



REPUBLIC OF TURKEY

ALTINBAS UNIVERSITY

Institute of Graduate Studies

Electrical and Computer Engineering

**DEVELOPING A FRAMEWORK TO INFLUENCING
EDUCATIONAL ORGANIZATION TO ADOPT
GAMIFIED LEARNING SYSTEM IN SMART SCHOOLS**

Farazdaq Nahedh Ismael ALSAMAWİ

Doctor of Philosophy

Supervisor

Asst. Prof. Dr. Sefer KURNAZ

Istanbul, 2021

**DEVELOPING A FRAMEWORK TO INFLUENCING EDUCATIONAL
ORGANIZATION TO ADOPT GAMIFIED LEARNING SYSTEM IN
SMART SCHOOLS**

Farazdaq Nahedh Ismael ALSAMAWI

Electrical and Computer Engineering

Doctor of Philosophy

ALTINBAŞ UNIVERSITY

2021

The thesis titled “DEVELOPING A FRAMEWORK TO INFLUENCING EDUCATIONAL ORGANIZATION TO ADOPT GAMIFIED LEARNING SYSTEM IN SMART SCHOOLS” prepared by “FARZDAQ ALSAMAWI” and submitted on 24.12.2021 has been **accepted by unanimously of votes** for the degree of Doctor of Philosophy Thesis in Electrical and Computer Engineering.

Asst. Prof. Dr. Sefer KURNAZ

Thesis Defense Jury Members:

Supervisor

Asst. Prof. Dr. Sefer KURNAZ

School of Engineering and,
Architecture

Altınbaş University

Prof. Oguz KARAN

School of Engineering and,
Architecture

Altınbaş University

Prof.Dr. Osman Nuri UCAN

School of Engineering and,
Architecture

Altınbaş University

Asst. Prof. Zeynep ALTAN

School of Engineering and
Architecture,

Beykent University

Prof. Dr. Mesut RAZBONYALI

School of Engineering and,
Natural Sciences

Maltepe University

I hereby declare that this thesis/dissertation meets all format and submission requirements of a Doctor of Philosophy thesis.

Accepted by Altınbaş University Institute of Graduate Studies on the following date:

____/____/____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Farazdaq Nahedh Ismael

Signature

DEDICATION

To my parents, To My Mother & My Father soul, To Turkey My second Country

To my wife and children, I dedicate this thesis



ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious, the Ever Merciful. Praise be to Allah, Lord of the Universe and Peace and Prayers be upon His final Prophet and Messenger, Mohammad (Peace be upon Him).

My utmost and sincere gratitude goes to my supervisor, Assistant. Prof. Dr. Sefer Kurnaz who has been a great mentor of my PhD work. His endless support, patience, assistance and counsel throughout my work as well as his vast research experience have been invaluable in the completion of this work.

My gratitude and appreciation to my beloved parents and my wife and children who has been the most important people behind my success, thanks for your love, encouragement and constant prayers. You are my inspiration and the backbone of my life.

ABSTRACT

DESIGN A CONCEPTUAL FRAMEWORK TO MOTIVATE EDUCATIONAL ORGANIZATION TO ADOPT GAMIFIED LEARNING SYSTEM IN SMART SCHOOLS

ALSAMAWI, Farazdaq Nahedh Ismael

PhD, Electrical and Computer Engineering, Altınbaş University,

Supervisor: Assistant Prof. Dr. Sefer KURNAZ

Date: October/2021

Pages: (161)

Gamified learning system (GLS) is essential for reducing the anxiety and make the teaching and learning more enjoyable and playful. The importance of gamified learning system has increased during COVID 19 because it helps in increasing the joyfulness and the engagement of teachers and students. However, previous studies have focused on gamified system (GS) in other domains such banking and for profit organization. In as educational setting, the studies of gamified learning system are limited and focused on developed nations. Accordingly, this research aims to find the predictors of the usage of gamified learning system by users of the system which in this study includes the teachers/instructors, administrative and managerial level employees who are working and managing the smart schools in Iraq. Using several theoretical adoption theories such as TOE and UTAUT, and information system success (IS success). A framework of gamified learning system proposed. Based on TOE, the study proposes that gamified learning system adoption is

affected by IC (IC) and organizational context (OC). The study also proposed user satisfaction (SA) as a mediator between IC and OC with behavioural intention (BI) to use gamified learning system. The study also proposed gamification to moderate the effect of IC on BI and cost to moderate the effect of OC on BI. In addition, the study proposed direct effect between BI and use behaviour (UB) and this effect is proposed to be moderated by self-efficacy (SE). A total of 394 teachers and managerial staff in Iraqi smart schools have participated in a survey to collect the data of this study. The data was analysed using smart partial least square (Smart PLS). The results of this study indicated that there are positive effects of IC and OC on BI to use gamified learning system among teachers and managerial staff in Iraqi smart school. SA mediated the effect while gamification moderated the effect of IC on BI. Cost did not play a moderating role. In addition, SE moderated the effect of BI on UB. More theories of adoption should be used to enhance the explanatory power of gamified learning system adoption. It is critical that decision makers increase their support for gamified learning system during the COVID19 period to reduce the anxiety as well as the depression due to lockdown and online learning environment.

Keywords: Gamified Learning System; UTAUT, TOE, IS Success; Improving Classroom Teaching; Media in Education

TABLE OF CONTENTS

	<u>Pages</u>
ABSTRACT.....	vii
LIST OF TABLES.....	xiii
LIST OF FIGURES.....	xv
LIST OF ABBREVIATIONS	xvi
1. INTRODUCTION.....	1
1.1 OVERVIEW	1
1.2 BACKGROUND OF THE STUDY	1
1.3 PROBLEM STATEMENT	5
1.4 RESEARCH QUESTIONS.....	6
1.5 RESEARCH OBJECTIVES	7
1.6 SIGNIFICANCE OF THE STUDY.....	7
1.7 SCOPE OF THE STUDY	8
1.8 STRUCTURE OF THE THESIS	9
1.9 SUMMARY	11
2. LITERATURE REVIEW.....	12
2.1 INTRODUCTION.....	12
2.2 GAMIFICATION	12
2.2.1 Definition of Gamification	13
2.2.2 Gamification in Education	13
2.3 THEORIES OF GAMIFICATION LEARNING SYSTEM.....	15
2.3.1 UTAUT	15
2.3.2 IS Success Model	20
2.3.3 TOE	21

2.4 EXISTING MODEL OF GAMIFICATION LEARNING SYSTEM	23
2.4.1 Critical factors for Gamified Learning System	34
2.5 CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT	36
2.5.1 IC and BI	38
2.5.1.1 PE and BI.....	39
2.5.1.2 EE and BI	39
2.5.1.3 Social influence and BI	40
2.5.2 OC and BI.....	41
2.5.2.1 TMS and BI	42
2.5.2.2 OR and BI.....	43
2.5.3 Mediating role of Satisfaction	43
2.5.4 Moderating role of Gamification.....	44
2.5.5 Moderating role of Cost	44
2.5.6 BI and UB.....	45
2.5.7 Moderating role of Self-efficacy	45
2.6 SUMMARY	46
3. METHODOLOGY	47
3.1 INTRODUCTION.....	47
3.2 RESEARCH DESIGN	47
3.3 RESEARCH POPULATION.....	50
3.4 SAMPLING	50
3.4.1 Sampling Techniques and Size	50
3.5 INSTRUMENT OF THE STUDY	51
3.6 VALIDITY AND RELIABILITY	52
3.6.1 Validity.....	52
3.6.2 Reliability	53
3.7 DATA COLLECTION.....	54

3.8 DATA ANALYSIS	54
3.8.1 SPSS Analysis	55
3.8.1.1 Replacing Missing Value	55
3.8.1.2 Outliers	55
3.8.1.3 Normality.....	58
3.8.1.4 Multicollinearity	62
3.8.2 Smart PLS Analysis	64
3.8.2.1 Assessment of the Measurement Model.....	64
3.8.2.2 Assessment of the Structural Model.....	65
3.8.2.3 Mediation Testing.....	66
3.8.2.4 Moderator Testing	67
3.9 SUMMARY	67
4. DATA ANALYSIS AND FINDINGS	68
4.1 INTRODUCTION.....	68
4.2 BACKGROUND INFORMATION OF RESPONDENTS	68
4.3 SMART PLS ANALYSES	69
4.3.1 Measurement Model.....	70
4.3.1.1 Convergent Validity	70
4.3.1.2 Discriminant Validity	73
4.3.2 Assessment of Measurement Model for Second Order.....	75
4.3.3 Structural Model.....	77
4.3.3.1 R-Square	77
4.3.3.2 Predictive Relevance	77
4.4 DIRECT EFFECT	78
4.4.1 Effect of ICs on Behavioral Intention	81
4.4.2 Effect of OCs on Behavioral Intention.....	81
4.4.3 Mediating Role of Satisfaction.....	82

4.4.4 Moderating Effect of Gamification	83
4.4.5 Moderating Effect of Cost.....	85
4.4.6 Effect of Behavioral Intention on Use Behavior	86
4.4.7 Moderating effect of Self-efficacy	86
4.4.8 Summary of Hypotheses Testing	88
4.5 SUMMARY	89
5. DISCUSSIONS AND CONCLUSIONS	90
5.1 INTRODUCTION.....	90
5.2 DISCUSSION	90
5.2.1 IC and Behavioral Intention	90
5.2.2 OC and Behavioral Intention.....	92
5.2.3 Mediating Role of Satisfaction.....	93
5.2.4 Moderating role of Gamification.....	93
5.2.5 Moderating role of Cost	94
5.2.6 BI and UB.....	94
5.2.7 Moderating role of Self-efficacy	94
5.3 IMPLICATIONS.....	95
5.3.1 Theoretical Implications.....	95
5.3.2 Practical Implications	96
5.4 LIMITATIONS AND FUTURE WORK.....	98
5.5 CONCLUSION	99
REFERENCES	100

LIST OF TABLES

	<u>Pages</u>
Table 2. 1: Summary of Literature Survey	28
Table 2.2: Similar Factors [44]	34
Table 2. 3: Critical Review of Adopting Gamified System.....	35
Table 3. 1: Source of Measurement	52
Table 3. 2: Source and Reliability of the Measurement.....	53
Table 3. 3: Normality Analysis	62
Table 3. 4: Multicollinearity	63
Table 3. 5: Criteria for Assessing the Measurement Model and Structural Model	66
Table 4. 1: Background of Respondents	68
Table 4. 2: Result of Evaluation the Measurement Model of First Order	71
Table 4. 3: Discriminant Validity of First Order	74
Table 4. 4: Results of Evaluating the MM of Second Order	75
Table 4. 5: R ² of the Models	77
Table 4. 6: Cross-Validated Redundancy	78
Table 4. 7: Result of Testing the Direct Effect	81
Table 4. 9: Result of Direct Effect of BI on UB	83

Table 4. 10: Summary of the Result of Hypotheses Testing	86
--	----



LIST OF FIGURES

	<u>Pages</u>
Figure 2. 1: Theory of Reasoned Actioned [66]	16
Figure 2. 2: Theory of Planned Behavior	17
Figure 2. 3: Technology Acceptance Model.....	18
Figure 2. 4: UTAUT Model [44]	19
Figure 2. 5: Information System Success [81].....	21
Figure 2.6: TOE Model by Tornatzky and Fleischer (1990)	22
Figure 2.7: Process of Selecting Articles.....	24
Figure 3. 1: Research Process and Design.....	49
Figure 3. 2: Boxplot of the Variables	58
Figure 3. 3: Histograms of Normality.....	61
Figure 4. 1: Measurement Model.....	76
Figure 4. 2: Result of Direct Effect Constructs.....	79
Figure 4. 3: Result of Direct Effect Variables	80
Figure 4. 4: Mediating Effect of Satisfaction.....	82
Figure 4. 5: Moderating Effect of IT Knowledge	84
Figure 4. 6: Moderating Effect of Cost.....	85
Figure 4. 7: Self-efficacy as a Moderator	87



LIST OF ABBREVIATIONS

AT	: Attitude
AVE	: Average Variance Extracted
BI	: behavioral Intentions
CA	: Cronbach's Alpha
CR	: Composite Reliability
DOI	: Diffusion of Innovation
DV	: Dependent Variable
EE	: Effort Expectancy
FC	: Facilitating Condition
ICT	: Information Communication Technology
IT	: Information Technology
IS	: Information System
IV	: Independent Variable
GLS	: Gamified Learning System
PE	Performance Expectancy
PLS	Partial Least Square
SA	User Satisfaction
SEM	Structural Equation Modeling

SI	Social Influence
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TMS	Top Management Support
TPB	Theory of Planned behaviors
TRA	Theory of Reasoned Action
TOE	Technology, Organization and Environment Framework
UB	Use behavior
UTAUT	Unified Theory of Acceptance and Use of Technology

1. INTRODUCTION

1.1 OVERVIEW

In this study, we highlight on the theory of technology adoption and gamification. In order to improve the education, it is essential to have a fundamental comprehension of gamification and how to apply the games element in non-games concept. It is important to motivate educational organizations to adopt new technology that can improve education and avoid anxiety among learners. However, it needs to understand how to design the framework that influencing the educational organization to adopt these technologies, and which ideal factors can give the optimum results. This chapter discusses several agenda, issues that are related to the introduction of this study. Mainly, the chapter focuses on deliberating the background of this research along with the problem of this research as well as the research questions, objectives, significance, scope, and structure.

1.2 BACKGROUND OF THE STUDY

In communities that rely on digital technologies and in which many attempts have been made for more quality and affordability for learners, schooling has become a major concern. The core components of sharing knowledge have been conventional instructional methods, such as the use of blackboards, seminars, books and written lessons. Teachers have actively tried innovative techniques and educational approaches; yet, many students have found conventional schooling to be inefficient and dull, of which today's schools face tremendous problems with student engagement and attention to learning [1]. Education is affected due to the outbreak of COVID 19. The influence of the virus' severity has been very catastrophic; one of the consequences is the closing of schools, more than 100 countries around the world have controlled schools openings in response to the pandemic, a huge use of online technologies to expand distance learning has been triggered by the closing [2].

E-learning is one of the most technologies that used to support normal education, The goal of e-learning implementation in usual conditions is to support face-to-face education to be more interactive, efficient, and flexible [2][3]. In order to solve the challenges of space and time in learning, the use of e-learning would be a remedy. For a long time, researchers have been working to increase e-learning efficiency, culminating in an updated e-learning paradigm from

teaching to learning [1]. In particular educational system in all countries were affected by the pandemic and that was increase the anxiety among all learners and due to the need to the e-learning systems to support education during the pandemic. Therefore, the need for enjoyment and joyfulness during the pandemic become critical [4].

The focus of the use of educational technology is to inspire a target to be involved with a specific educational field and have a better outcome [5]. The need to overlap the traditional learning methods with non-traditional learning technology is increased thus gamified learning system is arise as new technology can motivate and increase the learners engagement with the subjects that are being taught by teachers in the schools [6]–[8].

Today, gaming has become essential part of daily life. Almost all applications are being gamified to increase the enjoyment and keep the users engaged in the learning and the task conducted using the application. Our lives, but also because events, structures and services are increasingly gamified, our lives and reality are increasingly game-like in many fields like business and education [9]. In 2013, gamification was hailed as an important concept whose progress should be closely monitored and It was found around that using computer game factors can have a significant influence on students' psychological traits and learning behavior trance [1].

Gamification can be overlapped with the educational system , it is a game layer in nongame environment [5]. The game components utilized in gamification might be tools in the area, such as mechanics and dynamics, that are not computer games therefore gamification can also defined as “the use of strategical games elements in standard non-game contexts” [10]. It introduces elements of enjoyment and playing to systems in order to try to touch and trigger human motivations through game design [11]–[13].

As much as the need of the gamification it is important to retaining main role of the educational aim system, therefore [14] referred to gamification as the merging elements of game design into an intended system at the same time maintaining the instrumental roles of the target system. Experience with gameful application is the same to those that are developed to play a game but still have the same characteristics of the game which create a self-motivation (intrinsic motivation) [15]. This is because a GS adopt some techniques like badges and rewards in the form of points to maximize the engagement and participation of users and IC and achieve the required behavior [16].

As well as it can enhance the access and traffic to website and motivate the users to use the system [17]. In recent years, gamification usage has accelerated, causing dramatic increase in the number of gamified applications [9]. Nonetheless, there is little study usage of instructional technology in underdeveloped nations, and it is restricted to a few subject areas [3].

Gamification become more beneficial by improving a lot of factors that's effect on the target [7]. Banking system one of the instance where, GS has been widely adopted and it impacted the GS in banks [8], [18]–[21], as well as sport domain [15], [22], and to keep the exercise use continuously [23]–[26], gamification also improved in marketing [27]–[29], as well as healthcare [30], [31], and tourism [32]. In comparison to other disciplines, the number of studies on educational learning utilizing GS is rather low.

