Evaluation of the Performance of Information Systems Implemented at the University of Tripoli, Libya

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Abstract: Evaluating the performance of information systems (ISs) has emerged from the increasing influence of information technology on the effectiveness and efficiency of work processes in an organization (Bryman and Bell 2007). The aim of the overall study is to overcome a lack in the literature regarding the assessment of information systems (IS) in Libyan Higher Education (LHE), especially universities. The aim of this initial article is to focus on the University of Tripoli (UOT), a study that will be extended to other Libyan public universities. A description of the study, its significance and objectives and the methodology followed are presented, together with an analysis of the findings on the basis of appropriately chosen models. Finally, we assess the current level of ISs implemented in UOT by analyzing the findings based on these models.

1 INTRODUCTION

In Libya, access to the tools of information and communication technology (ICT) is still lagging behind, especially in government services. Libya, as a developing country, is eager to adopt new information technologies, although the implementation and use of modern technology in Libyan education are slow and at a low scale for many reasons (UNICCO 2009). There is a gap in the literature regarding the adoption of ICT, especially ISs, in Libyan Universities. This study aims to answer the main question of an ongoing research project, namely "*How does ICT in Libyan Universities look in the 21st century after years of serious technical, economic and social development?*" To answer this question, an assessment of the ISs implemented in Libyan Universities is conducted by using appropriate methods as described later. Indeed, the authors have carried out an initial case study of UOT as the first step in a field study in Libya, while other case studies will be conducted at other Libyan universities to get a fuller spectrum.

A study was conducted (Bakeer and Wynn 2014) on the use of ICT in Libyan universities with the aim of addressing this imbalance by analyzing how ICTs are used in Libyan universities. A new model for assessing ICT utilization in Libyan universities was proposed and applied at the University of Misurata (Bakeer and Wynn 2014). In (Elferjan 2015), training was highlighted as a factor required to enhance the education system. A few other unpublished studies, available only in Arabic, have investigated specific factors. This has led to a lack of available literature covering the issues related to ISs implemented in LHE, particularly in universities (Elferjan 2015). In this paper, UOT was chosen as the subject of an initial case study. Interviews were conducted with IT specialists working at the ICT Centre of UOT. To give a wider view, three models were chosen to analyze the data obtained, specifically: Zuboff's model, Nolan's model and the CPIT Model.

2 SIGNIFICANCE AND OBJECTIVES

This case study aims to describe the present situation of ICT at UOT and will be used for future comparison with other Libyan universities. Hence, the authors use the term "initial case study". Besides guiding adaptations of the survey and interviews for other case studies, this initial study will be useful in deciding how many case studies should be used in a future study. What makes this study unique is the treatment of locally-deployed ISs that are not e-

solutions (web-based), as well as classifying the business activities in UOT based on the model used in (Zornada and Velkavrh 2005). It should be noted that the overall goal of this research project is to assess the applicability of Collaboratively-Developed, ERP model (CD-ERP) within Libyan public universities.

In this study, only aspects of ICT associated with *"IS implementation"* which are deployed in UOT to handle business processes (educational activities, research activities and other business activities) are considered.

3 ABOUT THE CASE STUDY

UOT was chosen as the subject of this study since one of the authors is a staff member and it is the leading university in Libya. Also, UOT has been contributing effectively to the establishment of many universities in Libya by providing consultants and educators. Hence, these collaborations have led to the existence of similarities between all of the Libyan universities. UOT is a public university, the largest institution of higher education (HE) in Libya and the national leader in academic teaching, scientific research, and knowledge development. It consists of 6 campuses distributed over the city of Tripoli. There are 20 faculties (colleges) and 154 academic departments. The local teaching staff has 2970 members, while the international teaching staff numbers 80. A total of 70822 local students and 1598 international students are registered in undergraduate programs, while 3628 local students and 93 international students are registered in graduate studies. (University of Tripoli 2019).

