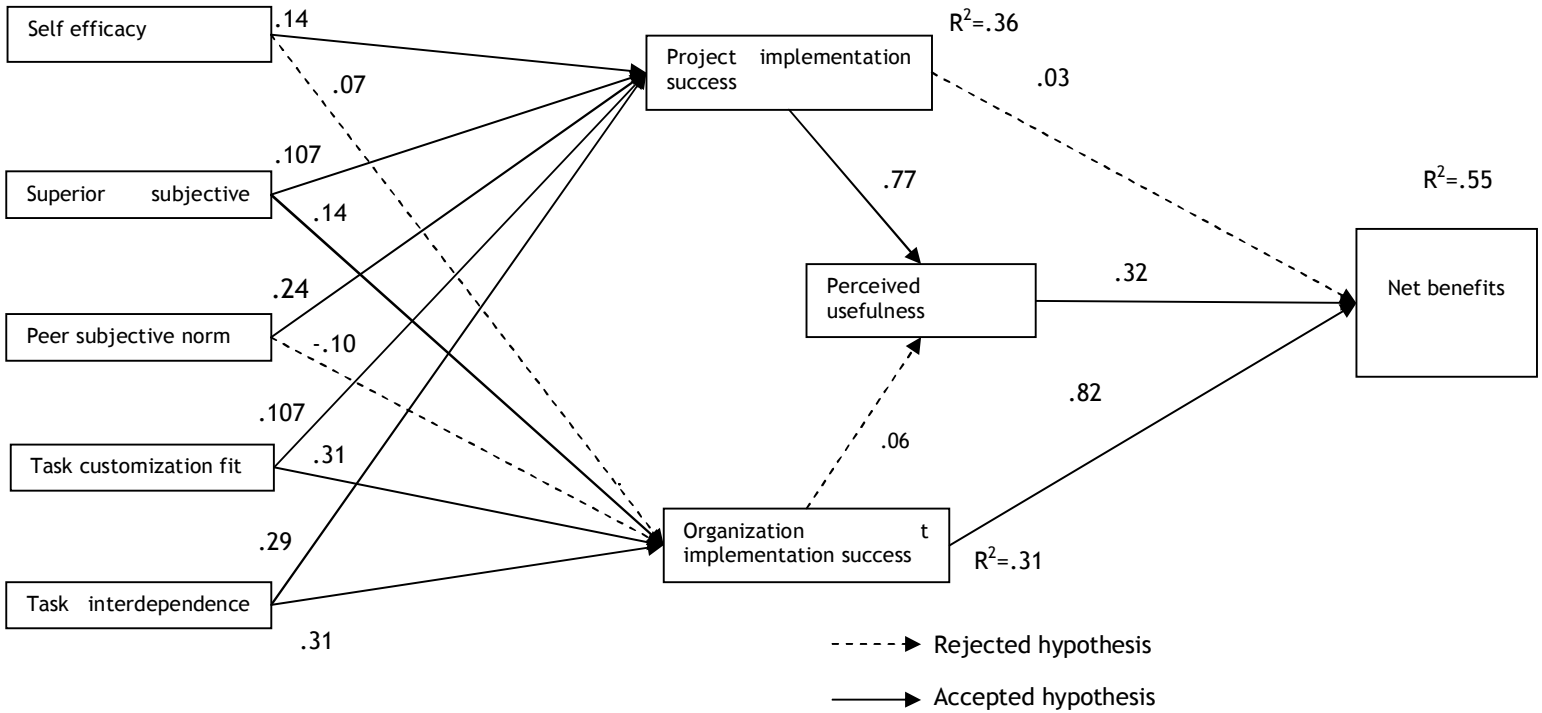


Fig 6-1 Research model and hypothesis test results

			Estimate	S.E.	C.R.	P	Acceptance
Project ISS	<---	Self Efficacy	.085	.026	3.278	.001	accepted
Org. ISS	<---	Self Efficacy	.087	.055	1.578	.115	**rejected**
Org. ISS	<---	Task Customization Fit	.482	.104	4.616	***	accepted
Project ISS	<---	Task Customization Fit	.305	.052	5.886	***	accepted
Org. ISS	<---	Task Interdependency Fit	.356	.069	5.140	***	accepted
Project ISS	<---	Superior influence Norm	.198	.041	4.777	***	accepted
Project ISS	<---	Peer Influence Norm	-.077	.047	-1.644	.100	accepted
Org. ISS	<---	Peer Influence Norm	.228	.108	2.113	.035	accepted
Org. ISS	<---	Superior Influence Norm	-.121	.084	-1.441	.150	**rejected**
Project ISS	<---	Task Interdependency Fit	.179	.034	5.324	***	accepted
PU	<---	Organization ISS	.040	.034	1.181	.237	**rejected**
PU	<---	Project ISS	0.774	.113	7.422	***	accepted
Net Benefit	<---	Project ISS	.053	.178	.297	.767	**rejected**
Net Benefit	<---	Organization ISS	.230	.057	4.053	***	accepted
Net Benefit	<---	Perceived Usefulness (PU)	1.280	.331	3.863	***	accepted