Gamification has been widely spread and increasingly being deployed in the instructional settings and educational progress, and it is described as a new instructional innovation that, when properly implemented and executed, will cause an improvement in learning [33]. For teachers, the introduction of gamification is considered advantageous because it can have implication for the progress of teachers in teaching and instructing subject as well as the performance of teachers and the development of schools [34]. It can improve the educators, teachers, instructor, to understand and effective design content that can be helpful for students and other instructor in teaching subjects. This is due to the fact that GAMIFIED LEARNING SYSTEM facilitates mostly in development of problem-solving skills, it promotes students' motivation, and their curiosity, enjoyment, and there educational performance [33], [35]–[37]. Nevertheless, with all this back ground about using gamification in many fields still there is a missing to an active theoretical model for gamification with appropriate empirical validation [4], [38].

Almost previous research has focused on using the Technology Acceptance Model (TAM) [8], [15], [28], [38]–[42]. Davis was the one who developed TAM in 1989. It includes factors that are unique to each individual which include main variable of TAM like the variable ease of use (PEOU), usefulness (PU), and attitude (AT) in order to predict a user's behavior intention (BI). Many others theories are applied and widely used in the area of gamification like the self-determination theory [13], [43].

UTAUT is the other dominant theory, developed by [44]. Eight theoretical adoption theories was used to developed UTAUT, and it works with variables such as effort that are needed to

utilize the gamified learning system such as effort expectancy (EE). Additional factors of the model include the expected performance from using the gamified learning system and this is referred to as performance expectancy (PE). The facilitating conditions (FC) along with the effect of others on the decision of the user which usually referred to as social influence (SI). All these variables can together affect and anticipate users' BI to use a technology such as gamified learning system. UATAT and TAM have recently been chastised for being too simplistic and individualistic, ignoring other factors (variables) related to the structure and behaviors of organizations [45].

On the organizational level, having effective and ready for change organization which referred to as OR as well as a supportive management for innovative idea and process known as top management support (TMS) are vital and considered among the most important OC that are yet not included in much studies of gamified learning system [46], [47]. Researchers developed Technology-Organization-Environment (TOE) framework to account the OC, the framework accounts for the differences in the perspectives of organizational stakeholders' adoption and perceptive to account for variables that are specific to the technology, the organization specification, and the surrounding environment that the organization conduct its business in this environment and in which it is operating. These variables are used by researchers to predict the UB of a technology by individual and organizations.

Nevertheless, new and emerging constructs has been added by researchers to account for the differences in their studies. For instance, IC were included by [48] and [47] where a human factors were considered by [49] [50] consider factors that are related to the adoption that suites the perspective and context of the previous studies. For instance, factors that are specific and fit in the context of system and factors that are specific and suit the human or individual were used in previous studies. According to [51] TOE is different from established theory such as TAM and UTAUT since it does not have an essential constructs, on the other hand, researchers tweaked the TOE framework and included additional variables that weren't there in the original framework.

The authors also argue about TOE, noting that it has little explanatory ability, as evidenced by the fact that more than half of the explanatory power in EDI adoption remains ambiguous [52]. Due to this reason researchers proposed a new technique by merging theories to further enhance the explanation of more than one underpinning theories to improve the variation and explain more the adoption of gamified learning system. For instance, [53] proposed combining TOE

and UTAUT to improve cloud computing adoption explanatory power. To explain technology adoption, [54] combined TOE and TAM.

In the scope of gamification, [55] integrated more than one underpinning theories to examine the effects of gamification on the use of application and system such as e-government. Abd. Ghani and Rahi [19] combined the diffusion of innovation (DOI) theory and UTAUT to explain the effect of gamification in banking application while there is a limitation and few studies on the integrated theories to explain the adoption of gamified learning system.

Large number of prior literature focus on the motivation and the influencing to adopt GS were examined in western countries and other developed nations and there is a lack of studies that deal with this specific topic in the context of countries such as Iraq and other developing countries. However, It is believed that if GS are implemented in developing countries it can assist these countries to improve and enhance their learning and educational system [56]. Today Around the world and in everywhere the anxiety and stress has been increased due to the outbreak of COVID 19. Therefore, based on the above discussion, this study aims to further investigate and examine the predictors of using a system of gamification in educational settings and in particular in smart school in developing countries this to develop a framework of gamified learning system in Iraq.

1.3 PROBLEM STATEMENT

Studies of gamified learning system is dominated by western countries and there is lack and need for such studies in the less developed countries [56]. Anxiety and depression among stakeholder in Iraqi school has increased due to the lockdown and the enforcement of online learning in the time of COVID19 [57]. Smart schools using technology and interactive technology where non-game context is transformed into a game context is a need to overcome the anxiety and depression. However, it is not known to what extend the Iraqi decision makers in smart school are willing to use this system. Important factors that hinder the adoption is related to the content of gamification as well as the cost, self-efficacy (SE) of teachers and managerial staff and the organizational capabilities.

As discussed in the background, the previous studies have focused on deploying the TAM model more frequent and has examined the adoption of GS in SMEs, manufacturing, banking's, and other industries. Few has examined the adoption of gamified learning system. As a result,

the goal of this research is to look into the way that smart schools in the developing countries such as Iraq is deployed and utilizing the gamified learning system. This research integrates the TOE with UTAUT theories, and (IS success) Information system success, because there is a need to provide a theoretical framework that can aid in understanding the variance in gamified learning system adoption.

The study focused on include OC from TOE theory such as organizational readiness (OR) and TMS, these OC variables are combined with , PE, EE, and SI which is IC variable of UTAUT. Because the cost is beard by the management which is usually the owner of the schools and operating the schools using self-funded procedures. Therefore, it is anticipated the process of gamification will act as a moderating variable between OC and BI to use the gamified learning system. This proposition is based on the prior research that have noted a moderating role of gamification. Teachers' SE is vital for impacting the relationship between BI and UB when utilizing the system to develop material and communicate it to learners. In this study, SE is used as a moderating variable. Thus, the ultimate goal of this research is to have an understanding of the predictors of using the gamified learning system and this enables the research to develop a framework for the usage of gamified learning system among users and give implications for the decision makers to enhance the suage of gamified learning system among all stakeholders such as teachers, students, managerial staff and administrative staff.

1.4 RESEARCH QUESTIONS

Based on the discussion that are linked to the role of IC and OC in the context of GAMIFIED LEARNING SYSTEM and its usage in the educational process and based on the notion that cost, gamification, and self-efficacy and SA are important intervening and conditional factors, this study proposed a link between these variables and aims to confirm this link by asking specific questions regarding the path of each relationship. Consequently, the questions are:

1. What are the effects of IC and OC on the gamified learning system adoption in Iraqi smart schools?
2. Does SA mediate the effect of IC and OC on the BI to use gamified learning system in smart school in Iraq?
3. Does gamification moderate the effect of IC on the BI to use gamified learning system in smart school in Iraq?

4. Does cost moderate the effect of OC on the BI to use gamified learning system in smart school in Iraq?
5. What is the effect of BI on UB of gamified learning system in smart school in Iraq?
6. Does SE of teachers moderate the effect of BI on UB of gamified learning system in smart school in Iraq?

1.5 RESEARCH OBJECTIVES

The ultimate objective of this study is to identify the predictors of gamified learning system and develop a framework of gamified learning system for smart schools in Iraq. Specifically, this study aims to look into the relationship among the variables and confirm the link among the variables. To narrow down the general objective to a working objectives, the study is expected to achieve the following specific objectives:

1. To examine the effects of IC and OC on the adoption of gamified learning system in Iraqi smart schools.
2. To investigate the mediating role of SA between IC and OC, and the BI to use gamified learning system in smart school in Iraq.
3. To determine the moderating role of gamification between IC and the BI to use gamified learning system in smart school in Iraq.
4. To examine the moderating role of cost between OC and the BI to use gamified learning system in smart school in Iraq.
5. To investigate the effect of BI on UB of gamified learning system in smart school in Iraq.
6. To determine the moderating role of SE between BI and UB of gamified learning system in smart school in Iraq.

1.6 SIGNIFICANCE OF THE STUDY

This research is important because it bridges the gaps in the literature by investigating the factors that affect the adoption of gamified learning system by teachers, instructors, administrative, and managerial staff in underdeveloped countries. The major contribution of

this research is related to the investigation of the gamified learning system in educational institution rather than business organizations such as banks or SMEs or healthcare, which dominated the literature. There are differences between business organization and educational institutions. The difference between the two is mainly related to the purpose, structure, regulation. The main purpose of business organization is to make and maximize profit while educational organizations aim to survive and provide educational services.

This study also contributes to the literature by examining the UTAUT as a theoretical adoption model for gamified learning system. Previous studies found that few studies used UTAUT in the context of learning technology [58], this study contributes to the literature in this regard.

The study also fills the gaps related to the criticism of TAM by incorporating additional factors that could help in explaining the variation in gamified learning system adoption. The study included along with the variables of UATUA, SA (from IS success), TMS, OR cost, gamification, and SE. The study also adds to the literature of the developing countries regarding the use of gamified learning system in education. More importantly, this study responds to the suggestion of researchers to combine the TOE and UTAUT, to increase the explanatory power of learning technology adoption.

Empirical recommendations are provided by this study. Stakeholders such as the teachers and managerial staff can learning more about the adoption of gamified learning system and enhance the adoption rate. Users can also benefit from this study by learning the importance of gamified learning system services. This leads them to adopt the services and enhance their teaching performance. Furthermore, the study is important for the students because it helps in reducing the anxiety among teachers and students and improve their performance. This leads to better graduates and better performance, which ultimately lead to better learning and teaching environment.

1.7 SCOPE OF THE STUDY

This study was conducted in Iraq. The study included all the smart schools that are existed in Iraq. The study is limited to the teachers and managerial staff of smart schools. This is because these groups are in charging of designing the content and providing the teaching and administrative supervision for the smart schools. The study is related to the acceptance and use of gamified learning system. The study utilizes the UTAUT along with factors such as SA,

gamification, cost, and SE. In addition, the study deploys the TOE framework. Mainly, the study deploys and combines the UTAUT, IS success and TOE. However, other theories such as TAM is used partially to support the development of the conceptual model of this study.

1.8 STRUCTURE OF THE THESIS

This study consists of five chapters. These chapters are related to the introduction of the study as well as the literature which discusses the theories and frameworks that are related to gamified learning system. The conceptual framework and hypotheses of this study. The third chapter presents the research methodology and elaborates on the research design, arrangement, population, and sampling along with the data collection and analysis. The data analysis and findings are discussed in the fourth chapter while the last chapter presents the discussion and conclusion of the research. The structure of the chapters are as follows:

Chapter I: Introduction

This chapter has presented the background of this study as well as formulated the problem statement. The issues that this study are intended to handle is the low usage of gamified learning system in Iraq and other development countries as well as the lack of using theoretical frameworks to explain more the adoption of this study. Further, the use of gamified learning system is expected to reduce the anxiety among students and teachers. Thus, the purpose of this study is to investigate the factors that lead to increase in the adoption of gamified learning system. Based on the identified issues of this study, the first chapter has listed six research objectives and six research questions that are related to the interrelationship among the variables and the mediating role of SA and the moderating role of cost, gamification, and self-efficacy. Significance of the study was discussed in this chapter and the scope of this study was highlighted. Lastly, the organization of this study was briefly discussed.

Chapter II: Literature Review

The second chapter of this study discusses the literature review. The chapter consists of several sections. Mainly, the chapter discusses the gamification and its definitions, as well as the gamified learning system. Theoretical adoption theories such as theory of UTAUT, IS success and TOE were discussed in this chapter. The discussion of the theories includes their origin, usage and justification for using the theory in the study. A literature was reviewed by examining the existing frameworks. A systematic literature review was conducted by filtering

the articles and selecting the most related articles. The literature was reviewed to understand the findings of previous studies and identify the gaps and develop the conceptual model. A total of 37 models were extracted and reviewed. Based on the review, the conceptual model as well as the hypotheses of this study were developed.

Chapter III: Research Methodology

This study is quantitative in nature because it deploys a questionnaire to collect the data. The chapter presents the research design, which is a quantitative, the population which are smart schools in Iraq that include 250 smart schools that have 10 at least teachers and managerial staff. The sampling include random sampling technique. The research instrument is an online questionnaire adopted from previous reliable sources. To further ensure the validity and reliability of the questionnaire, experts were invited to validate the instrument of this study. A pilot study was conducted to ensure the reliability of the validated questionnaire. After that, the questionnaire was used as the instrument of data collection. The data was collected from teachers and managerial staff using random sampling technique. The data analysis was conducted using statistical package of social science (SPSS) and Partial Least Square (PLS).

Chapter IV: Data Analysis and Findings

This chapter presents the data analysis of this study. The chapter presents the background information of the respondents using descriptive information, mean score, frequency, and counts of the background of the respondents. This has been followed by data examination to clean and prepare the data. The missing value which has been conducted using frequency analysis, outliers which has been examined using boxplot of the variables, normality which has been examined using the skewness and kurtosis as well as the histograms. Lastly, the multicollinearity which is related to the correlation among the variables has been examined using two indicators that are related to the variation inflation factors and tolerance. All these analysis were conducted using SPSS. Next, the PLS was used to test the hypotheses of this study. Mainly the PLS was deployed for testing the measurement model (MM) and the structural model (SM). This include the analysis of validities, reliabilities, and factor loading to assess the MM while the SM was assessed using the path coefficient, r-square, f-square, and q-square. The hypotheses were testing and process of testing the direct effect and the moderating effect as well as the SA as a mediating variable was discussed.

Chapter V: Discussions and Conclusions

The last chapter of this study discusses the findings. Result of hypotheses testing are discussed and compared with the findings of previous studies. Each hypothesis was explained, and the finding were presented. Next, the findings was compared with the findings of prior literature and the theories that supported the findings of this study. The chapter also provides the theoretical and practical implications of this study. Contribution to the theory such as the validation of the theories and the practical recommendation that are related to the findings of this study were discussed and practical implication for the decision makers were given to enhance the adoption of gamified learning system in the context of Iraqi smart schools. Limitations and direction of future works are given in this chapter. Lastly, the chapter concludes the findings of this study.

1.9 SUMMARY

This chapter has presented the introduction of this study. The study is investigating the factors that affect the adoption of gamified learning system by the respondents in Iraqi smart schools. Few studies examined the gamified learning system in general and in developing countries in particular. Accordingly, the study aims to investigate the adoption and highlight on the factors that lead to increase in the usage of gamified learning system. The significance of the study as well as the scope were discussed. The structure of the thesis as well as the summary were highlighted.

2. LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews and discusses the literature related to gamification system and its definitions, practices, and applications. The chapter consists of five sections. First section discusses the gamification system and its definitions, deployments as well as the usage in education. Second section discusses the theories of new technology adoption. Theories such as UTAUT, IS success and TOE are discussed. In the third section, a review of existing frameworks and the factors that affect adoption of gamified learning system is conducted. Last section discusses the conceptual framework of this study as well as the hypotheses development.

2.2 GAMIFICATION

Gamification is a concept that is related to the usage of methods such as badge, rewards, and points to encourage the participation in a desired behavior. Researchers and practitioners showed more interest in the topic of gamification in the recent years [17]. This experience of creating a joyful environment while doing tasks or learning is referred to as gamification which aims to encourage users to be active and engaged in the desired behavior [10] [15].

Gamification is considered as a new shift in learning paradigm [59] [6] [27]. The adoption of gamification in business context as well as in job related activities is a promising yet neglected process in the learning organization. Most of available work about gamification is derived by practitioners while the academic work that is related to the adoption of gamification in a learning institutions is still limited [6] [27] [38]. For this reason, researchers highlighted the notion that there is until now no appropriate empirical validated model for the gamification [38]. In this section, the gamification is defined and discussed.

2.2.1 Definition of Gamification

Gamification has been defined differently by several researchers. Gamification is beneficial for several stakeholder and it has the ability to increase the engagement among users as well as the loyalty of customers and users to the software that is using gamified processes and applications as well as to increase the sales of product and services [7]. Generally, one of the widely used definition in the literature referred to gamification as the process of using gamified design in a non-gamified context [10]. Researchers also defined gamification as “the use of game attributes, outside the context of a game with the purpose of affecting learning-related behaviors or attitudes” [60]. Other researchers defined gamification as “the process of applying game mechanics and game thinking to the real world to solve problems and engage users” [61].

The above definitions have focused on the use of non-game content into game content. Mainly the definition of [10] view gamification as the use of the game design in non-game context such as business, education, and so on. In the definition of [61] it is about the application of game machines in solving problems and creating creative thinking. However, in a more related definition to the context of this study and in learning environment, [60] view the gamification as the process of influencing the behavior and attitude of learners by creating a game context in which the users can be attracted and engaged. This definition is adopted in this study because it suits the context of the study.

2.2.2 Gamification in Education

Educational organizations, especially in developing countries, are facing challenges in delivering the level of Information Communication Technology (ICT) required to foster the development of learning, teaching, and other development activities by typical educational institutions. These ICT requirements are needed by the organization to follow up with the advancement in technology and to update their services to match the current technological environment [62] [63].