4 THEORETICAL FRAMEWORK

In recent decades, many authors have addressed the issue of the evaluation of IS performance. Factors that influence the success or failure of information systems are often discussed (Platisa and Balaban 2009). A number of techniques and models developed to study organizations from an informatics perspective were chosen keeping in mind the technological and organizational differences in a developing country, such as Libya, from the countries where these models were developed and tested. To evaluate performance, the following theoretical framework is used.

Within this theoretical framework, this paper addresses the following research question: How do the ISs deployed at UOT look after years of serious technical, economic and social development?

First: to study business activities in UOT, the authors adopted the model of business activities in a Higher Education (HE) institution presented by (Zornada & Velkavrh, 2005) as illustrated in Figure 1.
Second: to give a wider view, three models were chosen to analyze the data obtained from two points of view, namely: • Analysis of the overall level of ICT in UOT on the basis of Nolan's model. • Analysis of the ISs implemented in UOT on the basis of Zuboff's model. • Analysis of the level of e-solutions in UOT on the basis of the CPIT model.

5 RESEARCH METHODOLOGY

In this section, the research elements are summarized including: the strategy and approach followed, the research method used, the method of data collection, the sample, the research process, data analysis, and the limitations of the research.

5.1 Research Strategy, Approach and Philosophy

In this study, the authors have observed a single case study, where the subject is UOT. Moreover, the two main research approaches are deductive and inductive. As the authors investigated the implementation of ISs used in UOT, the inductive approach is appropriate, since it involves qualitative research in which the researcher collects data and develops a theory on the basis of data analysis. Data collection was based on interviews with purpose was to collect data on the level of ICT in UOT with emphasis on the deployment of ISs.

5.2 Sampling

Convenience sampling is a type of non-random sampling where members of the population who are easily accessible to a researcher are studied (Dornyei 2007) (Roestad 2016). Such a method was chosen due to the specific nature of the population, individuals who are working on/familiar with ISs in the context of UOT. Also, the population is "hard-to-reach". As it is an initial study, the results can direct future research, to be carried out with more accuracy.

5.3 Design of Data Collection

The design of data collection and analysis of the target population were based on the concept of snowball sampling/respondent-driven sampling (RDS). RDS is a popular method of data collection in the study of "hard-to reach populations", such as the homeless (Salganik and Heckathorn 2004). The use of snowball sampling in such cases has created a widespread perception of chain referral methods in general as methods of convenience sampling (Bonnie 1979). RDS combines "snowball sampling" (getting individuals to recommend those they know as subjects, who, in turn, recommend those they know and so on) with a mathematical model that weighs the sample to compensate for the fact that the sample was collected in a non-random way (Heckathorn 2012).

5.4 Recruitment Strategy

Using RDS, a researcher identifies one individual within a population as a "seed," collects data from the seed and obtains additional participants in the study based on the social network of the seed. These new participants then serve as seeds for identifying more participants. Thus, the snowballing of participants also illustrates the social network within a population (Salganik and Heckathorn 2004). Recruiting is thus driven by respondents rather than by interviewers (Schonlau and Liebau 2012). A method combining aspects of both snowball and RDS sampling was used. Each respondent was asked to give an estimate of the size of their network. This helped to decide whether to use interviews or questionnaires, which depends on the estimated size of the network of the seed(s).

5.5 Target Population

Based on the structure of UOT, the Centre for ICT was established to build and develop a technical environment improving the quality and efficiency of both academic and administrative performance within the university. Consequently, the Centre for ICT was the best starting point for our study, especially as it contains a department committed to developing and maintaining the ISs implemented across the university.

6 THE CASE STUDY RESPONDENTS

Three participants from UOT, labelled T-1, T-2 and T-3, were interviewed. The responses received from these respondents provided the authors with an initial understanding of the general level of ICT in UOT. In particular, these responses enabled an assessment of the level of the ISs deployed and UOT's capabilities for implementing in-house applications.

Table 1: Brief description of the respondents who participated in the study.