Table 6-1 Hypothesis test table

6.2 Discussion

The results from the proposed model suggest the influence of technology customization, peer and superior subject norm and principle self-efficacy as predictors of successful implementation of education on cloud technologies in public schools. These influences are beneficial to organization decision making, end user community (teacher/learner) and reducing uncertainty in project implementation. Furthermore, external variable impact on project and organization technology implementation success shows the necessity for new policy that delegate more management authority to public education. The results also confirmed that successful technology implementation in an organization is only successful when the implemented technology fulfills the organization mission. The dependent variable organization implementation success shows that implementing new technologies in an organization causes internal changes, which can be managed efficiently.

The impact of the two groups on the complementary variables of task interdependence and customization fit and peer and superior influence on project and organization implementation show an unbearable influence. The superior office had an impact on the project implementation stage. However, in comparison to peers (i.e., school teachers), the superior does not well understand the process of technology implementation. Successful project implementation had an impact on organization behavior of technology use, but does not show influence on utilizing that technology and deriving benefits

to the organization. Peers had a positive influence on organization implementation success, and organization implementation success had an impact on only utilizing technology, rather than to the organizational behavior of technology use. Therefore, we recommend that authorities need to address new innovative policies, tools or practices. Public education is a public service and policy implementation should be developed by education authorities (e.g., Ministry of Education and Science, Republic of Bulgaria). However, the process of policy development has to be transparent and monitored through the teachers' community. The new regulation has to seek not just an introduction of a new student assessment policy, but also effective to diagnose technology management in the school and student's learning process. Authorities need to support technology adoption in instructional learning because the accomplishment of successful projects contributes to learning and teaching quality. Digital technologies such as cloud computing improves student performance. Technology implementation itself forces the adoption of new appropriate assessment policy. However, a new service virtualization policy should underline teacher commitment in this new environment because even after the implementation of ICT for teaching and learning in schools, teachers are still involved in all in-class and out-class student activities (G. Brown, 2004)

Our findings indicate that collaboration and knowledge exchange between team members are very important drivers of task interdependency and customization fit, and influence project implementation and technology acceptance at the organizational level. In a project team, the design of

communication and knowledge exchange, and team member's behavior, and their analytical and technical expertise (Sousa, 2004) have a direct impact on interdependent team work. For example, with an increasing longevity of a collaboration group, individual behavior becomes less receptive of communication because collaborators are not using the communication channels to share new knowledge (Katz, 1982; Staw & Salancik, 1977). Such a threat disrupts the comfort of project development and team work predictability. Thus, policy framework should not support a collaborative team based on long-term contracts in the sense that collaboration between internal and external experts need to be flexible because of the impact of uncertainty. Members in a collaborative team should stay together, but without disturbing the success of project implementation. Inefficient communication between team members come from heterogeneous characteristics (Rogers, 1995).

The results confirmed that the organization to identify the critical issues project into process have to learn how and to whom to address project task to ensure efficient and promised benefit from technology adaptation (Somers & Nelson, 2001). This to happen, organization need to develop clear project goals and objectives, and to built interdependent cooperation between experts, to built channel for ongoing technology vendor' technical support.

Only a strong hierarchy and well distributed tasks can result in beneficial organization outcome. In this paper, we also confirm that team and individual performance had an impact on the quality of teamwork (Hoegl & Gemuenden, 2001). For the future use of task interdependence and

customization fit, we should consider other predictors of teamwork quality such as correct planning, project control and team member's skills (Mathieu, et al., 1992), and resource scarcity in an organizational context such as individual's skills and professions (Mathieu et al., 1992). From our results, we argue that team work is directly related with the quality of collaboration, which is one of the key factors of successful project management. In the literature on collaboration, it is discussed that tension exist between being collaborative and competitive (Bruce et al., 1995). For example, the possibilities of information leakage between partners could have the partners to become rivals at a later stage. To prevent this, collaborative partners have to keep the exchange of information focused on the objects of collaboration such as information related to project development and technology implementation.