The episode of COVID 19 has greatly expanded the uneasiness among all IC. In specific, the instructive framework in all nations were influenced by the widespread. This has expanded the requirements for amusement and blissful educating and learning preparation [4]. Gamification could be a unused mechanical advancement that makes a difference in expanding the engagement of clients [6]–[8]. Gamification is characterized as “the utilize of amusement plan

components in non-game contexts” [10]. It includes components of delight and satisfaction to applications so that it endeavours to actuate the person thought processes by means of diversion plan [11]–[13]. Gameful encounter is comparative to those made by playing a diversion and it has the characteristics of secretive as well as the natural inspiration [15]. Usually since a gamified framework employments strategies such as rewarding points and identifications to extend the interest and engagement of people and accomplish the required behaviour [16]. It moreover makes a difference in increment the activity to an online site and pulling in modern clients [17].

Recent application of gamification include the educational organization and this technology contributes to the goodness and improvement in learning [33] [34]. Several implications are expected to be produced by gamification such as the improvement in the schools and the teacher performance. It can increase the student’s participation and understanding. This is due to the notion that it helps in developing the abilities and skills of students and enhance their engagement in learning [33], [35]–[37].

This hesitation of learning institution could be due to several criteria such as the usefulness, ease of use, cost, and the suitability of the content of smart class and gamified learning materials [8], [46], [47]. Recently, one of the indispensable applications that is used by students and lecturers in higher education is the smart class and its applications such as interactive games. Gamification lowers the cost of learning and improves the academic performance of students. In addition, all the stakeholders such as students and teachers can benefit from the gamification because it provides advantages that can make the process of learning easier and accessible [15], [24].

Overall, it can be understood from the above discussion, that there are several stakeholders inside and outside the learning organization that affect the usage of gamified learning system. However, the main purpose of developing the gamified learning system is to serve the students at the schools so that the school can attract more students and improve its operations. This study focuses on the teachers and the managerial staff at smart schools in Iraq. This because having teachers that are capable of using the gamified learning system is beneficial to provide interactive teaching in the time of COVID 19.

2.3 THEORIES OF GAMIFICATION LEARNING SYSTEM

Many theories have been used in previous studies to investigate the adoption of gamified learning system technology. One of the widely used model is the Technology Acceptance Model (TAM) by [64]. However, TAM was developed to assess the acceptance of organization for technology adoption. Other models include the theory of planned behavior (TPB) and theory of Reasoned Action (TRA). A meta-analysis study showed that 85% of studies on E-learning has used the TAM model to investigate the factors that affect learners to adopt the learning technology and only 4% of studies that investigate learning have used UTAUT [65]. The authors suggested researchers to investigate the e-learning using different theories such as the UTAUT. In a recent study, a meta-analysis review was conducted on 285 articles published between 2009 and 2015 in leading journals, found that only 1% of the studies have used UTAUT as a theoretical adoption theory while the majority have focused on TOE and TAM [58].

UTAUT was developed by [44]. The authors reviewed and summarized eight adoption theories to develop the UTAUT. The model can explain 70% of the variation in technology acceptance and can strengthen the inadequacy in other models [44]. In addition, due to the criticism of UTAUT, this study incorporate TOE, which divided factors into technological, environmental, and organizational and previous studies suggested the combination of the two models to enhance the explanatory power of technology acceptance [53]. Thus, the following section discusses the UTAUT and TOE as well as the information system success (IS success). The use of IS success is mainly due to the deployment of SA as a variable in this study and this model can explain the satisfaction of users with new technology. Other models such as TAM are marginally discussed and utilized in this study.

2.3.1 UTAUT

Before discussing the UTAUT model, it is worthwhile to understand how the model was developed and based on which theoretical adoption theories the model was mainly relied. One of the theories that UTAUT has used is the theory of reasoned action (TRA). The theory was developed by [66]. The theory proposed that the adoption of new technology or the conduction of an action is based on the attitude and subjective norms of the IC who are about to do the action. The two influencing factors such as attitude and subjective norms affect the BI which

in turn will have direct effect on UB. Figure 2.1 shows the conceptual model of the theory of reasoned actioned.

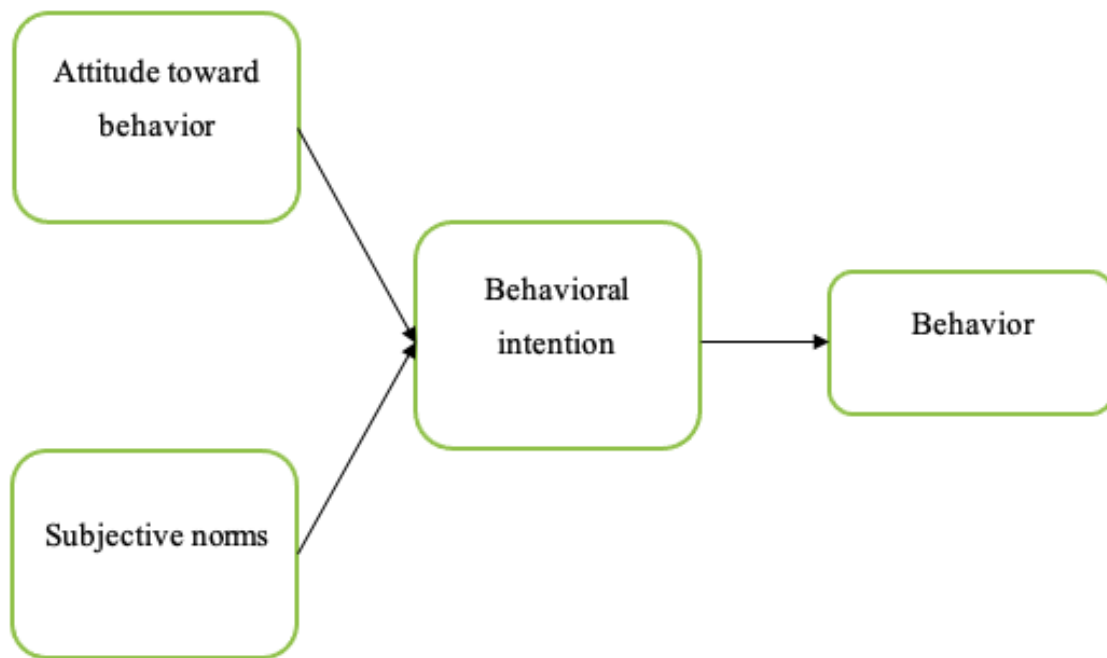


Figure 2. 1: Theory of Reasoned Actioned [66]

It can be seen that the main variables of the theory are the attitude toward behavior and the subjective norms. Subjective norms are similar to SI in UTAUT [44], [67]. Based on the TRA and to fill its inadequacy, [68] developed the TPB by adding new variable; PBC along with attitude and SNs. The theory is more preferable compared with TRA and it was developed to support the adoption of technology and has been used in various studies to examine the adoption of technology [69]. Figure 2.2 shows the conceptual model of the TPB.

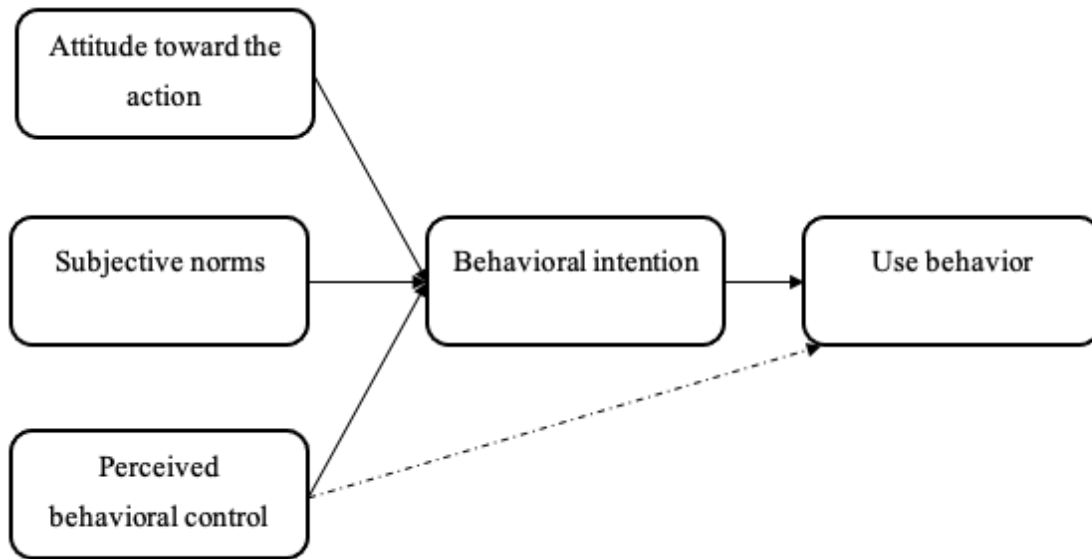


Figure 2. 2: Theory of Planned Behavior

The theory has been used in previous studies such as in the study of [69] who investigated the adoption of SaaS among public universities in Malaysia and found that the theory is able to explain the variation in SaaS adoption among the public universities. In addition, the study of [70] who tested the effect of security and privacy on the attitude and behavior intention toward adoption of cloud service among pre-service teacher in Turkey and found significant effect of the two variables on attitude. This theory of TPB was one of the components of the UTAUT model. The variable perceived behavioral control is similar to FC in UTAUT.

One of the widely used TAM which was developed by [64]. Mainly, TAM has been used intensively in explaining the behavior of adoption of new technology. TAM uses external factors to find the impact on internal beliefs, attitude, intentions and actual use of a system [71]. The key variables of TAM are ease of use and usefulness, and it proposes that these variables are the main determinants of adopting new technology by organization [64]. The model proposed that ease of use and usefulness will have an effect on attitude, which will influence the intention to use a particular system. This intention generates the actual use of the system. Davis [64] defined usefulness as “the extent to which a person believes that using a system would enhance his or her job performance”. Whereas the ease of use was defined as “the extent to which a person believes that using a system would be free of mental efforts”

[64]. Nevertheless, TAM was designed to examine the IT adoption from organizational perspectives in business field [71]. Figure 2.3 shows the TAM model.

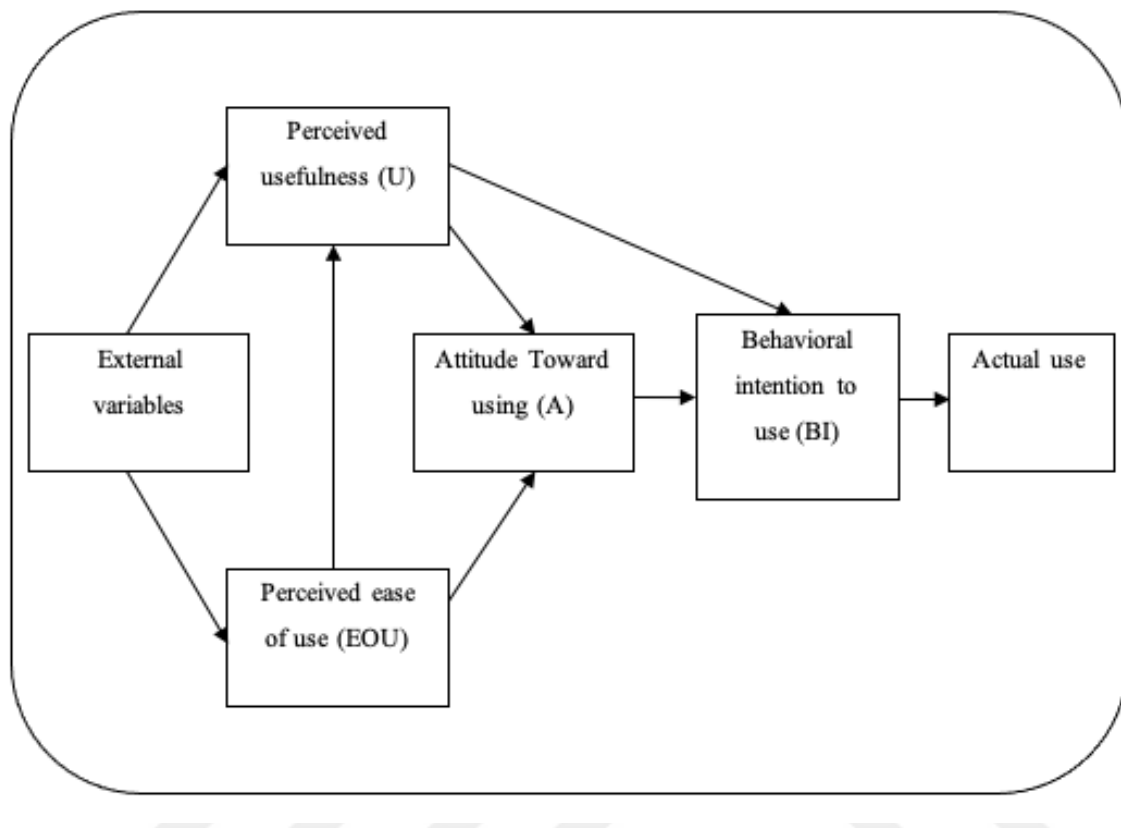


Figure 2. 3: Technology Acceptance Model

The TAM model has been used in previous studies and it dominates the acceptance of new technology. For example, in the study of [72], TAM was used to examine the adoption of cloud archiving among university in Germany. Similarly, Park and Kim [73] have used the TAM model to examine the adoption of cloud computing in university as well as business organization contexts.

A meta-analysis study showed that 85% of studies on e-learning has used the TAM model to investigate the factors that affect learners to adopt the e-learning and only 4% of studies that investigate e-learning have used UTAUT [65]. The authors suggested researchers to investigate the e-learning using different theories such as the UTAUT. In a recent study, a meta-analysis review was conducted on 285 articles published between 2009 and 2015 in leading journals, found that only 1% of the studies have used UTAUT as a theoretical adoption theory while the

majority have focused on TOE and TAM [58]. According to [44] PU is similar to PE. In addition, PEOU is similar to EE.

UTAUT was developed by [44] based on eight models that includes TAM, TPB, TRA, social exchange theory (SET), diffusion of innovation (DOI) and other models [44]. Venkatesh et al. [44] proposed that BI toward accepting and using new technology is affected by PE , EE, and SI while the UB is affected by the BI as well as the FC . In addition, the model proposed variables to be as moderators. Figure 2.4 shows the conceptualization of UTAUT.

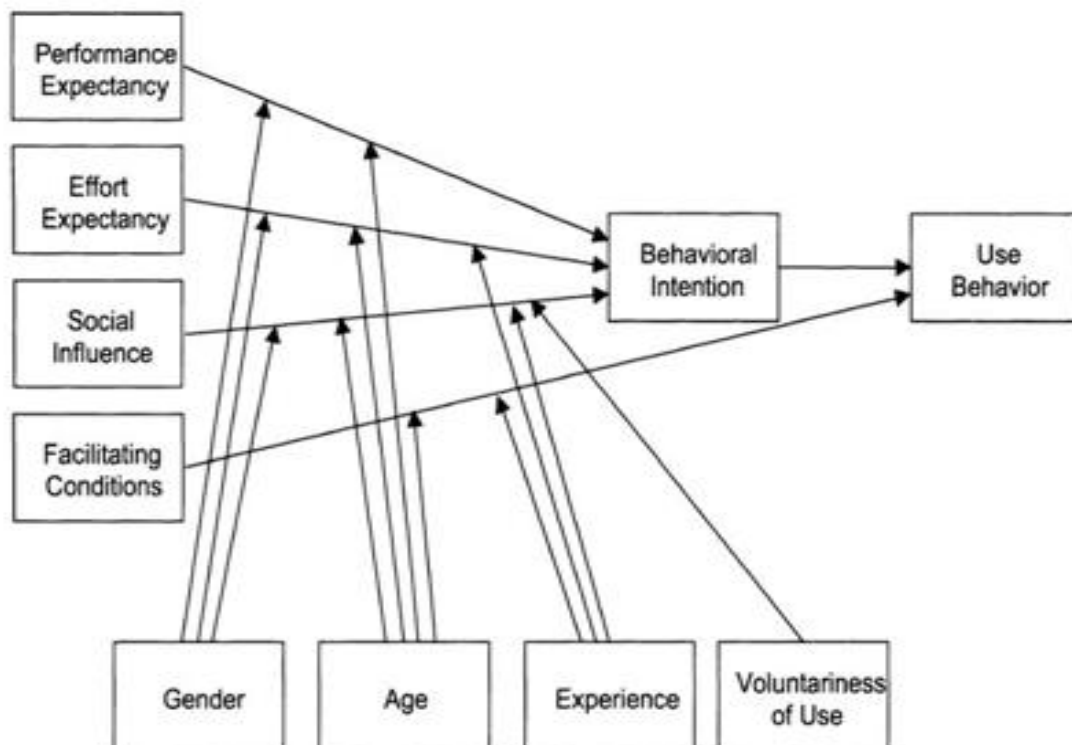


Figure 2. 4: UTAUT Model [44]

Venkatesh et al. [67] expanded UTAUT and proposed the UTAUA2 suits in a buyer setting. Differences between UTAUT and UTAUT2 is the contextual factors. UTAUT2 includes three context-specific factors (hedonic inspiration, cost esteem, and propensity) in arrange to apply the UTAUT in a buyer setting. Lian [74] chose to utilize UTAUT defending the choice because

it superior clarifies the inquire about setting in the technology services by adding other variables that are more related to technology adoption such as security, trust, and privacy.