Respondents	Position	Years of Experience
T-1	Former Head of ICT Centre	5
T-2	Head of ICT Centre	10
T-3	Head of IS Department	7

The respondents were all experienced in the use, support and management of ICT within the university. These selection criteria for the initial study could also be useful in future field studies. The details of the respondents are given in Table 1.

The authors witnessed a new shift in the Centre for ICT, which gave the opportunity to observe a critical change affecting the entire ICT process at the university. The authors started the interview process with the former head of the Centre for ICT (T1) when he was still in the position. This interview was paused due to an unexpected battle in Tripoli, during late summer 2018. By the end of the battle, a new head of the Centre had already occupied the position. Despite this, the interview with the former head of the Centre was continued, since he held the most knowledge on the things occurring at the Centre, as well as being the initial seed of the sequence of interviews. He proposed the new head of the ICT Centre (T2) as a potential seed. The authors interviewed the new head of the Centre, who in turn recommended the head of the Information Systems Department (T3). This proposal was natural, since the target component of ICT was the level of IS deployment rather than the overall ICT level. The respondents were first introduced to the study via e-mail and then contacted by telephone for the first session of the interview. After this, a list of the additional information needed was e-mailed to them and eventually video-conference sessions were held to conclude the interviews. The languages used in the interviews were Arabic and English for easier communication with the respondents. The lengths of these interviews were between 35 minutes and 2 hours.

7 THE FINDINGS

The Centre for ICT.
The ICT Centre provides networking services, access to the Internet, Intranet services, e-mail, software development and technical support, as well as technical consultancy and training to the University's IT staff. The Centre is directly responsible to the University President. Apart from the administrative department of the Centre, there are five departments namely, Networking and Information Security, Department of Information Systems, Department of Technical Support and Maintenance, Department of Electronic Publishing and Department of Documentation and Statistics

Business Activities in UOT and the Information Systems implemented

To study both business and associated sub-business activities, the authors adopted a model of business activities in HE institutions presented by (Zornada and Velkavrh 2005) as shown in Figure 1. This model was discussed with the interviewees to check whether or not all business and sub-business processes had been included.
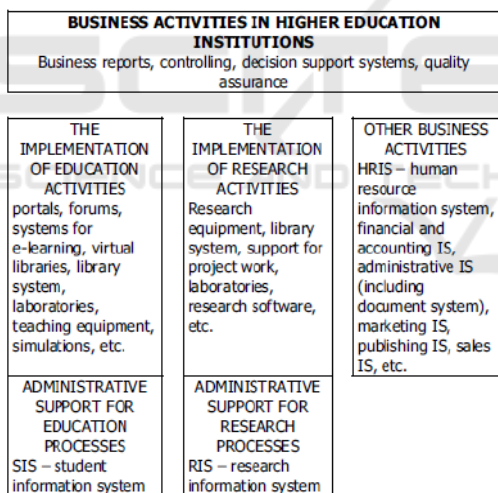

Figure 1: Business activities in a higher educational institution (Zornada and Velkavrh 2005).

1)   The implementation of educational activities
Such business activities consist of the following: portals and forums for e-learning, a virtual library, library system, laboratories, teaching equipment, and administrative support for the process of education in the form of a student information system (SIS). UOT lacks a system unified across all faculties to support its educational activities. Some faculties still rely on old in-house systems to accomplish some tasks, while others are completed using paperwork. In 2016, the

university launched a new online system enabling students to manage their course programs. Now all students use a unified system for course registration and similar tasks. This system operates online, while an offline version is under development. At present, the exchange of information between this online system and older offline systems (on local servers in the faculties) is operated manually using excel/SQL files.

The e-learning program, consisting of portals and forums for both SIS and the learning system, was launched in 2010. This system was fully online, but after the uprising in 2011, the system was limited to managing studies, with no option to perform learning tasks online. Also, the monthly grand program was launched in 2012 is presently done manually using computer applications, such as MS Excel. The registration of new students is electronically operated through the university's main registry.