Project developers tend to focus of organization benefit impact in after implementation stage, but did not consider system, service or information quality. In differ to Wixon and Watson (2001), we are investigating only success factors that had positive impact on project implementation in organizational level. We do not consider individual attitude of technology use.

Chapter 7 Conclusion and implication

7.1 Implication

Partnership could be based on financial, institutional or knowledge transfer support. Source of such partnership could be public, private or both; if any public or private organization is recognized as institutional body, then the support flow between the institutions could result in knowledge transfer or proposing legislative (policy and standardization). According to the geographical location of those institutions the collaboration could be local or global, but for both is possible to have private or public source. Global collaboration could be non-commercial partnership where one of the partners is a global technology leader or international non-profit organization.

Results shows that cloud technology have positive impact on student's grades. According to Gavin Brown (2004) policy implication of new teacher assessment are desired. He recommended that implementation of any innovative assessment policy, tools or practices in national or local level need to account the complex structure of class activities including teacher objective opinion about student performance, even the learning results are proposed in digital format. It is expected (G. Brown, 2004) with implementation of new standards from authorities may reduce teachers effectiveness work in this process. Objective teachers' opinion has to be in the center of new digital environment. Even development and implementation of ICT for teaching and

learning in school, teachers are still involved in all in-class and out-class student's activities. Policy implementation have to developed by education authorities (for example Ministry of education and science, Republic of Bulgaria), but development process have to be transparently monitored from teachers community. The new regulation have to seek not just an introducing of new assessment policy, but also to be effective to diagnosed students learning, and to contribute of increasing learning and teaching quality. Cloud technology improves students' performance, and implementation of appropriate assessment policy has to underline the teacher commitment in this new environment.

In policy convergence research done by (Bennett, 1988) contents four distinct processes enumerate in his theoretical framework: deterministic process, emulation, harmonization and penetration. Republic of Bulgaria is member state of European Union, and national legislation framework has to be compatible with European directives. When Ministry of education and science is developing innovative policy framework for education on the cloud technology educational service for public schools, have to consider Bennett (1988) policy research, where policy as solution have to be achievable and have to solve the problem in nature. Thus, the policy could be easy to be harmonized and replicate to other member states.

This research was not related to appropriate use of technology, but we are agreeing with (Jurison, 1996) that appropriate technology originally articulate as intermediate technology in the sense that organizations adopt wide available technologies in appropriate to their needs way. Even that into

organization level individual benefits (laborer) occurs before improvement of organization effectiveness. We encourage adoption of cloud technologies as teaching-learning tool via collaboration and project development. Our findings clearly show that projects developed in collaborative way are more beneficial to entire educational community, because more than one group could benefit from project results. Thus, increase efficiency of spending public funds. For this reason Ministry of education and science, shall developed online registry of success developed and implemented education on the cloud technology public projects. Aim of such registry, is disseminate information about successful projects, which could be use for easy replication of those projects.

Another message which this paper would like to address to school authorities and developers of education in the cloud technologies, to increase the efficiency (for both sides) they need to be more collaborative. In one side peer support is important driving force (Sykes, et al., 2009). For example, when having peers sharing stories on successful project and technology implementation, or sharing information on project development tools they are likely to increase the efficient way to accept the technologies and to use them more effectively. In another side to be collaborative project stake holders have to consider that they could develop not only digitalized service for local community needs but also by creating partnership the project result can have more global impact. For example in recent research of Mumford (2002) was investigated how to form such a complex relationship between different stake

holders of public service innovations. In the end he concluded that the link between technology owner and technology adopter need to be reverse too, because partnership between public and private organization would have impact of development on subsequent innovation. Thus, new policy implications have to encourage developing and implementing innovations for public authorities (Austin et al., 2006), because such innovation are going to have impact on public sector side and on contributors side. The impact could be measured with created social-value production and social returns. Social innovations are derived by external knowledge transfer (Mumford, 2002). Public policy has to support social innovations in public sector, expectably in education service, because innovations are the driving force of rapid development of digital education services.

Public authorities have the obligation to do procurement weight to promote development and to implement desirable, fordable and suitable cloud technologies. Sustainable technology adoption is driver of cloud technologies from public authorities for forging certainty and trust on cloud environment in education process.