Several previous studies have used the UTAUT in investigating the factors that affect the adoption of technology in E-government context, or business organization context. However, the use of the model in technology studies still limited [75]. In the present study the UTAUT is used as the theoretical foundation for developing the proposed research model. Thus, the factors of UTAUT such as PE , EE, SI , are used in this study along with other factors such as gamification, cost, SA, TMS, OR and SE because they are crucial for ensuring the successful adoption and usage of technology [76]–[79].

2.3.2 IS Success Model

The IS success was created by DeLone and McLean [80] who conducted a scientific classification counting 180 researches that look at the appropriation of innovation appropriation. The demonstrate proposed that the data quality, framework quality, and benefit quality have an effect on purposeful to utilize and client fulfillment and in turn, the purposeful to utilize and client fulfillment influence the net benefits of utilizing the information system [80]. After ten years of developing the model, DeLone and McLean [81] tested the validity and the reliability of the model in explaining the variation in adopting new technology. the authors reviewed more than 100 articles that have used the IS success model to explain various technology adoption such as e-commerce and e-learning as well as other technology adoption. DeLone and McLean [81] found that the model is valid and can perfectly explain the variation in technology adoption. Figure 2.5 presents the IS success model.

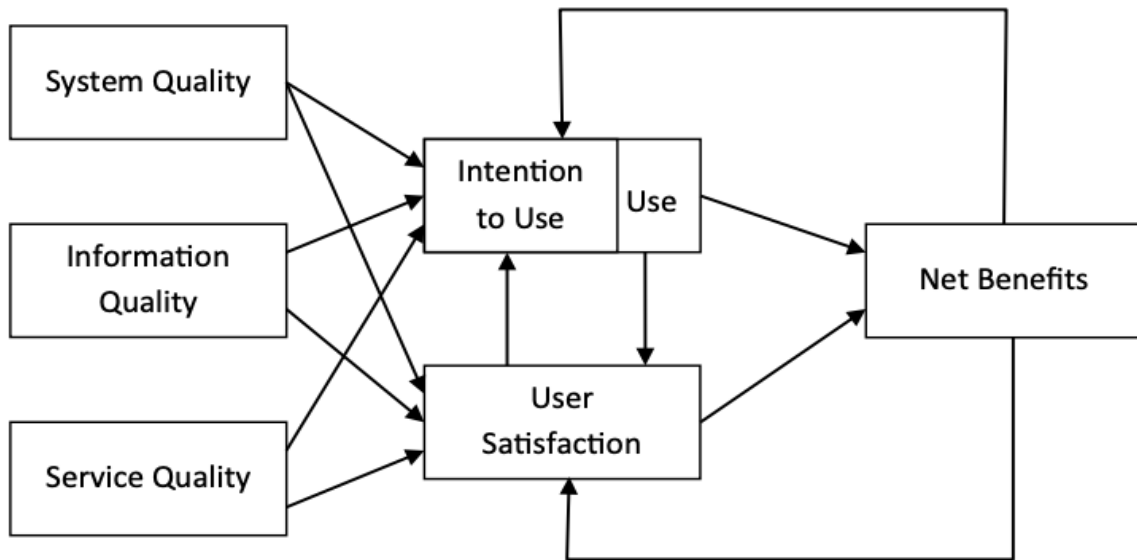


Figure 2. 5: Information System Success [81]

The authors highlighted the significance of SA with the electronic administrations to embrace the innovation. an illustration was given by DeLone and McLean [81] is the high benefit quality will lead to SA which in turn will increment the net benefits whereas on the other hand, a destitute benefit quality will have negative affect on satisfaction and net benefits. In 2016, [82] have once more conducted an examination of the thinks about that have utilized the IS victory and pointed out that the demonstrate is accepting consideration from analysts and being utilized in expanding number of articles in alluded diaries. Analysts have actualized the show of DeLone and McLean [82] and affirmed the significance of client satisfaction for innovation acknowledgment [81], [83], [84]. Few considers within the setting of gamified learning system have included SA and inspected its impact on the BI toward utilizing the gamified learning system. Hence, in this research, the SA as a mediator is examined.

2.3.3 TOE

Tornatzky and Fleischer [85] created TOE system to decide the organizational level appropriation of IT and Data Framework (IS) item and administrations. Since at that point, TOE has risen as a broadly utilized hypothetical selection system for the acknowledgment and utilize of IT items and administrations [86]. TOE is diverse from other hypothetical selection models and systems since it incorporates the factors that are related to innovation, organization, and environment [87]. Figure 2.6 appears the TOE show by Tornatzky and Fleischer [85].

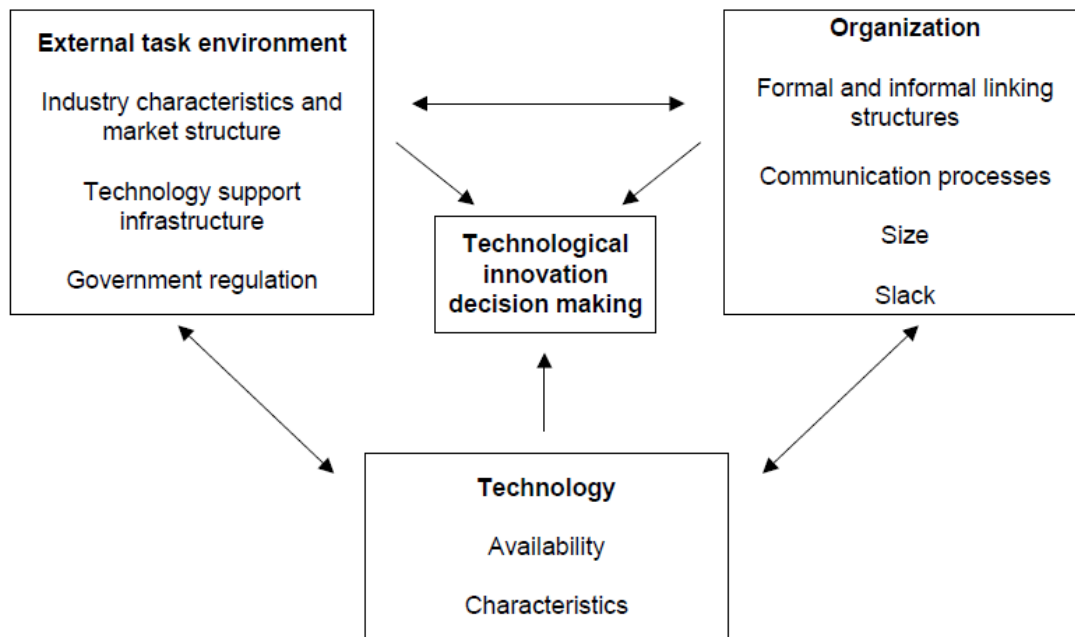


Figure 2.6: TOE Model by Tornatzky and Fleischer (1990)

Researchers changed the variables of TOE and added several variables. These includes the factors of diffusion of innovation (DOI) such as compatibility, complexity and other factors such as security [49], [88], privacy [88]. The original framework includes technological availability as a variable of the technology construct.

Furthermore, there is ample of factors were incorporated in the TOE as OCs. Prior studies included factors such as knowledge capabilities, strategic use of technology, innovation capacity, operational capability, TMS, innovation [52]. On the other hand, the environmental variables of TOE concentrate on the environment in which the organization conducts its operations, with emphasis on the external variables that influence the industry such as the incentive as well as the regulation of the government [89]. Due to the context of this study, this construct is not included in the conceptual framework.

Many researchers have criticized the TOE framework. [90] pointed out that TOE is merely a taxonomy for describing and categorizing variables under three main categories. However, TOE does not represent a well-developed theory or an integrated and comprehensive framework that can be used as a reference for adopting new technology. In similar view of

other researchers, [91] [51] [52] also claimed that TOE framework has no confirmed constructs and variables of TOE are usually dependent on the context of the adoption.

Prior studies have deployed the framework to include the factors of the studies according to their specific context. For example, Lian et al. [49] divided the dimensions into TOE dimensions [48] categorized the factors into individual, organizational, technological, and environmental. Alkharusi and Al-badi [50], divided the factors into human related factors and system related factors.

Following the approach of [49], [48] and [50], and based on the context of this study, the factors were divided into IC that are related to the teachers' perception about the gamified learning system and organizational that are related to the aspects that affect the teachers' adoptions of technology such as the support of the management toward the usage of gamified learning system and the readiness of organization such as the technological and financial readiness as well as the human resource readiness to use the gamified learning system.

2.4 EXISTING MODEL OF GAMIFICATION LEARNING SYSTEM

Previous studies have indicated the lack of studies that investigate the gamified learning system [92]. Thus, studies that related to GS adoption in education and non-education context are reviewed. A systematic literature review (SLR) was conducted by selecting the most related articles from existing reliable databases i.e., Web of Science (WoS), IEEE, and Scopus were searched. Keywords used in the search are gamification, GS, gamified learning system, and gamification in education.

A add up to 653 articles were extricated from the three databases. Three screenings forms were performed to filter the articles. Within the to begin with screening, copied articles were checked to discover the articles that were ordered in more than one database, and this has brought about in removing 279 articles. Within the moment screening, outdated articles were removed as well as the non-English articles. Articles published before 2011 were removed to have updated view about the gamification. A total of 293 articles were removed based on date of publication, scope, and language. In the third screening, a full reading of the articles was conducted. As a result, a total of 44 articles were removed based on their technical nature and approach because the focus of this study is only on the BI and the adoption of GS.

By and large, out of the 653 articles, 279 articles were evacuated within the to begin with screening, 293 articles were expelled within the moment screening, and 44 articles within the were removed within the third screening. A total of 37 articles have met the inclusion criteria of this research. Figure 2.3 presents the steps involved in choosing the articles.

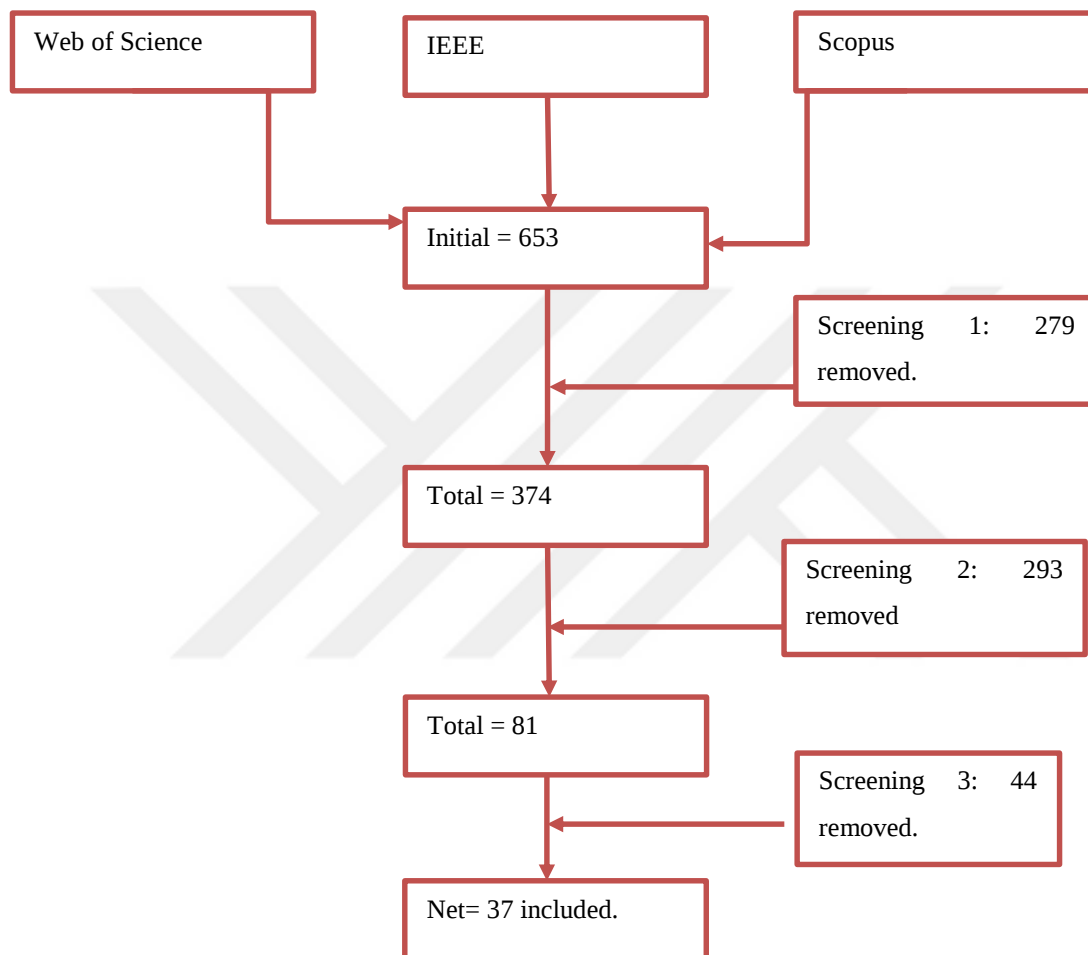


Figure 2.7: Process of Selecting Articles

An add up to of 37 articles were surveyed in profundity and the components of these articles were extricated. [38] found that the factors that can have an impact on the BI toward adopting the SAP and ERP are telepresence and content interface affect the flow while flow and enjoyment affect the ease of use. Flow, PEOU and PU affected the BI. In the study of [8] In the e-banking, important determinant of the perceived intention are related to the socialness, PEOU, enjoyment, and the PU of the technology. These variables were significant in predicting the perceived intention. In addition, the study of [15] found that perceived enjoyment and playfulness declined by use. Women has higher benefits from the gamification. Ease of use

decreased with the increase of age. Similarly, TAM was used by [39] and found that utilizing the TAM model, this research have come up with a model that can be utilized for the BI and actual use of GLS. However, the research only proposed a model for gamification and have not examined the model.

Studies also deployed TAM such as in the [40] who found that Using the input of 168 respondents who participated in this research, the important factors related to the use intention were identified. These includes variables such as enjoyment, playfulness, SN, AT, and PEOU as well as the PU. In the study of [25], the TAM variables such as PEOU, PU, and additional variable such as SI, enjoyment, playfulness variables were important in deciding on the predictors and antecedents of the continued use of GS for exercises. In similar approach, [93] TAM was used and variables that are critical for the satisfaction, loyalty as well as the psychological ownership are related to the SI and PU along with the PEOU and self-investment affected the psychological ownership has greater effect that the variables of TAM. Again, [95] along with the variables of TAM which include the PEOU and PU, the impact of media affinity is also critical factor in defining the intention to use gamified systems for learning. In the study of [26] this study managed to examine the impact of a certain variables such as the PU and PEOU along with the SN in explaining their impact on the weaning fitness technology usage as well as the mediating role of attitude and this has helped in explaining the important variables were identified.

In the study, [21] in a Portugal settings, the impact of gamification, socialness and PU as well as the PEOU and enjoyment are identified as critical variables to impact the intention to use GS system. [97] In a learning settings and more into the GLS, interaction between learner-instructor, along with the interaction with the system and the learners and the degree to which they enjoy, benefit and perceived the system as easy to be deployed are critical for the satisfaction and the usage of the GLS. [28] also found that the model of TAM is helpful in explaining the intention of engagement and the attitude of brands in UK marketing context. In the study of [41] fun system affect the intention to use and discontinued use of GS. Ease of use also has impact on the continued use intention. [42] confirmed the mediating role of enjoyment between the leaderboard design and the personal development competitiveness on the usage intention.

Other theory such as UTAUT has been also examined. In the study of [94], important determinant of e-learning BI and actual use using GS system are the e-learning motivation, SI, content quality, and the FC from the model of UTAUT. The theory was to explain sufficient variation in the BI and actual use. UTAUT was also deployed by [20] and found that PE , EE, SI , hedonic motivation, price value, habit and gamification affect the BI. Habit affects UB. Similarly, [98] found that FC, PE, EE are critical variable in explaining the behavior of individual toward using system such as GLS. [19] also found that PE , EE, FC are important for the adoption.

Other theories that have been use are DOI, IS success, TPB, and others. For instance, [24] used TPB and found that these variables were critical in identifying the word of mouth, continued use. The SN as well as the network exposure, and recognitions are vital determinant of the word of mouth, continued use and exercise. [32] used the experiential market to examine the loyalty and complaints. The findings showed that gamification is important to improve the tourists experience and loyalty as well as to reduce the complaining behavior. In the study of [100], the IS success was deployed gamification is proposed as a moderator and tested by this study. The finding showed that IS success variables such as quality of system, service, and information as well as the use and SA are critical to affect the organizational impact toward the use of GS system.