2)   The implementation of research activities
The implementation of research activities involves research software, support for research work, research laboratories, research equipment, as well as the Research Information System RIS, providing support for the research process. There is no integrated IS for research business activities at the university. One of the projects launched by the ICT Centre is the Digital Archive of the University of Tripoli, DRUoT. Its aim is to digitally store all the output of research, theses, dissertations, books and published papers. This system is administered by the ICT Centre and hosted within the data centre inside the university. Uploading privileges are granted only to the staff of the ICT Centre, while browsing and downloading are open to the public. One of the projects introduced to the university is Office 365, taking advantage of its benefits in ERP systems, E-management and access to international journals based on a subscription. Moreover, there are e-solutions for the refereed journals and periodicals issued by the faculties of UOT in various fields.

Other business activities require human resource information systems (HRISs), finance and accounting ISs and administrative ISs. UOT does not possess any HRIS, except for the administration of academic staff: this is an IS developed by staff within the ICT Centre. Its aim is to handle the data and procedures related to academic staff. Also, there is an IS for students who are awarded a scholarship to study aboard. This system is not owned by the university, but by the Ministry itself. Other work related to human resources is done either using MS-office (Excel or Access) or by hand.

Finance and accounting are partially computerized. In the faculties, such matters are usually done by hand or using MS-office, while the main office of finance and accounting uses an in-house application. The administrative IS, incorporating a document handling system, is computerized in the central offices, such as the University President's office, but handled manually or using MS-office in other divisions. There is a so-called "network resource management system", a centralized system controlling Internet access across the university campuses, ensuring the anonymity of users and determining privileges, such as limits on time spent online and the amount of data that can be downloaded.

3) Hosting and Data Centre

All online systems operate on the university's website, including: the registration system; the billing system responsible for managing student, faculty and staff accounts using Office 365; issuing passwords for access to the University's wi-fi hotspot; and the academic staff administration system. These systems communicate electronically with the university's website. All online systems are hosted by a Libyan company on a server dedicated to UOT. This option provides control over the server, as it can be remotely controlled using administrator privileges. It is thus possible to install and set up any software. This server is located in the company, but the current CIO of the Centre is negotiating to move it to the university's data centre, where all university data is stored. The off-line systems are not centralized, but are under the management of individual faculties to perform specific services. Thus, the offline systems are hosted locally inside faculty buildings.

Finally, there are three main categories of ISs in UOT as itemized below:

- In-house applications developed by an ICT or faculty team using a variety of development tools, such as VB/SQL, ASP/SQL Server and C++. These applications have many problematic issues, are out-of-date and badly documented.
- Applications bought from local vendors and maintained by the vendor or open-source software. The latter are difficult to maintain or develop.
- Access/Excel applications used to support some core activities.
- Integration of such systems is limited to manual communication. There is no bridging software. Data is transferred in Excel, CSV or database files.

8 ANALYSIS AND DISCUSSION

The findings of this initial study expose the weaknesses of the ISs used within UOT. This section presents an analysis and discussion of these findings on the basis of selected models, providing the authors with an easy way to compare ICT levels, especially the ISs deployed, at the time of the field study, as well as giving the reader a better understanding of the research findings. The selected models are:

- Analysis of the ISs deployed in UOT on the basis of Zuboff's model and Nolan's model.
- Analysis of the level of e-solutions in UOT on the basis of the CPIT model.

8.1 Analysis of the Findings based on Nolan's "Stages of Growth Theory"

The Stages of Growth Theory (or Nolan's model) is a classical method for assessing ISs. Although this model has been modified over time, it is still used to describe the growth of IT in an organization and to categorize the evolution of what are known in this context as data processing departments (Hollyhead and Robson 2012). This theory splits the development of IT in an organization into a number of stages. Each stage has its own specific problems regarding information systems, users, technology, IT personnel and management instruments (Nolan and Koot 1979).