However, its usefulness and efficiency digital technologies have some boundaries, for example cloud service infrastructure images the inland highways in the sky, and unless they are unsafe they are useless. Processes of digital education have to be added as additional public provided service monitored and scanned from national CERT agency. Good practice is the

initiation of Ministry of transport and information technologies, Republic of Bulgaria, where was started program “Safe Internet” since 2006.

Academia showed to us that schools which are not practicing technology adopting in time they are intend to increase its service cost (Mulgan & Albury, 2003). Public project development has some limitations (Nikolaeva, 2011) and homogeneous communities are late adapters, and participation in heterogeneous project teams give strategic advantage from diverse knowledge sharing among internal and external group members.

7.2 Conclusion

In summary, e-learning use in public education is not question of to implement or not to use, it is questioning the time of complex utilization period, and successful implementation in entire organization and with desire to result in equilibrium between service cost and productivity (Lassila & Brancheau, 1999). The proposed technology implementation success framework shows that the focus of project developers is in the organization benefits after the implementation stage, but in contrast to Wixon and Watson (2001) this research did not consider system, service or information quality, because the proposed framework did not consider individual attitude of technology use, rather to investigate the individual and collaborative influence on technology implementation in organizational level. Organization net benefits depend from project development purpose measured by all tested heterogeneous factors and model mediating factors of OrgISS, ProIS and PU.

Sustainable technology adoption is driven by successful collaboration between school principles and technology implementation team rather to current policy and administrative influence from public authorities. To build a successful collaboration and knowledge transfer trust between members is becoming an important predictor, and future research on this filed is needed. From our study we would like to address a future research on teacher motivation not only to use digital technologies but also to learn to do a minimum technical maintenance, and the impact of such behavior on efficiently use of digital technologies in public education. Interdependency and communication between stakeholders is critical for task compulsion and team decision making. For public education external experts are likely to be technology specialist, and with minimum customization of the system, their effort will make the technology go live (Benbya et al., 2004) and also external experts could have strong impact on public organizations to catch up innovation in the stage of massive adoption. It is important to understand that public organizations and technology owners have their own enterprise goals, and those goals differ in their purpose. Project development and knowledge exchange between public education and technology firms, are activities done between none rivals.

Collaboration in project development and technology acceptance is combination of knowledge skills, tools and techniques of project activities in order to meet project expectation. Collaborators are individuals, which represent an organization actively involved in the project. We confirm that in

project development process project success and technology acceptance success need to meet stakeholder satisfaction and factors such as net benefits and perceived usefulness measure such satisfaction.

In this research had being identified two groups of benefits gained from technology utilization that have direct impact on teaching/learning environment, and second are cost benefits. For example with adopting education on the cloud, public education reduces the public service cost, and project cost might be used as comparison measure between available technologies on the market, and this could help school principle in accounting next year school budget. Also, with adopting cloud technologies maintaining risky assets such as IT equipment and staff cost are transferred outside public schools.

Aim in this research was not to decide how to use cloud technologies in education process more efficiently, rather than how to organize the decision making process inside the public education organization during technology implementation. However the model is design to support decision making, this model could not replace fully the real world situation, because the structure of public organization as schools depends from the government legislations. Organizational changes for better adoption of internet based technologies should be made in local level, and such individual changes might lead to more global changes in the national level with updating the national public education framework. It is mean changes related to the process of project design, development and implementation could differ in different

public organizations but activities as procurement, which is mandatory for public budget organizations, are under governance of government' vision and strategy. Such changes will have impact on public education after update of national strategy for public education development only.

7.3 Limitations

Limitation of logical analyze of case study is that it does not provide information about project success, management success or stakeholder satisfaction. Consequently similar study could not be used to measure the utility of project development and its success, can only classify variety of goals of project development; purposes of use; adoption of particular technology design.

Another important limitation of this study is that the sample is biased toward cases of adopted projects rather than cases in process of project development and implementation, or cases of school authorities with opinion of dissent usefulness of digital education services. Those education authorities who perceived the e-learning website as less useful, difficult to use, less enjoyable, or face scare of resources to develop certain project are not likely to have observed in the study. Limitation of the data set relies on objectivity and authenticity of the provided information from the report.

Limitation of survey questioners is that individual answers subjectively to their own perception of technology use and project implementation.

This study did not consider the difference between team members, project leader, and their experience and did not rate the team performance (Hoegl & Gemuenden, 2001).

Survey questioner was proposed with 5 Likert scale, this affect the distribution rate in the listed answers.