Similar to the approach of this study, few studies combined more than one theory. For instance, [55] combined and examined several models such as TAM, DOI, UTAUT, TRA, TPB, and DTPB. This study is a unique study that attempted to show the differences in the variation of intention to use gamified e-government. The uniqueness of this study comes from its approach as it compared the validity of several theories in this process. The variables that are related to gamification such as playfulness are critical for the use of e-government application. [18] combined UTAUT and DOI and found that Certain variables such as innovativeness are important for the use of gamified learning system.

In the study of [47], a combination between TOE and UTAUT is proposed. The study has merging between the two theories is expected to have a better explanation of the variation in using GS by SMEs in Malaysia. However, further testing is needed to ensure that the model is valid for the purpose that it was designed for. Since the organizational level is the concern, the study included several variables that are organizational in nature to capture the organizational variable. In [46], TOE and TTF were combined and the findings showed TOE context are important for the adoption of AL. Important variables include the HR readiness, TMS, AIT for task technology, security and privacy and relative advantage as well as the inclusion of cost effectiveness, and technology are all important predictors of the AI adoption. [102] combined TAM and TTF and found that TTF affected PEOU. The mediating usefulness in the TTF, SI, and variable of TAM is confirmed.

An outline of the articles is displayed in Table 2.1. The table gives the number of article, creator (s), year, country were considered in conducting the SLR. In addition, the table provides a brief description of the articles and its independent variable (I.V) as well as the dependent variable (D.V). Mediator and moderator of previous studies were included, and method used in the articles as well as sample size and the method of data analysis were highlighted. Unit of analysis and brief summary of the result of each article were given in the table.

Table 2. 1: Summary of Literature Survey

Author / year	Country / industry	I.V.	D.V	Med / mod	Theory	Method	Findings
[38]	SAP enterprise resource planning (ERP)	• Interactivity • Telepresence • Content interface • Flow • Enjoyment • PU • PEOU	BI (BI)	Nil	TAM	112 respondents using PLS	The factors that can have an impact on the BI toward adopting the SAP and ERP are telepresence and content interface affect the flow while flow and enjoyment affect the ease of use. Flow, PEOU and PU affected the BI.
[8]	Portugal/ e-banking	• Perceived socialness • PEOU • PU • Perceived enjoyment	Perceived intention	Nil	TAM	183 customers using AMOS	In the e-banking, important determinant of the perceived intention are related to the socialness, PEOU, enjoyment, and the PU of the technology. These variables were significant in predicting the perceived intention.
[15]	Finland Sport	• Network exposure • PEOU • SI • Reciprocal benefits • Recognition • Playfulness • Enjoyment • PU	Continued exercise intention	Age and gender as moderator	TAM	195 individual	Perceived enjoyment and playfulness declined by use. Women has higher benefits from the gamification. Ease of use decreased with the increase of age.
[39]	Nil	• PEOU • PU • Attitude • Comparison vector • Network vector • Outcome vector	BI Actual system use	Nil	TAM	Conceptual	Utilizing the TAM model, this research have come up with a model that can be utilized for the BI and actual use of GLS. However, the research only proposed a model for gamification and have not examined the model.
[40]	Turkey Learning	• PEOU • PU • Perceived enjoyment • Perceived playfulness • SN • Attitude	Continued use Intention	PU Perceived enjoyment PU Attitude	TAM	168 users	Using the input of 168 respondents who participated in this research, the important factors related to the use intention were identified. These includes variables such as enjoyment, playfulness, SN, AT, and PEOU as well as the PU.
[24]	Finland	• Network exposure • SN • Recognition • Reciprocal benefits • Attitude	Word of mouth Continued use Continued exercise	Attitude	Theory of planned behavior	186 computer users	These variables were critical in identifying the word of mouth, continued use. The SN as well as the network exposure, and recognitions are vital determinant of the word of mouth, continued use and exercise.
[25]	Finland Gamified exercise	• PU • PEOU • Enjoyment • Playfulness • Recognition • SI	Continued use	Attitude	TAM	200 computer users	The TAM variables such as PEOU, PU, and additional variable such as SI, enjoyment, playfulness variables were important in deciding on the predictors and antecedents of the continued use of GS for exercises.
[27]	Korea Branded application	• Innovativeness • Mental simulation • Need for cognition	Adoption of new branded application	Three ways interaction	Nil	288 students and graduates	Innovativeness, mental simulation, and need for cognition are important for the adoption of new application. The three-way interaction is statically significant.
[93]	Taiwan	• Perceived control • Perceived familiarity • Self-investment • SI • PU • PEOU	Psychological ownership Satisfaction Loyalty - Continuous usage	Nil	TAM	791 users	In the context of this study, variables that are critical for the satisfaction, loyalty as well as the psychological ownership are related to the SI and PU along with the PEOU and self-investment affected the psychological ownership has greater effect that the variables of TAM.

Table 2. 1: Summary of Literature Survey (table continued)

Author / year	Country / industry	I.V.	D.V	Med / mod	Theory	Method	Findings
			- Willingness to pay more				
[94]	Indonesia e-learning	- E-learning motivation - SI - Content quality - FC	BI Actual use	Major	UTAUT	85 students	Important determinant of e-learning BI and actual use using GS system are the e-learning motivation, SI, content quality, and the FC from the model of UTAUT. The theory was to explain sufficient variation in the BI and actual use.
[95]	Spain Learning	- PEOU - PU - Media affinity	Intention to use gamification	Nil	TAM	20 teacher and students	Along with the variables of TAM which include the PEOU and PU, the impact of media affinity is also critical factor in defining the intention to use gamified systems for learning.
[96]	UK Learning	- PE - EE - Perceived playfulness - Learning style - Perceived innovativeness	m-learning adoption in formal and informal learning	Nil	NIL	130 students	PE, EE, playfulness as well as the way of learning which is referred to as the learning style along with the innovativeness are important variables were identified.
[26]	US Fitness	- PU - SN - PEOU	Wearing fitness technology use	Attitude toward WFT	TAM	230 users	This study managed to examine the impact of a certain variables such as the PU and PEOU along with the SN in explaining their impact on the wearing fitness technology usage as well as the mediating role of attitude and this has helped in explaining the important variables were identified.
[21]	Portugal Banking	- Gamification - Socialness - PII - PEOU - Enjoyment	Intention to use Business impact	Nil	TAM	183	In a Portugal settings, the impact of gamification, socialness and PU as well as the PEOU and enjoyment are identified as critical variables to impact the intention to use GS system.
[97]	UK	- Learner-instructor interaction - Learner-system interaction - PEOU - PU - Perceived playfulness	Satisfaction Continued use	Nil	TAM	150 student	In a learning settings and more into the GLS, interaction between learner-instructor, along with the interaction with the system and the learners and the degree to which they enjoy, benefit and perceived the system as easy to be deployed are critical for the satisfaction and the usage of the GLS.
[28]	UK Marketing	- PU - PEOU - Perceived SI - Perceived enjoyment	Intention of engagement Brand attitude	Intention of engagement	TAM	323 students	Again, the model of TAM is helpful in explaining the intention of engagement and the attitude of brands in UK marketing context.
[55]	Korea E-government	- PEOU - PU - Compatibility - Playfulness - Peer influence - Superior's influence - SE - Rasource FC - Technology FC	Attitude Subjective norms Perceived behavior control Intention to use	Nil	TAM, DOI, UTAUT, TRA, TPB, and DTPB	156 users	This study is a unique study that attempted to show the differences in the variation of intention to use gamified e-government. The uniqueness of this study comes from its approach as it compared the validity of several theories in this process. The variables that are related to gamification such as playfulness are critical for the use of e-government application.
[56]	South Africa Learning	- SE - Computer anxiety - Challenge - Learning opportunities - Perceived playfulness - Perceived curriculum fit	BI	Playfulness Perceived curriculum fit	Nil	209 tourism teachers	This study reviewed the literature and constructed a new model of GLS. The empirical testing of the model showed positive impact of SE, playfulness, and enjoyment in explaining the BI toward the adoption of GLS in the context of African country such as south Africa.

Table 2. 1: Summary of Literature Survey (table continued)

Author / year	Country / industry	I.V.	D.V	Med / mod	Theory	Method	Findings
[22]	Finland E-sport	• Vicarious achievement • An appreciation of aesthetic • Physical attractiveness of players • Drama • Escapism • Appreciation of player skill • Social interaction • Novelty • Aggressive	e-sport watching frequency	Nil	Nil	888	Along with established theories, there are several other variables that can lead to the usage of e-sport watching frequency such as the novelty, social interaction, skills, and drama as well as the appreciation of players skills.
[20]	Brazil Banking	• PE • EE • SI • FC • Hedonic motivation • Price value • Habit • Gamification impact	BI UB	Age Gender	UTAUT 2	326 users	PE, EE, SI, hedonic motivation, price value, habit and gamification affect the BI. Habit affects UB.
[98]	Brazil	• PE • EE • FC • Familiarity	Behavioral	Nil	UTAUT	77 user	FC, PE, EE are critical variable in explaining the behavior of individual toward using system such as GLS.
[29]	South Korea Mobile application	• Epistemic • Social integrative • Personal integrative	Engagement Purchase intention	Age Experience	Nil	5072 smartphone users	Personal and social integrative are important predictors of engagement and purchase. There are differences based on age and experience.
[18]	Malaysia Banking	• Compatibility • Innovativeness • PE • EE • Perceived technology security	Intention to adopt internet banking Intention to recommend	Gamification	UTAUT and DOI	398 response	Certain variables such as innovativeness are important for the use of gamified learning system.
[99]	UK Learning	• Student engagement • Gamified course • Deep study approach • Surface study approach • Part time, full time	Course performance	Gender	Nil	136	GS is more effective than traditional system. Students are more engaged in GS. Female and students with online job are more engaged in gamified courses.
[30]	Iran Health system	• Utilitarian • CROI • Service excellence • Hedonic • Aesthetics • Playfulness • Value • Social support • Informational support • Emotional support	Brand equity Brand awareness Brand image Perceived quality Brand loyalty	Value	Nil	351 users	Social support affected direct the brand equity and indirectly via value. Value mediated the effect of social support on brand equity.
[32]	Spain Tourism	• Experience • Sense • Feel • Think • Act • Relate • Emotion	Loyalty Complaints	Nil	Experiential market	242 users	Gamification is important to improve the tourists experience and loyalty as well as to reduce the complaining behavior.
[47]	Malaysia SMEs	• Technology context • Employee technology know-how • PE • Perceived relative advantage • Perceived technology security • Organization context	Technology adoption	Nil	UTAUT and TOE	Conceptual	A combination between TOE and UTAUT is proposed. The study has merging between the two theories is expected to have a better explanation of the variation in using GS by SMEs in Malaysia. However, further testing is needed to ensure that the model is valid for the purpose that it was designed for. Since the organizational level is the

Table 2. 1: Summary of Literature Survey (table continued)

Author / year	Country / industry	I.V.	D.V	Med / mod	Theory	Method	Findings
		• CEO and top management characteristic • Perceived adoption cost • FC • Environment context • Normative pressure • Mimetic pressure • IC • SI • Hedonistic drives					concern, the study included several variables that are organizational in nature to capture the organizational variable.
[19]	Malaysia Banking	• PE • EE • FC • SI • General self-confidence	Intention to adopt internet banking Intention to recommend	Gamification	UTAUT	398 customer	PE, EE, FC are important for the adoption.
[100]	Portugal Learning	• Information quality • System quality • Service quality • Use • SA • Individual impact	Organizational impact	Gamification Enjoyment Challenge	IS success	215 USERS	Gamification is proposed as a moderator and tested by this study. The finding showed that IS success variables such as quality of system, service, and information as well as the use and SA are critical to affect the organizational impact toward the use of GS system.
[101]	Several countries 3D games for managerial learning	• PEOU • Rewards	• Perceived effectiveness • Perceived usability • Transferability of skills Situating learning	Culture Gender	Adoption theory	319 users	PEOU and rewards has a significant effect on perceived effectiveness. Culture play a moderating role between PEOU and rewards with perceived effectiveness.
[37]	Review	• Systematic literature review	Review	Review	Review	Review	Important variables includes, motivation for the gamification, engaged users, and SF as well as the flow and the cognitive absorption are the primary constructs addressed the gamification.
[41]		• Enjoyment • Ease of use • Usefulness	• Continued use • Discontinued use Contribution	User conception	TAM	562 users	Fun system affect the intention to use and discontinued use of GS. Ease of use also has impact on the continued use intention.
[46]	India Talent acquisition	• Technology • Cost effectiveness • Relative advantage • Security and privacy concerns • Organization • HR readiness • TMS • Environmental • Competitive pressure • Support for AI vendors • Task technology fit for AIT	• Adoption of AI technology for TA Actual usage of AI technology for TA	Stickiness to traditional TA methods	TOE and Technology Task fit	562 HR manager	TOE context are important for the adoption of AI. Important variables include the HR readiness, TMS, AIT for task technology, security and privacy and relative advantage as well as the inclusion of cost effectiveness, and technology are all important predictors of the AI adoption.
[42]	-	• Leaderboard design (player vs team) • Personal development competitiveness	Usage intention	Enjoyment	TAM	213 users	Mediating role of enjoyment is confirmed between the leaderboard design and the personal development competitiveness on the usage intention.
[4]	Conceptual	• Gamification design • Users' resources and motivations • Gameplay	Experiential value realization	Nil	Nil	Conceptual	This study proposed a model to explain the gamification. Important determinant of the experiential value realization are related to the design of gamification, users' resource and motivations and gameplay.

Table 2. 1: Summary of Literature Survey (table continued)

Author / year	Country / industry	I.V.	D.V	Med / mod	Theory	Method	Findings
[102]	Cyprus Learning	• Task technology fit • SI • Social recognition • PU • PEOU • Attitude	Continuance intention	Usefulness	TAM and task technology fit	375 instructors	TTF affected PEOU. The mediating usefulness in the TTF, SI, and variable of TAM is confirmed.
[23]	China Exercise	• Technological function • Instruction • Provision • Self-monitoring • Self-regulation • Goal attainment • PU • PEOU • Perceived enjoyment	Continuance usage intention	Exercise SE	TAM	449 users of fitness apps	SE moderated the effect of usefulness on continuance.

Based on the above table, previous studies can be categorized based on many criteria such as unit of analysis, country, approach, data analysis technique, tools and theories. In this section, the study categorizes the reviewed articles based on the theoretical underpinning theories. It can be seen from previous studies that the majority deployed the TAM model. For example, ten of the above studies in Table 2.1 investigated the usage of gamified learning system using TAM model and mainly used questionnaire to collect the data from the respondents and their findings that PEOU and PU as well as other factors such as trust and IT related knowledge are key factors for the usage of gamified learning system [8], [15], [21], [25], [26], [28], [40], [95], [97].

The second theoretical framework deployed in previous studies as shown in Table 2.1 is the UTAUT model. Researchers [19], [20], [96], [98] used the UTAUT as theoretical framework and collected data using a questionnaire. Findings of their studies showed that EE, PE, SI, FC, moderators of UTAUT; age, gender, experience, and voluntarily are essential for the usage of gamified learning systems.

Other studies have deployed different theoretical adoption theory such as the theory of planned behavior in the study of [24] or the theory of IS success in the study of [100]. Few studies deployed the framework of TOE such as in the study of [46]. In addition, it can be seen in Table 2.1 that limited number of studies combined theories to explain the variation in the gamified learning system.

adoption. For instance, the study of [18] deployed the UTAUT and DOI to examine the usage of GS in banking in Malaysia. The combination of the two theories can explain large part of the variation in the usage of the system. In addition, [47] in the context of SMEs in Malaysia also deployed the UTAUT and TOE to explain the adoption of GS by SMEs. In educational context, the study of [102] deployed the TAM and TTF in Cyprus learning organization and found that the combination has resulted in better explanation of the variation of the usage of gamified learning system.

Researchers [4], [22], [27], [30], [32], [37], [56], [96], [99] also have used exploratory approach to investigate the benefits, challenges as well as the factors that affect the adoption and usage of GS. The high number of exploratory studies indicates that the gamification is still emerging and there are growing number of studies that are interested in the topic.

Overall, it can be seen that TAM is dominating the research of gamification system and technology adoption. This is in agreement with the finding of meta-analysis review showed that 86% of articles in adoption of learning technology was conducted using TAM and only 4% using UTAUT and 2% using TPB [65]. It can be seen also that several research combined models to increase their explanatory powers in explaining the variation in learning technology adoption. This has been the norm of the literature. Venkatesh et al. [44] combined eight models to develop UTAUT. In technology adoption context, researchers suggested the combinations of the two models [103]–[105]. This study is combining the models of UTAUT, TOE and IS success to explain the adoption of gamified learning system.