As illustrated in Figure 2, the first stage in Nolan's model is "initiation", where the automation of labour-intensive operations is carried out to reduce costs and increase efficiency. All of the UOT organization is beyond this stage. Indeed, UOT's top management, and even the authorities in the faculties, are pushing toward adopting the best available technologies.
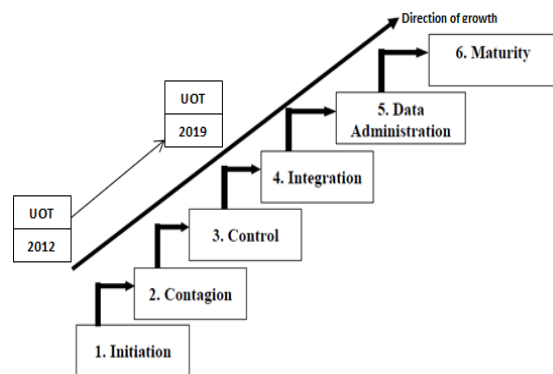

Figure 2: An analysis of the growth of ISs at UOT.

"Contagion" is the second stage, when an organization becomes more familiar with automation.

There is an increasing desire for new technologies. UOT is already beyond this stage as well. All the departments and divisions use information technologies, ISs and software applications to complete their business faster and more reliably. Limited links between ISs in the same department have already been launched by various means, such as CSV or Excel files.

The "Control" stage follows the spread of automation systems throughout an organization and the failures encountered in the "Contagion" stage. Some ISs deployed in UOT have been replicated in various departments. The action taken by UOT's management to unify the online registration system is a good example of this. Before, each faculty had run different course registration systems. Some faculties with few students used MS Excel or Access to handle such processes, while others used in-house applications developed by their IT staff, e.g. the Faculty of Information Technology and the Faculty of Economics. However, we cannot say that UOT has passed through the "Control" stage, since some systems are replicated in various departments, such as the document management system. Simultaneously, UOT is, to some degree, already in the next stage, "Integration", since the university is planning to manage all its business processes and sub-processes via integrated information systems. Currently, there is a tendency to carry out services with the support of in house applications implemented using computer software such as MS Excel and Access. As a result, the authors see the level of ICT, especially the deployment of ISs, as being between the "Control" and "Integration" stage, due to the new shift at UOT to control the growth of ICT.

8.2 Analysis of the Findings based on Zuboff's Model

The concept of "automate, informate, and transformate" was introduced by Zuboff to describe the impact of information technologies on organizations: "Automate" refers to the use of Information Technology (IT) instead of human resources to undertake business processes, tasks, or work activities; "Informate" refers to the use of IT to generate timely and relevant data which can be used by the employees of an organization and its external trading partners and "Transformate" refers to the use of IT to help organizations restructure their business models, processes, practices, assets, capabilities, and relationships, in order to create new products, services, or business processes, and reposition themselves in the market (Angeles 2013) (Zuboff 1988). Here, Zuboff's model is used to analyze the ISs deployed in all kinds of business activities, while business and sub-business activities are divided into three categories, as in the model of business activities in a HE institution presented by (Zornada and Velkavrh 2005).

Figure 3 presents an analysis of the adoption of ISs at UOT based on Zuboff's model. Educational activities and administrative support for the education process are the only processes among the university's core functions to be facilitated by advanced ISs. Hence, enhancement of the current ISs and new ISs are needed to fully "Transformate" the servicing of educational activities. Support for both research activities and other business activities is insufficient for "Transformating" all the related activities to be electronic.

Business Activities	Automate measure technical aspects of IT (rate of information flow, accuracy, timeliness)	Informate IT reports and project implementation	Transformate perspective improvements in service, intangible benefits (trust, loyalty, brand, etc)
The implementation of educational activities and administrative support in the education process	In-house applications available for students, as well as staff, in many business processes, such as course registration or uploading results.	Regular reports are available and reliable in many parts of the system to provide accurate information helping the top management of the university or the authorities of the faculties in making decisions.	Only course registration has been transformed into a fully-automated system.
The implementation of research activities and administrative support in the research process	Both in-house applications and purchased software are available for some research activities, such as journal websites and libraries.	Partially reliable information is obtainable from reports generated by websites for local journals published by the university.	
The implementation of other business activities, such as ISs for the management of HR, sales, finance or documentation	Some systems are available, such as an HRIS for the administration of academic staff, finance IS, network resource management system and document management system	Very limited reports are obtainable from these ISs. The top management uses these reports during the annual procedure of closing financial affairs.	