7.4. Future study

Quantity and quality of performance vary between different organizations, but both are depending from external environment stability. Predictability of main processes had depended on how organization tasks are subdivided with their project partner as well. To understand more of last cause is need to study the motivation of building communication channels and also to measure the shared knowledge between internal and external experts. In this research factor interdependence measures the links between those experts. To increase the efficiency of this collaboration is needed in future to build set of information processing mechanism (such as hierarchy) which aim is to distribute deferent rules between project partners.

APPENDIX A. Descriptive data

Question	Option	Answers	%
(D1)The organization for which work is:			
	Junior school	48	20.89
	Junior high	133	57.82
	Middle school	52	22.6
	Other	10	4.34
(D2)The organization is under financial support of:			
	Ministry budget	43	18.69
	Municipality budget	180	78.26
	Private	7	3.04
(D3)Location of our school is in			
	Capital city	36	15.69
	City	126	54.78
	Village	51	21.17
	Did not answer	17	7.39
(D4)I understood the definition of e-learning in this survey			
	Yes	228	99.13
	No	2	0.87
(D5)I have experience in developing e-learning project			
	Yes	95	41.3
	No	135	58.7
(D6)In the stage of developing and implanting e-learning project to the school, my colleagues had participated			
	Yes	77	33.47
	No	153	66.53
(D7)I had collaborated with external expert in the process of project implementation. Those experts was from:			
	ICT supplier	65	28.26
	Other public organization	16	6.95
	Ministry of education	43	18.69
	Other schools	34	14.78
	I did not collaborate	114	49.56
(D8)How many e-learning project were implemented in your school in last three years:			
	One project	78	33.91
	Two projects	26	11.3
	Three projects	8	3.47
	More than three	26	11.30
	Neither one	91	39.56

Appendix B Literature review of construct variables

Construct	Related definition in literature				Dimension of used construct	Construct used in related theories
Project implementation success	Information system implementation success were identified as success with project issues, such as complete project in time, on budget, proper functionality; (Wixom & Watson, 2001)				Complete project in time; on budget; proper functionality	D&M model (Wixom & Watson, 2001)
Organization implementation success	Information system implementation success were identified as success with organizational issues, such as change management, widespread support, political resistance (Wixom & Watson, 2001)					D&M model
Perceived usefulness	"PU is a perception of the degree to which the stakeholder believes that using a particular system has enhanced his or her job performance, or his or her groups or organization performance" The next two condition: technology is useful if produced benefits, and second condition is cost are less important than benefits, makes PU not same as Net benefits (Seddon, 1997)	The degree to which the user believes that using a particular system has enhanced his or her job performance (Rai, et al., 2002)	The degree to which an individual believes that using the system enhances his or her productivity and job performance (Sabherwal & Chowa, 2006)		Individual impact (DeLone & McLean, 2002); Perceived measures of net benefits from IS use (Seddon, 1997)	D&M model (Rai et al., 2002; Seddon, 1997); TAM (Sabherwal & Chowa, 2006)
System use	The organization community behavior of, or effort put into using the system (The individual behavior of, or effort put into using the system) (DeLone & McLean, 2002)	The degree of organization satisfaction with the system (Rai et al., 2002)			System use, usage, utilization (Kukafka et al., 2003)	D&M model
Net benefits	Organization net benefits are perceived by stakeholders (individuals, groups of individuals, management of organizations, and society), in whose interest IS effectiveness will be evaluated as general measure of technology which would be less likely to be important from one to another stakeholder. (Seddon, 1997)	Utilitarian measure to which organization acts to maximize benefits and minimize cost (McAlister et al., 2008);			Net benefits; utilization; cost saving, (DeLone & McLean, 2002)	D&M model
Self-efficacy expectation	A person beliefs concerning his/her ability to successfully perform a given task or behavior are the major mediator of behavior and behavior change (Bandura, 1977)	The conviction that one can successfully execute the behavior requirement to produce the outcomes (Bandura, 1996; McAlister et al., 2008)	Individual belief expectation of own abilities to contribute in information system use (Compeau & Higgins, 1995b)	Assuming the individual past experience, it is use to measure perceived ease or difficulty of performing the behavior (Ajzen, 1991)	Self-efficacy expectation; Self-efficacy; Perceived behavioral control	Social cognitive theory (Bandura, 1977) TRA; TBP (Ajzen, 1991)