UTAUT is comprehensive model and has combined eight models which includes variables that are similar in nature and function as well as definition. For example, according to [44] PE is similar to PU (TAM) and relative advantage (diffusion of innovation (DOI)). EE is similar to ease of use (TAM) and complexity (DOI). Table 2.2 shows the similarity between the factors.

Table 2.2: Similar Factors [44]

Variables	Sources
PE	PU in TAM1, 2, 3 as well as the extrinsic motivation from motivational model and relative advantage from DOI.
EE	PEOU in TAM 1, TAM2, complexity from the DOI
SI	SN (TRA, TAM2, TPD/DTPB, C-TAM-TPD); social factors (MPCU); Image (DOI)
FC s	PBC (TPB/DTPE, C-TAM-TPB) FC s (MPCU); Compatibility (DOI)

2.4.1 Critical factors for Gamified Learning System

A few research looks at the selection of gamified framework either in commercial or instructive settings. The commercial utilization of gamified framework outflanks the instructive one with TAM is dominating the research of GS either in the commercial setting and business usage of GS or in the education settings. Vital factors that have been inspected within the writing incorporate the PEOU and PU. These two factors have been built up as critical indicators of receiving gamified framework in a few considers e.g. [8], [15], [21], [26]. So also, in receiving

gamified learning system the PEOU and PU were found fundamental indicators of BI e.g. [95], [97]. Other vital variable is the SI which is identical to subjective standards e.g. [20], [25], [28].

Elements of gamification such as enjoyment and playfulness were demonstrated to have coordinate and interceding impacts on the BI toward employing a gamified framework [8], [15], [40], [56], [96], [97]. Taken a toll of receiving the innovation could be a basic calculate and can decide the choice of the administration [46], [47]. Summary of the study are given in Table 2.3.

Table 2. 3: Critical Review of Adopting GS

Author / year	Country	Industry	Theory	PE*	EE*	SI*	TMS	OR	CO	SE	SA	EN	PL
[8]	Portugal	E-banking	TAM	√	√							√	
[15]	Finland	Sport	TAM		√							√	√
[40]	Turkey	Learning	TAM	√	√							√	√
[24]	Finland	Exercise	TPB			√							
[25]	Finland	Exercise	TAM	√		√							√
[95]	Spain	Learning	TAM	√	√								
[96]	UK	Learning	UTAUT	√									√
[26]	US	Fitness	TAM	√	√	√							
[21]	Portugal	Banking	TAM	√	√							√	
[97]	Taiwan	Learning	TAM	√	√								√
[28]	UK	Marketing	TAM	√	√	√						√	
[56]	South Africa	Learning	Nil							√			√
[20]	Brazil	Banking	UTAUT 2	√	√	√			√				√
[98]	Brazil	Banking	UTAUT	√	√								

Author / year	Country	Industry	Theory	PE*	EE*	SI*	TMS	OR	CO	SE	SA	EN	PL
[18]	Malaysia	Banking	UTAUT and DOI	√	√	√						√	√
[19]	Malaysia	Banking	UTAUT	√	√	√				√	√	√	√
[100]	Portugal	Learning	IS success								√	√	√
[102]	Cyprus	Learning	TAM and TTF	√	√								
[23]	China	Exercise	TAM	√						√			
[46]	India	Talent	TOE				√	√	√				
[47]	Malaysia	SMEs	UTAUT and TOE			√	√		√				

From Table 2.3, it can be concluded that there are several factors that have been used in the context of GLS. The previous studies seems to focus on the TAM and UTAUT as well as the deployment of mixed theories to increase the explanation of the variation of the adoption of GLS and other learning technologies. The OC such as TMS, cost, and OR are less specified. satisfaction, SE and EE, PE, and SI of the technology are critical for the adoption and has been used by limited number of studies. Table 2.3 moreover appears that gamification's measurement are either the enjoyment or the playfulness or both together. The studies were mainly in organization for profit however, studies of the educational settings are still limited.

2.5 CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

The conceptual framework of this researcher was created based on several theories. From the theory of TOE, the classification of factors into IC and OC has been done. The components of IC included the individual variables of UTAUT. For the OC factors, they also included variables that are specific to the organizational context and include the TMS and OR. UTAUT factors in conjunction with other components were consolidated to upgrade the illustrative

control of this research. The components of UTAUT incorporate the PE, EE, and SI. The study has utilized TOE to clarify the categorization of the factors of the research into IC and OC. Analysts have utilized the TOE to classify the variables based on the setting of their researchers. In order to strengthen the inadequacy of TOE and to support the development of robust framework for Indian companies to adopt the technology, [106] combined the TOE with TAM and found that this combination could explain the variation in the technology adoption. This study is using the UTAUT and combined it with TOE and IS success because the UTAUT is designed to investigate the individual adoption of technology [107], [108]. Therefore, the construct of IC includes the variables of ICs of UTAUT [108].

The second construct is the OC. These factors are incorporated to support the direct use of the gamified learning system. The constructs include the variables of TMS and OR [52], [109]. Additionally, based on the IS success, the study proposed that the SA can mediate the effect of ICs and OC on the BI [73] [110]. The impact of IC is anticipated to be moderated by gamification. Individuals tend to perceive the technology having in their mind the degree to which they enjoy using the technology and in this regard, the playfulness and the enjoyment of the technology are critical to form the gamification. In addition, the cost which is an OC variable and can explain the decision of the owners of the smart school to adopt the technology and use the technology. Indeed, high cost might make the management hesitant to use the technology while low cost is an encouraging determinant. Accordingly, this study proposes that the cost is a conditional factor. High cost will reduce the effect of OC on BI while the low cost is expected to improve the association between OC and BI. Another moderating variable is the SE. Having high SE for the teachers and instructors will lead to better utilization and higher intention to use the system while the low SE is a major reason for not using the system. In other words, even if the intention is positive, the low SE might hinder the intention and lead to not using the GLS. Figure 2.2 appears the conceptual system of this research

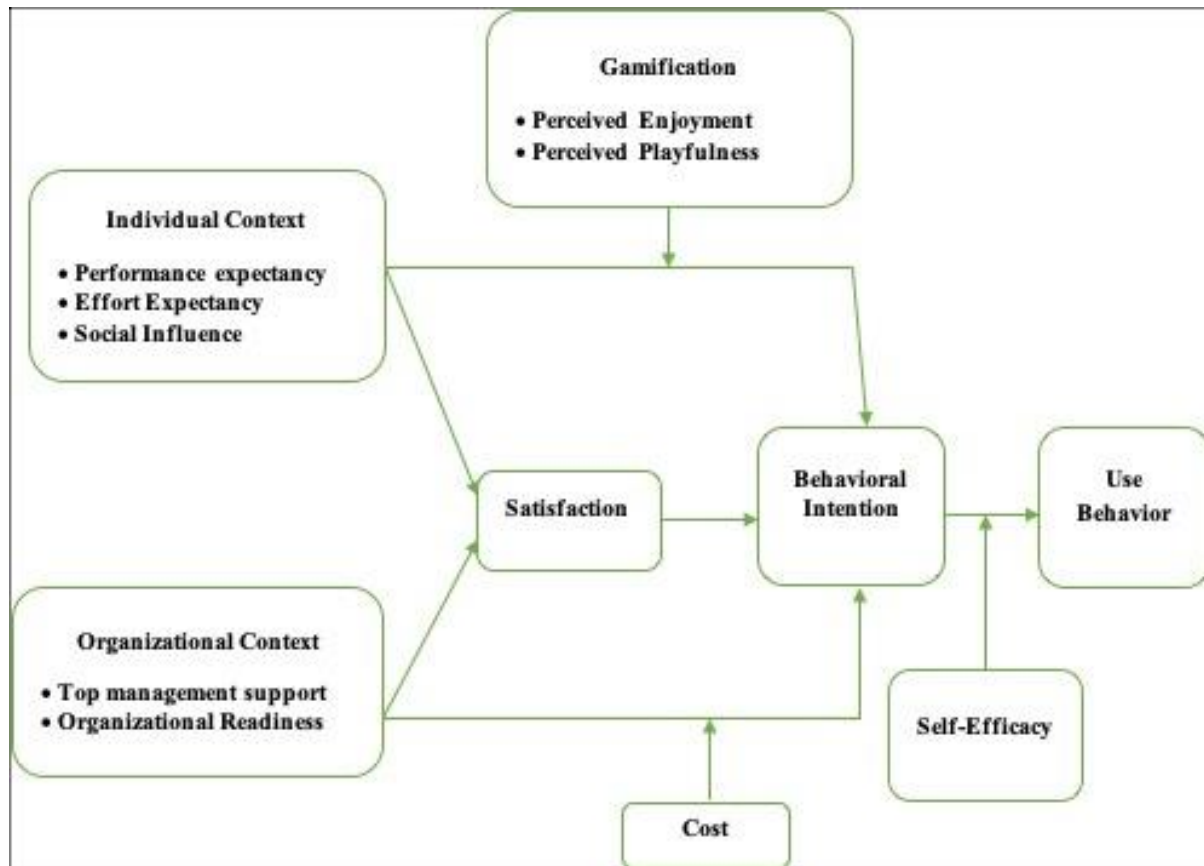


Figure 1: Conceptual Framework

2.5.1 IC and BI

Lian et al. [49] investigated the effect of human factors on the acceptance of technology and found this construct has significant effect on the adoption of technology. [50] investigated the effect of human related factors on the adoption of technology by public sector. [48] incorporated PE, EE, and SI as ICs and proposed that the effect of the IC on intention to use accounting technology is significant. Venkatesh et al. [108] considered the EE, PE, and SI as person related factors and proposed that they can have a noteworthy impact on the BI of receiving an unused innovation [104]. Within the setting of gamified framework, [47] inspected the selection of gamified framework by SMEs in Malaysia and found that person setting is critical indicators of innovation appropriation. [100] too found that person affect is basic for the selection of gamified framework. Hence, it is proposed that person setting will have a coordinate positive impact on the BI to utilize gamified learning system

in shrewd school in Iraq. H1: IC affects positively the BI to use gamified learning system

2.5.1.1 PE and BI

PE is characterized by [108] as the degree to which an person accepts that utilizing modern innovation will offer assistance him or her to achieve picks up in individual execution. A few analysts explore the impact of PE on BI and found noteworthy impact of the variable on the BI to utilize the innovation. For illustration, Bellaaj et al. [111] inspected the impact of PE on the purposeful of proceeded utilize of e-learning and found that PE decided the deliberate to proceed utilizing e-learning. Cao [75] in China found that PE influenced the BI to embrace cloud capacity by Chinese understudies. [112] explored the impact of PE on the selection of innovation and found this impact is positive and noteworthy. Based on UTAUT, value in TAM is comparable to PE [44]. Analysts too found that convenience is one of the vital factors for the innovation appropriation. For illustration, [72], [73], [113] found that value is fundamental variable for the appropriation and utilization of technology services in Germany, Korea, and Saudi Arabia respectively.

PE is the advantage that a client can pick up from employing a framework. Clients would utilize the gamified learning system in case they seen that there are advantages from utilizing the system. The advantage may will be improving educating and learning along with the performance and understanding along with the reduction of anxiety when they decide to use gamified learning system.

. A few past studies considers inspected the impact of PE on the BI to utilize GS. For occasion, in managing an account industry, analysts [18]–[20], [98] found that PE encompasses a noteworthy impact on BI to utilize gamified framework. In instructive setting, the [96] found that PE is an imperative indicators of gamified learning system to use M-learning. gamified learning system is advantageous for instructor, school and understudies. Hence, it is proposed that PE will have a critical impact on the BI to utilize gamified learning system in Iraqi schools.

H1a: There is a positive effect of PE on BI to use GAMIFIED LEARNING SYSTEM.

2.5.1.2 EE and BI

EE refers to the ease of using a technology such as gamified learning system [44]. According to UTAUT model, the EE is similar to PEOU in TAM [44]. Researchers who deployed the

model of TAM found that PEOU has a significant positive effect on the BI to adopt technology. Burda and Teuteberg [72] found that PEOU affects the PU which in turn affect the UB of cloud archiving. Aharony [114] found that BI of librarians and information specialists is affected by the PEOU. Al-Gahtani [113] found that PEOU affects the UB to adopt e-learning in Saudi. Gupta et al. [115] found that PEOU is the most important factors for the adoption of cloud by SMEs in Malaysia.

Few researchers investigate technology adoption using UTAUT. For example, Bellaaj et al. [111] tested the effect of EE on the acceptance of e-learning and found that EE significantly affects the BI to use e-learning. Cao et al. [102] found that EE affects the intention to use cloud-based storage by students. Nguyen, et al. [112] found that EE affects the BI to use technology.

EE is the physical and mental exertion that are required to utilize the gamified learning system. Clients will convey the gamified learning system on the off chance that the utilize of the framework is simple and requires negligible endeavors. [20] found that EE is imperative indicators of the BI of clients in managing an account segment to utilize gamified framework. Within the same vein, [98] show that EE is basic for the utilize of gamified framework. [19] moreover determined comparative result by showing the significance of EE. Instructors in Iraqi savvy school would utilize the gamified learning system in case they seen the framework to be simple to utilize. In this way, it is hypothesized:

H1b: EE has a positive effect of BI on gamified learning system.

2.5.1.3 SI and BI

The study [116] investigated the adoption of cloud by Saudi's students and noticed the importance of SI on the user to use the technology. The author suggested future research to pay attention to the role of friends and peers in technology acceptance studies. Nevertheless, Venkatesh et al. [44] pointed out that when a new technology introduced, the effect of SI is weak compared with other variables such as PE and EE. [117] in the theory of diffusion of innovation (DOI) pointed out that when a new innovation introduces, people will take time to understand it and its usage and accordingly, peer influence will have minimal effect in this stage. In later stage, the spread of the innovation will lead to stronger effect of peers on each other. [118] explored the appropriation of M-learning by understudies. The discoveries demonstrated that understudies with more utilization of versatile administrations are less

influenced by others' conclusions; they would take their choices on receiving M-learning based on their involvement and information on utilizing comparable advances. On the other hand, understudies with less utilization of versatile administrations would find the application and administrations of M-learning difficult to utilize and hence would depend on other's conclusion with respect to the appropriation and utilization of M-learning.

A few analysts examined the impact of SI on the selection of modern innovation. For example, [119] explored the impact of SI on the deliberate of conclusion client to switch to innovation and found there's a noteworthy and positive impact between the two factors. [75] found that SI has critical impact on the students' selection of cloud capacity in China. Nguyen et al. [112] found that SI significantly affects the BI to use technology in Vietnam. On the other hand, a contradictory result existed in preceding research of [120], [121] who investigated the adoption of enterprise resource planning (ERP) software by business students and found insignificant effect of SI on BI. [120] also found that SI did not affect the students' BI for storytelling and animation using social media in Malaysia.

SI alludes to the impact of relatives, companion, co-workers, specialists and encompassing IC on the choice of instructors to utilize the gamified learning system. High SI and the wide utilization of the framework among people and the community will lead inevitably to utilizing the framework [44]. In work out setting, [25] found that the SI contains a critical impact on the BI and proceeded utilize of work out. In managing an account, [21], [19] and [20] found that SI is basic for the purposeful to utilize gamified framework. [28] moreover found that SI influenced the demeanor toward utilizing gamified framework. Hence, it is anticipated in this research that SI will influence emphatically the BI of instructors in Iraqi school to utilize the gamified learning system It is hypothesized:

H1c: SI will have a positive effect on BI to use gamified learning system.

2.5.2 OC and BI

OC is defined as “the factors that assist the individual to adopt the technology provided by the organizations”. Researchers who deployed the TOE framework has included the OC as one of their constructs. OC include two variables (sub-constructs) namely, TMS and OR. Gangwar et al. [54] found that the OC has a significant effect on the adoption of technology. Low et al. [51] also found a significant effect of OC on the technology adoption. Lian et al. [49] found

that OC are an important construct for the adoption of technology in Taiwan. Similarly, Senyo et al. [122] found that OC is essential for the adoption of technology in developing countries.

Within the setting of gamified learning framework, OC setting is basically related to the OC characteristic and back of utilizing gamified framework. It is one of the build of TOE and it reflects on the administration recognition and activity toward embracing an unused innovation. Analysts who conveyed the TOE found that OC setting is critical for the technology adoption. For occurrence, within the research of [18], OC measurement features a critical impact on the selection of gamified framework by SMEs. Additionally, the research of [46] found that OC develop is vital for utilizing gamified framework to procure ability in India. In like manner, this research proposes that OC setting is imperative for the administration of Iraqi schools to utilize the gamified learning system.

H2: OC will affect positively the BI toward using gamified learning system.

2.5.2.1 TMS and BI

TMS is classified by many researchers as an OC [49], [54], [123]. Lian et al. [49] investigated the effect of TMS on cloud adoption and found that the role of TMS is vital for the adoption of technology. Similarly, other researchers found that TMS significantly affected the adoption of technology in developing countries [122]. Yang et al. [124] investigated the readiness to adopt SaaS and found that TMS is essential for preparing organizational to adopt the technology. Low et al. [51]; Gangwar et al. [54] also investigated the effect of TMS on the adoption of technology and found this effect is significant.