Figure 3: An overall analysis of IS adoption at UOT on the basis of Zuboff's model.

8.3 Analysis of the Level of e-Solutions in UOT using the CPIT Model

The Connect, Publish, Interact, Transform (CPIT) model was developed by the UK Department of Trade and Industry to evaluate the impact of e-business technologies on an organization's business processes based on a 2-dimensional matrix. The aspects considered are: "Connect", referring to the use of basic Internet technologies; "Publish", referring to publishing information using online technologies; "Interact", referring to two-way communication via the Internet and finally "Transform", referring to an organization using online technologies to fully transform its business processes (DTI 2003). For convenience, the analysis of UOT's e-solutions is divided into three parts, as in the model of business activities in a Higher Education (HE) institution presented by (Zornada and Velkavrh 2005).

Firstly, an analysis of the e-solutions adopted for educational activities at UOT is illustrated in Figure 4.

Figure 4: Analysis of e-solutions adoption for educational activities at UOT.

Among the activities facilitated, interaction is best seen in the online content related to educational activities, especially in the case of the online SIS and its services. Figure 5 summarizes the analysis of the adoption of e-solutions in research activities at UOT.

Figure 5: Analysis of e-solutions adoption in research activities at UOT.

Figure 6 summarizes the analysis of the adoption of e-solutions in other business activities at UOT.

Figure 6: Analysis of e-solutions adoption in other business activities at UOT.

In general, the level of adoption of e-solutions for educational services seems to be beyond the level observed in other business activities in all aspects, with interactive content being available to students and staff via the online SIS system. However,

Figure 7: The overall analysis of the adoption of e-solutions at UOT on the basis of the CPIT Model.

improvement is needed, as stated by each of the experts. None of the kinds of business activities is close to being served by a fully transformed system, which is represented by the "Transform" aspect in the CPIT model. Unlike in the case of educational and research activities, there is no capability of interaction based on any online system available for other business activities. Figure 7 illustrates the overall analysis of the adoption of e-solutions at UOT on the basis of the CPIT Model.

9 CONCLUSION

This study can be interpreted as a pre-testing of research techniques and methods, questionnaires and interviews, while also gaining information on the state of ICT in LHA. Identifying practical problems involved in the research procedure, such as the interpretation of instructions and time limits, was also considered to be an objective. Moreover, it helps to project the number of case studies, as well as the minimum number of participants that should be involved in future research.

Based on the above, the sampling technique and recruitment strategy were effective and led to valuable findings. Furthermore, the authors were able to analyze the findings on the basis of Zuboff's model, the CPIT model and Nolan's model. Regarding the practical problems of the research procedure, the initial study went beyond the planned deadline, partially due to the battle in Tripoli during the summer of 2018. Using online communication was ineffective on many occasions and the authors were sometimes forced to wait for an answer for days. Also, keeping the online sessions active was not easy.

Regarding the number of case studies to be conducted, the initial study indicated that ISs developed by Libyan public universities are already in use in other HE institutes across the country, indicating the similarity between Libyan universities. Also, the time spent on this initial study has led to tighter limitations on the time available for further research. As a result, a total of three case studies is a strategic choice.