Outcome expectation	Beliefs about the likelihood of outcome that might's result from the behaviors that a person might close to perform and perceived values of those outcomes (Wixom & Watson, 2001)	When individual efforts influence total outcome and consumption of this benefits differ by individuals. Thus behavior can be conducted by measuring the feel of individual if they do or do not a certain behavior practiced after achieving the formal goal (McAlister et al., 2008)	Beliefs about the likelihood of outcome that might's result from the behaviors that a person might close to perform and perceived values of those outcomes (Bandura, 1996; McAlister et al., 2008)	Outcome expectation; attitude toward behavior	TRA; TBP, SCT
Subjective norm	Refers to the perceived social pressure to perform or not to perform particular behavior. (Ajzen, 1991; 2002)	Individual perception about the particular behavior which is influenced by the judgment of significant others		Subjective norm; Normative beliefs; Motivation to comply	TBP (Kukafka et al., 2003)
Peer Subjective Norm	Individual perception about the particular behavior which is influenced by the judgment of significant colleagues (Taylor & Todd, 1995)			Peer influence	TBP
Superior Subjective Norm	Individual perception about the particular behavior which is influenced by the judgment of supervisor (mother office) (Taylor & Todd, 1995)			Superior influence	TBP
Task technology fit	Employ system functionality with task requirement, with providing little distraction as possible to support technology user in his performance (Goodhue, 1995)			Task technology fit; Tool functionality Task requirement	TAM, D&M model (Kukafka et al., 2003)
Task Customization Fit	Response to the lack of fit between organization process and those developed from technology designer (Gattiker & Goodhue, 2005)	Customization: Response to the lack of fit between organization process and those developed from technology designer (Gattiker & Goodhue, 2005))		Customization	D&M model
Task Interdependence Fit	The degree to which coordination links between project partners produce a valuable benefit (Gattiker & Goodhue, 2005)			Interdependence	D&M model
Project Champion	The degree to which project leader successfully influence information system implementation			Champion; project champion	D&M model

Appendix C Survey questionnaires in Bulgarian language

Item	Question/ Въпрос	Strongly disagree/ Напълна съм несъгласен	Disagree/ По-скоро съм несъгласен	Neither agree, neither disagree/ Нито съм несъгласен, нито съм съгласен	Agree/ По-скоро съм съгласен	Strongly agree/ Напълно съм съгласен
TCF1	e-Learning technology understand my organization mission. (Goodhue, 1995) (BG) Като цяло, е-образователната технология покрива нуждите на организацията ми.	○	○	○	○	○
TCF2	The IS people (technology developer/ external project experts) we deal with understand the day-to-day objectives of my work group and mission with our organization. (Goodhue, 1995) (BG) Доставчика на е-образователната технологиия (неговите експерти) разбира ли моите ежедневни работни нужди и мисията на моята организация.	○	○	○	○	○
TCF3	I am satisfied with the level of technical and business planning consulting expertise I received from external experts. (Goodhue, 1995) (BG) Доволен съм от нивото на техническа и работна експертиза която получих от доставчика на е-образователната технология.	○	○	○	○	○
TCF4	When the education on the cloud system was being implemented the technology was changed to better. (Goodhue, 1995) (BG) При разработването на проекта и при внедряването на е-образование бяха направени персонални промени по	○	○	○	○	○

	технологията удволетворяващи специфичните нужди на организацията.					
TIF1	TIF1: To be successful this project must be in constant contact with its external team members. (Gattiker & Goodhue, 2005) (BG) За да бъде успешен един проект по внедряване на е-образование е необходимо да бъдат привлечени външни експерти.	○	○	○	○	○
TIF2	In project development and implementation process communication links between internal and external team members are essential for better technology implementation. (Gattiker & Goodhue, 2005) (BG) При разработването на проекта и внедряването е-образование е важна комуникацията между експертите работещи по проекта.	○	○	○	○	○
PSN1	PSN1: My colleagues think that the organization should use information system. (Taylor & Todd, 1995) (BG) Моите колеги мислят, чеорганизацията ни трябва да използва е-образование.	○	○	○	○	○
PSN2	Generally speaking, I want to do what my colleagues think I should do. (Taylor & Todd, 1995) (BG) Честно казано, искам да направя това, което моите колеги мислят че трябва да направя.	○	○	○	○	○
SSN1	SSN1: Official authority would think that the organization should use information system (Taylor & Todd, 1995) (BG) Ръководният орган на която сме подчинени иска от нас да внедряваме е-образователни технологии	○	○	○	○	○
SSN2	Generally speaking, I want to do what official authority think I should do (Taylor & Todd, 1995) (BG) Честно казано, искам да направя това, което организацията на която сме подчинени мисли че трябва да направя.	○	○	○	○	○