TMS is fundamental for any organizational activity. It gives the monetary and non-financial bolster to continue with a venture or an activity. A few consider found that the bolster of administration is basic for embracing a unused framework such as cloud computing [51], [106], [124]. In gamified framework setting, [47] proposed that the TMS is an basic calculate for the gamified innovation selection among SMEs. [46] found that the TMS may be a basic factors for the utilize of gamified framework within the securing of ability. In like manner, TMS is proposed to have a critical impact on the BI of schools in Iraq to utilize gamified learning system

H2a: TMS affects positively the BI to use gamified learning system.

2.5.2.2 OR and BI

OR incorporates the foundation status to function and utilize the gamified learning system. OR is one of the important OC figures within the TOE as pointed out by analysts[52], [109][125]. It may be a combination between the availability from organizational and innovative viewpoints [125]. Yang et al. [124] demonstrate that OR is basic for the appropriation of an unused innovation. Within the study of [46], it alludes to the significance of status for embracing gamified framework for ability securing. OR is the foremost critical enablers of blockchain appropriation [126]. In this research, it is anticipated that school that has high availability will be more fruitful in utilizing the gamified learning system and will have higher BI to utilize the framework. Hence, it is hypothesized:

H2b: OR has a significant effect on the BI to use gamified learning system.

2.5.3 Mediating role of Satisfaction

SA is defined as “an affective state that is the emotional reaction to the entire technology experience of a user” [72] [127]. SA with cloud services investigated in few studies [128]. A high quality cloud services is more preferable for active users than low quality services [128]. DeLone and McLean [80] developed the Information System Success. Several prior studies indicated the imperative role of SA in the technology usage and adoption [80] [81], [83], [84].

Kang [110] proposed that SA with cloud affect the BI to use technology services. Park and Ryoo [119] investigated the intention of users to switch toward technology and found that SA with the cloud is an important predictor of the intention to switch to technology services. Park and Kim [73] examined the impact of SA on the BI to use technology is critical and important. [72] referred to the importance of SA for trust and PU in using the technology.

Lin et al. [97] found that SA with the gamified framework is vital indicator of proceed utilize of the framework. Aparicio et al. [36] too found that fulfillment with the gamified framework influenced the utilization of the framework. Based on our audit, the interceding part of fulfillment within the setting of gamified framework has not been explored. SA interceded the impact of PU and PEOU on the BI to utilize online learning framework [129]. Fulfillment too was found to be a full go between experiential esteem drives and the genuine utilize of progressed portable administrations [130]. Advance, SA moreover interceded the impact of site convenience on use purposeful of website [131]. Appropriately, this research proposes that

fulfillment with the gamified learning system will intervene the impact of person setting and OC setting on the BI to utilize gamified learning system among Iraqi schools.

H3: SA mediates the impact of IC on the BI to use gamified learning system.

H4: SA mediates the impact of OC on the BI to gamified learning system.

2.5.4 Moderating role of Gamification

Gamification could be an unused tool that is included in a non-game substance to extend the consideration and inspiration. Components of gamification incorporate the liveliness and the delight. Few researches inspected the directing part of this variable. For occurrence, the directing part of gamification was inspected within the research of [100] and it was found that gamification directed the person effect on the OC affect. Gamification also directed the impact of purposeful to utilize on deliberate to prescribe [18]. Essentially, within the research of [19], gamification directed the impact of deliberate to embrace gamified framework in keeping money with the deliberate to prescribe. In this way, in this research, it is anticipated that impact of person setting on BI to utilize gamified learning system will increment with a high level of gamification and bad habit versa. Subsequently, it is hypothesized:

H5: Gamification moderates the impact of IC on the BI to gamified learning system.

2.5.5 Moderating role of Cost

The cost is imperative indicators and it a basic measure for the choice of administration to utilize or not to utilize an innovation. Monetary cost within the frame of introducing, repairing, keeping up and preparing staff as well as planning substance is basic for choice producers when it comes to utilize a gamified framework [46]. [47] show that the taken a toll of receiving the gamified framework influences the appropriation of the innovation adversely. Taken a toll was inspected in few thinks about as a directing variable. Within the research of [132] taken a toll directed the impact of BI on the green fertilizer innovation (GFT). In this consider, it is anticipated that the high cost will lead administration of keen school to abstain from embracing the gamified learning system and bad habit versa. Appropriately, it is hypothesized:

H6: Cost moderates negatively the impact of OC on BI to use gamified learning system.

2.5.6 BI and UB

Theories such as TAM, UTAUT, TRA, TPB assumed a link between BI and UB [64], [66], [133], [134]. Most of past hypotheses of innovation appropriation such as TAM and UTAUT has connected the behavioral purposeful to utilize behavior [64] [44]. Taylor and Hunsinger [135] explored the impact of deliberate on the utilize of Google.Doc by college understudies and found noteworthy relationship. Cao et al. [75] explored the impact of behavioral deliberate on utilize behavior of innovation and found critical impact between the two factors. A few considers have determined comparative comes about [63], [136], [137].

In line with this conceptualization, the larger part of studies acknowledged the link between BI and UB to derive the UB of users of a technology [20]. In this way, in this consider, it is anticipated that BI will influence emphatically the UB toward utilizing gamified learning system by Iraqi schools.

H7: BI affects positively the UB of gamified learning system.

2.5.7 Moderating role of Self-efficacy

SE is the capacity of instructors to utilize the gamified learning system [138]. SE vary among instructors and this makes contrasts in their recognition of utilizing the innovation [139]. It is one of the foremost critical factors when it comes to evaluating the readiness of instructors to utilize a innovation [140]. It is contended that SE is the reason behind not utilizing the technology among instructors [141]. Typically because the level of ICT may be a deciding calculate for employing a innovation among instructors [142]. SE was found too to be an basic figure for utilizing the gamified framework [55], [56]. A audit consider found that SE could be a driving variable of the gamification [37].

Few thinks about look at the directing impact of SE. For illustration, within the consider of [23] SE directed the impact of PU on continuation deliberate to utilize the innovation. In this consider, SE is anticipated to direct the impact BI on the UB of gamified learning system. In like manner, it is hypothesized:

H8: High SE will improve the effect of BI on UB of gamified learning system.

2.6 SUMMARY

This chapter has presented the literature review of this study. The chapter discussed the gamification and its definitions and usage in learning education. Theories of new technology adoption such as TOE, IS success and UTAUT were discussed. The combination between the theories is a norm in the literature of adopting new technology. TOE was used as a main theory to classify the factors into IC and OC. On the other hand, the UTAUT was deployed to explain the inclusion of the IC's components. Further, the OC was included based on the literature. Furthermore, the IS success was deployed to explain the mediating role of satisfaction among the variables.

To further justify the selection of the variable and their inclusion in this research, a total of 37 studies were selected from the literature of GS and they were further refined and filtered to include only the related articles. The 37 articles were reviewed and analyzed. Based on the literature, the conceptual framework of this study was developed along with the hypotheses. The hypotheses included direct effect hypotheses as well as mediating hypotheses of satisfaction which can be explained using the theory of IS success. The moderating effect of cost and gamification were also discussed as well as the moderating role of SE. In the next chapter, the research methodology of this study is discussed, and the method of data collection and analysis are highlighted.

3. METHODOLOGY

3.1 INTRODUCTION

This is the third chapter of this study, and it discusses the research methodology. There are nine sections in this chapter. First section introduces the chapter and highlights the contents of the other following sections in this chapter. The second section presents the research design of this study. This study is quantitative deploying a survey design where the data is collected using a questionnaire. The third section presents and discusses the population of this study. Sampling procedures and processes are discussed in the fourth section. This study is using the random sampling technique. The instrument of data collection is a questionnaire. Details of the questionnaire are given in fifth section. The sixth section presents the process of validating the questionnaire and ensure its reliability. The seventh section presents the field data collection. The eighth section discusses in detail the processes of data analysis. Preliminary analyses that include the replacement of missing value, outliers, normality, multicollinearity, non-response bias, and exploratory factor analysis are discussed. The main analyses include the assessment of the measurement model and the structural model using the Smart PLS software. Last section summarizes the chapter.

3.2 RESEARCH DESIGN

There approaches of conducting studies are discussed in the research methodology exploratory, descriptive or explanatory [143]. This study is using the explanatory approach. An explanatory approach refer to the attempt of individual to comprehend why things happen [143]. This study seeks to have better comprehension of the usage of gamified learning system. This will be done by examining the casual relationship between constructs such as ICs, OC, gamification, cost, SE BI as well as the UB. Thus, this study is explanatory in nature.

Research also can be either deductive or inductive. In this study, the aims is to determine the factors that affect the adoption of gamified learning system by teachers, thus, the deductive approach is the most appropriate. This study adopts the theory of UTAUT and TOE as well and IS success to develop the hypotheses, collect quantitative data from the sample of teachers and managerial level employees and it uses the SEM techniques.

Among the objectives of this study is to examine the factor that affect the adoption of gamified learning system. For this reason, this study consists of five main phases. The first phase is to identify the problem and issue related to the study. These include the fact that GLS has not been researched much by the educational setting and most existing studies are into the business usage of GS. The issue also include the perception of individual and the organizational capability in predicting the usage of GLS. There are also issues related to the perception of satisfaction, cost, and gamification in the self-efficacy. The second phase is a literature review. In this phase, a review of the adoption theories that are related to the GLS and can explain the behavior of individual toward using the GLS is conducted. In addition, each of the theory has been discussed and the justification of using the theories have been given and discussed. To deeply understand the findings of previous studies, 37 articles which have researched the topic of this study. The existing literature to support the problem as well as to identify the gaps, issues and to develop the research framework is discussed. In addition, a review of articles related to the adoption of gamified learning system was conducted.

In the third phase, the study developed the conceptual framework based on the literature. The development of the proposed framework was based on TOE which deployed to explain the grouping of the variables into IC and OC. The OC in particular was similar to the variables of TOE in the organizational context while the IC was mainly taken from UTAUT which an individual based model that concern about the adoption of individual of a new technology. the model was also included additional explanatory variable such as the intervening variables of SA and the conditional variable such as cost, gamification, and self-efficacy. These variables were used in constructing the proposed framework of this study and they were supported by related literature. Based on the framework, the phase included the development of the hypotheses of this study.

In the fourth phase the research methodology was determined. In order to test the conceptual framework, the study determined the population and sample. In addition, the study used a questionnaire for data collection. The questionnaire was validated by experts and a pilot study was conducted to ensure its reliability. Next, the actual data collection took place. The data was analyzed using SPSS and Smart PLS as embedded in SEM. The fifth phase is to present the findings and the implications of this study. The findings of this study was presented, and the hypotheses were tested. Figure 3.1 shows the processes that were conducted in this study.

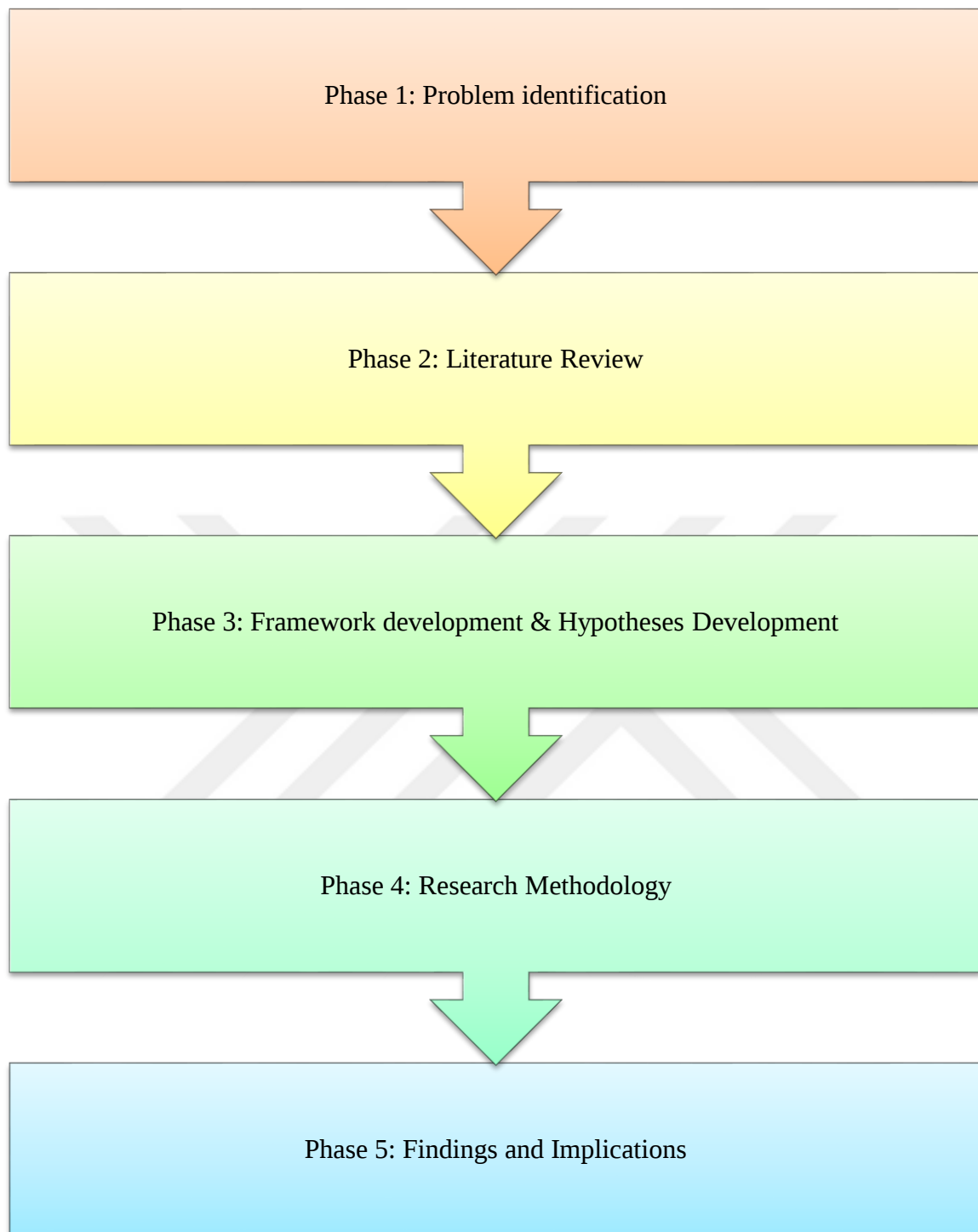


Figure 3. 1: Research Process and Design

3.3 RESEARCH POPULATION

When conducting a research, the population of the study should be determined based on the objective of the study. In this research, the population that this study wishes to examine is the smart school in Iraq. These school are scattered all around Iraq and in number they are 250 smart schools. The population of this research is the smart schools in Iraq. There are 250 smart class in Iraq. Thus, the respondents of this study are choosing from this population which account to 250 schools. However, to represent these schools, there are teachers or instructors and administrative or managerial staff in these schools, and they are the representative of these schools. In number, each school has at least 10 members. Having a simple calculation ($250 \times 10 = 2500$). These classes are scattered within the Iraq and utilize digitalized environment where a smart board and tablets are used for instructing. Instructors within the course educate all subjects from math's, history, and science. These 250 keen classes are the population of this research. The intermediary of this study are the instructors and the administrative staff within the Iraqi smart schools. Test of this study comprises of instructors and administrative staff at the Iraqi schools. In each shrewd lesson there are 10 instructors, and this makes the populace of this research is 2,500.

3.4 SAMPLING

Sampling is defined as “a process of selecting a number of IC from a population, preferably in such a way that the IC are representative of the larger group from which they were selected” [147]. This study uses random sampling technique. The following sections discuss the sampling technique and size.

3.4.1 Sampling Techniques and Size

The population of this study consists of 250 smart classes in Iraq. Random selection and network referral were used to collect the data. When using the Structural Equation Model (SEM), there are rule of thumb that must be considered for selecting the sample size. Hair et al. (2017) indicated that a sample size of 80 is considered minimum sample size for the use of Smart Partial Least Square (PLS). Kline (2013) conducted a review of the studies that have used the SEM and concluded that a 200 response is a typical sample size. For this study, the sample size is calculated based on the formula that was given by Krejcie and Morgan (1970),

which showed that the exact sample size of population of 2,500 is 333 at Alpha or margin error of 0.05 and confidence level of 0.95.

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where :

- n = sample size
- X^2 = Chi – square for the specified confidence level at 1 degree of freedom
- N = Population Size
- P = population proportion (.50 in this table)
- ME = desired Margin of Error (expressed as a proportion)

Therefore, based on this formula, the sample size is 333. However, due to the low response rate reported in previous studies on gamified learning system adoption, a decision was made to expand the sample size by 100%. Researchers recommended when distributing the questionnaires to distribute additional amount to hedge for low response rate. For example, Dolnicar et al. (2016) suggested to increase the sample size to avoid low response rate, which increase the potential for bias in the responses. Hassan and Ghazali (2012) suggested to double the actual sample to avoid low response rate and to remove missing value and outliers. In this study, following the suggestion of Hassan and Ghazali (2012), the actual sample is doubled. Therefore, to avoid the low response rate, and to account for outliers, and missing values, this study distributed 666 questionnaires in a random sampling manner.