After conducting the initial study, the authors propose to interview two participants in each of the additional case studies, based on the assumption that the other two case studies are characterized by a similar structure to UOT. The second type of data analysis is based on quantitative data to collect information and expectations regarding the current ISs. The initial study indicated that the department responsible for IS deployment is the Department of

Information Systems at the ICT Centre. The involvement of all the staff at the Department of Information Systems in the ICT Centre and at the ICT office in each faculty is targeted. This study comes as initial research in a project to assess the applicability of the CD-ERP model in LHE. Further case studies will be carried out in other Libyan universities. The results of this series of studies will be applied to the planning of future IS development in Libyan universities at national level. Also, the author recommends using process mapping and system profiling to achieve a better understanding of the basic business processes and associated ISs.

REFERENCES

Angeles, Rebecca. 2013. "Using the Technology-Organization-Environment Framework and Zuboff's Concepts for Understanding Environmental Sustainability and RFID: Two Case Studies." *International Journal of Social, Management, Economics and Business Engineering, 7(10).*

Bakeer, Ali, and Martin Wynn. 2014. "ICT Utilization in Libyan Universities: A Report on Case Study Research." *the Sixth International Conference on Creative Content Technologies, ISBN: 978-1-61208-346-9, P: 165-170.* Venice, Italy.

Bonnie, Erickson. 1979. "Some Problems of Inference from Chain Data. In: Schuessler Karl F., editor. Sociological Methodology." *Blackwell Publishers* 10: 276–302.

Bryman, Alan, and Emma Bell. 2007. *Business Research Methods.* Oxford University Press.

Dornyei, Z. 2007. *Research methods in applied linguistics.* New York: Oxford University Press.

DTI. 2003. *Business in the Information Age: International Benchmarking Study.* London: Booz Allen Hamilton.

Elferjan, Majda. 2015. *Development of training programs provided for academic staff of Libyan University.* Salford, UK: University of Salford.

Heckathorn, Douglas D. 2012. "Snowball versus respondent-driven sampling, Sociol Methodology." 41: 355–366.

Hollyhead, Andy, and Alan Robson. 2012. "A Little Bit of History Repeating Itself—Nolan's Stages Theory and the Modern IS Auditor." *ISACA Journal* 5.

Nolan, Richard, and Willam. D Koot. 1979. *Nolan Stages Theory Today: a framework for senior IT management to manage information technology.* Nolan, Norton Co.

Pearlson, Keri E., Carol S. Saunders, and Dennis F. Galletta. 2010. *Managing and Using Information Systems: A Strategic Approach (4th ed.).* Hoboken, New Jersey: John Wiley and Sons, Inc.

Platisa, Gordana, and Nedo Balaban. 2009. "Methodological Approaches to Evaluation of Information System Functionality Performances and Importance of Successfulness Factors Analysis."

Management Information Systems Vol 4, No. 2: 011-017.

Roestad, Viktor Olai Stokvik. 2016. *The Validity of an Extended Technology Acceptance Model (TAM) for Assessing the Acceptability of Autonomous Ships, Master Thesis.* University College of Southeast Norway.

Salganik, Matthew J., and Douglas D. Heckathorn. 2004. "Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling Sociological Methodology." *JSTOR* 34: 193-239.

Schonlau, Matthias, and Elisabeth Liebau. 2012. "Respondent-driven sampling." *The Stata Journal* 12: 72–93.

Simon, Marilyn. 2011. "Assumptions, Limitations and Delimitations, Excerpted from Simon, M. K. (2011 Ed)." In *Dissertation and scholarly research: Recipes for success*. Seattle: WA, Dissertation Success, LLC.

UNICCO. 2009. "The Libyan National Report on Adult learning and Literacy Educationunesco."

2019. *University of Tripoli.* University of Tripoli. Accessed 1 20, 2019. http://uot.edu.ly/.

Yin, Robert K. 2009. *Case Study Research: Design and Methods.* SAGE.

Zornada, Leo, and Tamara Bertok Velkavrh. 2005. "Implementing ERP Systems in Higher Education Institutions ." *27th Int. Conf. Information Technology Interfaces ITI 2005.* Cavtat, Croatia.

Zuboff, Shoshana. 1988. *In the age of the smart machine: The future of work and power.* New York: Basic Books.