SE1	SE1: I could complete the project development if there was someone giving step by step instruction. (Bandura, 1977; Compeau & Higgins, 1995a; Taylor & Todd, 1995) (BG) Аз мога да разработя проект за е-образование ако някой ми показва стъпка по стъпка	○	○	○	○	○
SE2	I could complete the project development even I had never used education on the cloud technology before (Bandura, 1977; Compeau & Higgins, 1995a; Taylor & Todd, 1995) (BG) Аз мога да разработя проект за е-образование въпреки че никога не съм използвал/а такава технология преди.	○	○	○	○	○
SE3	I could conduct education on the cloud project development if government had built-in help facilities for assistance. (Bandura, 1977; Compeau & Higgins, 1995a; Taylor & Todd, 1995) (BG) Сам/а мога да въведа в употреба удобна за работа е-образователна технология	○	○	○	○	○
SE4	Implementation of education on the cloud project is entirely within my control. (Bandura, 1977; Compeau & Higgins, 1995a; Taylor & Todd, 1995) (BG) Практиките по участие в създаването на проект за внедряването на е-образование са напълно по моите възможности.	○	○	○	○	○
ProIS1	The education on the cloud project met its critical project deadlinesл (Wixom & Watson, 2001) (BG) Внедряването на проекта по е-образование приключи в рамките на планираното.	○	○	○	○	○
ProIS2	The cost of education on the cloud project did not exceed its budgeted amount (Wixom & Watson, 2001) (BG) Внедряването на проекта по е-образование приключи в рамките на бюджета.	○	○	○	○	○
ProIS3	The education on the cloud project provide all of the cloud technology functionality that it is supposed to provide (Wixom & Watson, 2001)	○	○	○	○	○

	(BG) Внедряването на проекта по е-образование приключи с внедряване на технология с планираната функционалност.					
OrgIS1	Implementation level success ія addressing organizational issues such as change management widespread support, but had faced political resistance. (Seddon, 1997; Wixom & Watson, 2001) (BG) Внедряване на проект е-образование беше подкрепен от моята организация но срещна съпротива от институцията но която сме подчинени.	○	○	○	○	○
OrgIS2	With implementation of education on the cloud project was necessary to make change in the organization (teaching and learning style). (Seddon, 1997; Wixom & Watson, 2001) (BG) След внедряването на е-образователната технология се наложи да направиме промени в управлението на организацията ни.	○	○	○	○	○
OrgIS3	Change in the organization created by education on the cloud project was managed effectively. (Seddon, 1997; Wixom & Watson, 2001) (BG) Такава промяна беше реализирана успешно.	○	○	○	○	○
OrgIS4	Implementation of education in the cloud project was beneficial to the organization .(Seddon, 1997; Wixom & Watson, 2001) (BG) Технология като е-образование е вполза на организацията ни.	○	○	○	○	○
PU1	Implementing information system will improve students skills and grades. (Seddon, 1997; Taylor & Todd, 1995) (BG) Внедряването на е-образование ще повиши знанията и оценките на учащите.	○	○	○	○	○
PU2	With implementing of education on the cloud project our organization became to perform better, and started to fulfill our mission more efficiently. (Seddon, 1997; Taylor & Todd, 1995) (BG) След въвеждане на е-образование, започнахме да чувстваме подобрение и по-ефективно да изпълняваме	○	○	○	○	○

	мисията на нашата организация.					
PU3	Overall, using cloud technology into public education will be advantageous (Seddon, 1997; Taylor & Todd, 1995) (BG) Като цяло, използването на е-образование е благоприятно	○	○	○	○	○
NB1	Our organization could implement education on the cloud project alone too. (Seddon, 1997; Wixom & Watson, 2001) (BG) Нашата организация може да внедри елктронно образование сама.	○	○	○	○	○
NB2	Collaboration at education on the cloud project development has reduced uncertainty in project implementation (Seddon, 1997; Wixom & Watson, 2001) (BG) Сътрудничеството с външни експерти при разработване на проект е-образование намали неизвестните при неговото внедряване.	○	○	○	○	○
NB3	Collaboration at education on the cloud project development has support decision (Seddon, 1997; Wixom & Watson, 2001) (BG) Сътрудничеството при разработване на проект е-образование бе ползотворно за взимане на решения.	○	○	○	○	○
NB4	Collaboration at education on the cloud project development was beneficial to the end user community (teacher and learner) (Seddon, 1997; Wixom & Watson, 2001) (BG) Сътрудничеството при разработване на проект е-образование беше ползотворно за крайният потребител (преподавател и учащ).	○	○	○	○	○

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Acknowledgments

The dissertation is the result of motivation and insights from professors; from dedicated care and love from family; support from St. Nicholas community at Orthodox Metropolis of Korea; of endless assistance and support from Mr. Andonov and entire crew of the Embassy of Republic of Bulgaria, in Seoul and Family "Zelen" and whole Bulgarian community; of financial support from all handicraft masters from Oreshak, Bulgaria.

I am very mush indebted to Professor Jorn Altmann, Professor Junseok Hwang and Professor Hyenyoung Yoon, without their constant guide, motivation, insights and valuable comments on thesis and academic paper development, I would not have complete the dissertation.

I would like to extend gratitude to the ITPP (Seoul National Univeristy) and ITTP (Korea Advance Institute of Science and technology) and TEMEP students who had inspired me on academic issues and provided me with academic advices at the time of critical need.

My gratitude also goes to Ms. Yeojin Lee, Ms. Mihee Kim and Ms Kwi-Yeong Kwon ITPP managers between Feb 2012 and Feb 2018, and Ms. Jooyoung Kim, manager of IEPP between Feb 2012 and Feb 2016, who shared untiring support, love and care for achieving the success.

Last but not less important, I would like to express my gratefulness to Mr. Orlin Kouzov, Ministry of education and science, whose support particularly on data collection was very significant for research completion.

초록

클라우드 환경에서 교육 관리 프레임워크에 대한 실증 연구

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기술경영경제정책 대학원

최근 학계에서는 정보기술을 교육현장에 활용하는 효율적인 방법에 대해서 모색하고 있다. 디지털 기술의 도입에 대한 개인과 교육계의 태도는 정보기술의 활동을 통해서 경험할 수 있는 다양한 편리함들을 통해서 변화하고 있다. 본 연구에서는 클라우드 환경에 기반한 교육 관리프로젝트를 공공 교육현장에서 실행하는데 영향을 미치는 성공요인들에 대해서 분석하였다.

선행연구들에서는 기술의 도입 목적에 따라서 개인과 조직의 기술 수용에 대한 두 가지 요인을 밝히고 있다. 개인적 또는 쾌락적 목적에서 기술을 수용하는 이유는 새로운 기술을 통한 용이성과 즐거움을 추구하는데 있으며, 이러한 관점들은 기술 수용에 대한 개인의 태도를 연구하는데 주로 반영되고 있다. 조직관점에서 기술 수용은 주로 공리주의적 목적으로 설명되고 있다. 공리주의적 목적에서 조직의 기술 이용은 보다 편리와 효율성을 취하하는데 있으며, 선행연구들은 조직 관점의 기술수용에서 주로 기술도입을 통한 편리에만 초점을 맞추고 있다.

본 논문에서는 조직수준에서 클라우드기반 교육관리 시스템 도입의 성공요인과 이용자의 수용태도를 보려 한다. 이를 통해 정보시스템의 도입에 기여, 궁극적으로는 지역뿐만 아니라 유럽전역의 교육현장에서 클라우드 기술을 실현하는 것을 촉진하고자 한다. 바카라니의 프레임워크 접근법을 이용하여 프로젝트 목적과 기술의 이용에 따라 59개 사례를 분석하였다. 분석 결과는 기술수용이론에 따라 조직 수준에서 프로젝트의 목표와 목적, 투입 요소와 성과, 네 가지 프레임워크로 나타내었다(DeLone & McLean, 2002; 1992).

연구 결과, 구조방정식 모델과 확인적 요인 분석을 통해서 사용자 맞춤과 상호의존성, 동료 영향 요인이 프로젝트에서 조직의 기술도입단계에 양의 영향을 미치는 것을 확인하였다. 그러나 실행단계에서는 학교장의 높은 영향력과 자기효능감만이 기술 수용에 영향을 미쳤다. 본 연구에서는 연구 시사점들과 함께 한계점, 그리고 미래 연구에서 추후 논의되어야 할 점들을 함께 설명하고 있다.

주제어: 기술 수용 성공요인, 협업 및 프로젝트 개발, 행동경제학, 공교육 클라우드 기술