3.5 INSTRUMENT OF THE STUDY

This study is using a questionnaire to collect data from the respondents. The questionnaire is a structured close ended. The measurements of the variables are adopted from previous studies that have investigated the gamified learning system or similar fields. The questionnaire consists of introduction that presents the purpose of the questionnaire. The questionnaire also include four sections. In the first section, the background of the respondents such as their age, gender, and level of education are listed. Second section seeks to find information related to the variables of the study. The third section is devoted to BI, and the fourth section seeks to find information about the UB. The items are evaluated based on five Likert scale where (1) refers to strongly disagree and (5) to strongly agree. The use of five Likert scale is based on the fact that these scales are more efficient compared with other seven and ten point Likert scales [151],

[152]. A copy of the questionnaire after is given in Appendix A. Table 3.1 shows the variables, number of items, and source of measurement.

Table 3. 1: Source of Measurement

Variable	No. of items	Source of measurement
PE	4	[59]
EE	4	[59]
SI	4	[59]
Playfulness	4	[97]
Enjoyment	5	[153]
Cost	5	[154], [155]
Satisfaction	3	[97]
OR	4	[46]
TMS	3	[46]
SE	5	[56]
BI	3	[59]
UB	4	[46]

3.6 VALIDITY AND RELIABILITY

Validating the instrument and checking its reliability is an essential part of a research to increase the accuracy of the measurement [156]. In this study, the instrument of data collection was validated, and a pilot study was conducted to assess the reliability. In the following sections, a discussion of the validity and reliability are given.

3.6.1 Validity

Validity is defined as “the degree to which an instrument measures what it is supposed to measure” [157]. Hair et al. [158] suggested that researchers must go through the validation

process to ensure that the instrument is not questionable. [144] recommended researchers to invite experts to review the measurements so that the items could be more reliable to collect the relevant information.

Arabic version of the questionnaire was prepared using a back-to-back translation. In this study, 13 experts in gamified learning system and technology acceptance were invited to validate the questionnaire. After two months, three experts replied and validated the questionnaire. The translated version along with the English version were checked by three experts. The comments and feedback of the experts were considered for refining and correcting the questionnaire. Each expert was given a space to provide his or her feedback and suggest corrections for the questionnaire. These corrections were addressed individually, and a final copy of the questionnaire was presented for the field data collection.

3.6.2 Reliability

After completing the validity and correcting the questionnaire based on the suggestions of the experts, some items were modified and removed while other was added. [159] suggested for pilot study to include 10% of the sample of the study. The sample of this study includes 67 respondents. A total of 67 questionnaires were distributed to teachers and managerial staff in Iraq via online questionnaire. A total of 39 questionnaires were received. Two responses were removed due to missing value resulting in 37 complete and valid responses. These response were considered sufficient for the pilot study. This is because researchers such as [156] indicated that the number of responses greater than 30 and less than 500 is adequately to represent the population and can be used to conduct any academic research [156]. Table 3.2 shows the variables are having acceptable reliability because CA is larger than 0.70 as suggested by [143] and [160].

Table 3. 2: Source and Reliability of the Measurement

Variable	No. of items	Source of measurement	CA >0.70	Reliable
PE	4	[59]	.934	YES
EE	4	[59]	.932	YES
SI	4	[59]	.897	YES

Playfulness	4	[97]	.905	YES
Enjoyment	5	[153]	.901	YES
Cost	5	[154], [155]	.898	YES
Satisfaction	3	[97]	.888	YES
OR	4	[46]	.904	YES
TMS	3	[46]	.900	YES
SE	5	[56]	.912	YES
BI	3	[59]	.819	YES
UB	4	[46]	.877	YES

3.7 DATA COLLECTION

Data collection of this study was conducted using an online questionnaire. Deploying the Google.Doc tool, the questionnaire was created. English and Arabic languages were used in the questionnaire. A request for help in distributing the questionnaire was made to the schools. A total of 666 questionnaires were distributed to the smart classes.

Data collection took place between 9 June and 17 November 2020. The first wave of answers accounted to 113 responses. This was followed by follow up with schools to remind the respondents to answer the questionnaire. This has resulted in additional 109 responses. Additional follow up and reminders during the following months resulted in collecting a total of 412 responses and they are enough for the analysis [160].

3.8 DATA ANALYSIS

Data analysis of this study was conducted using SPSS version 24.0 and Smart PLS version 3.2.7. In the following sections, the SPSS analysis that have been conducted using the SPSS and includes the missing value, outliers, normality, and multicollinearity, are discussed. In addition, the main analysis using the Smart PLS and includes the measurement model and structural model are also given and discussed in the following sections.

3.8.1 SPSS Analysis

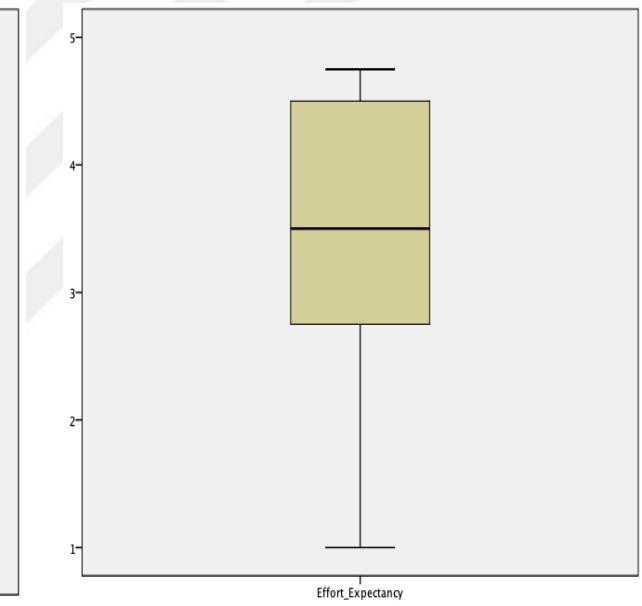
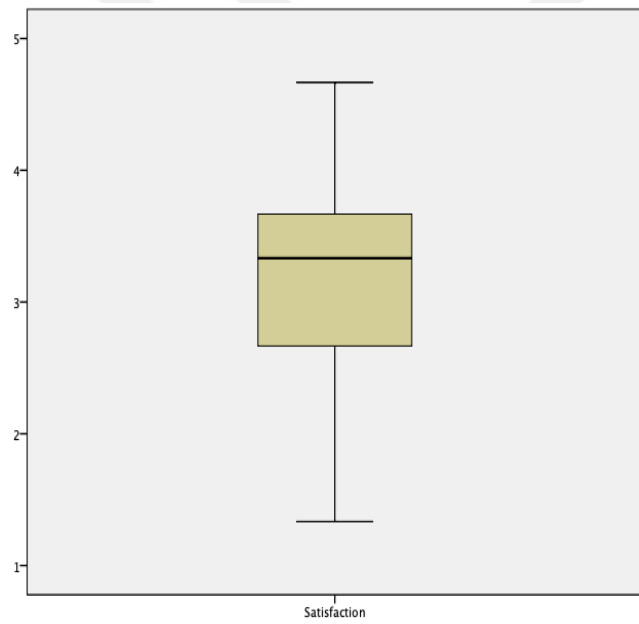
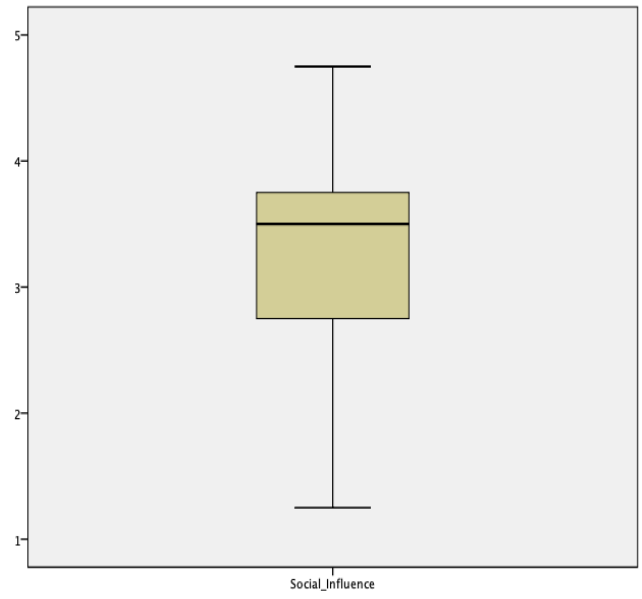
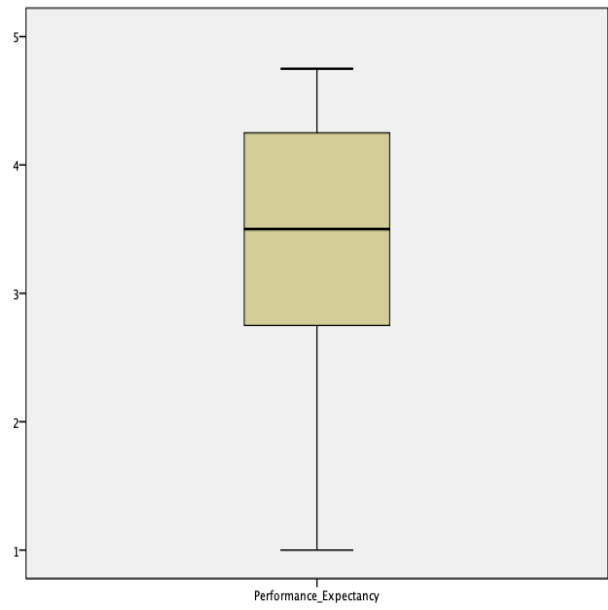
The analyses in this section were conducted using SPSS. The goodness of the data to be used in the analyses must be checked before proceeding to further analyses. Researchers such as [161] and [160] emphasized that the data must be examined for its goodness and its readiness for conducting further analyses. There are several analyses that were conducted to examine, clean, and cleanse the data. These analyses include the replacement of missing value, outliers, normality, and multicollinearity. These analyses are discussed in the following sections.

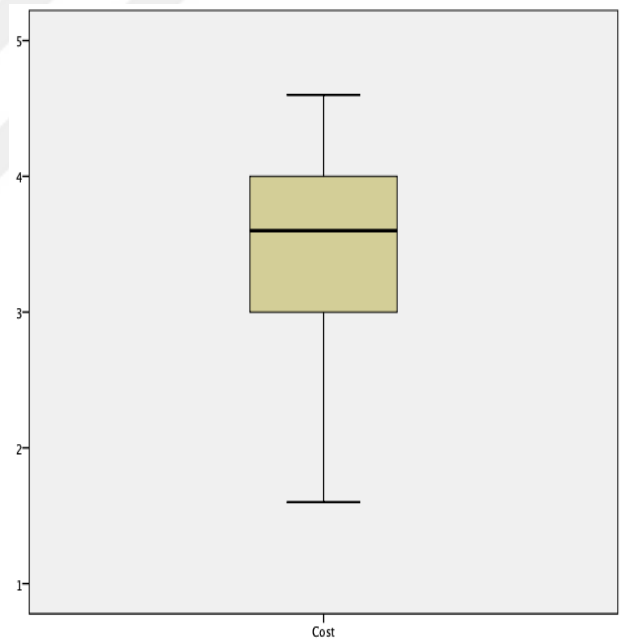
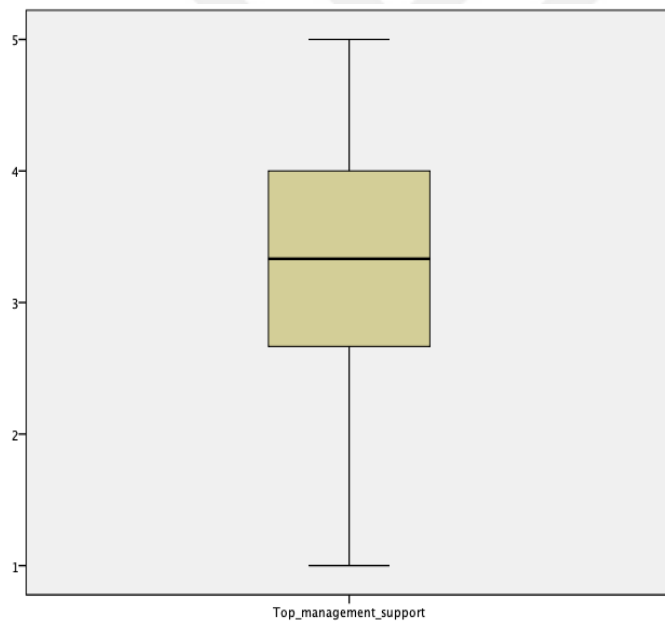
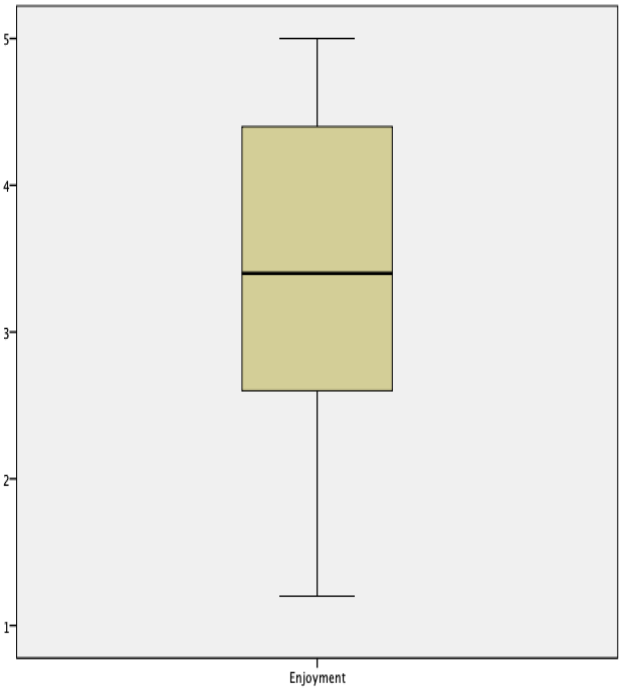
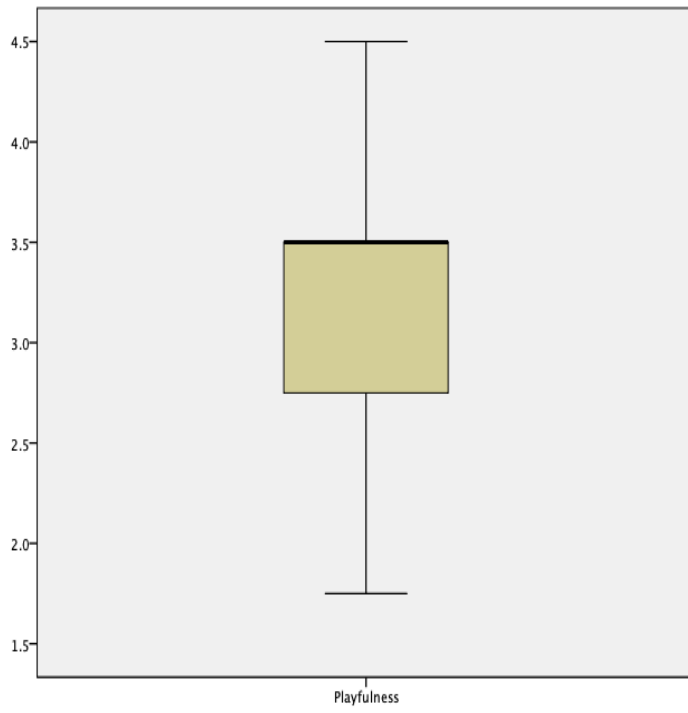
3.8.1.1 Replacing Missing Value

The first analysis was to check the missing value using the frequency analysis in SPSS. Hair et al. [161] suggested that missing value less than 15% should be replaced by the mean. However, for responses that missed more than 15% of the questions, researchers must delete the response. In this study, a total of 7 missing values that have more than 15% of the questions not answered by the respondents were removed. Hair et al. (2017) pointed out that labelling all questions as required will minimize the missing value, but it will discourage respondents from answering the questionnaire. Thus, the 7 missing value was due to not labelling all the questions as required and respondents were free to skip some questions that they are not willing to answer. In addition, 9 responses were missing less than 15% of the answers were replaced by the mean score value. This has made the complete responses (412-7) 405.

3.8.1.2 Outliers

Pallant [161] and Hair et al. [160] suggested researchers to examine the data for outliers by examining the boxplot of the outliers. In this study, based on these suggestions, the study examined the boxplots and found 11 values were far from the mean score and they were outliers. Thus, a decision was made to delete the 11 responses. Boxplots of all the variables are given in Figure 3.2.





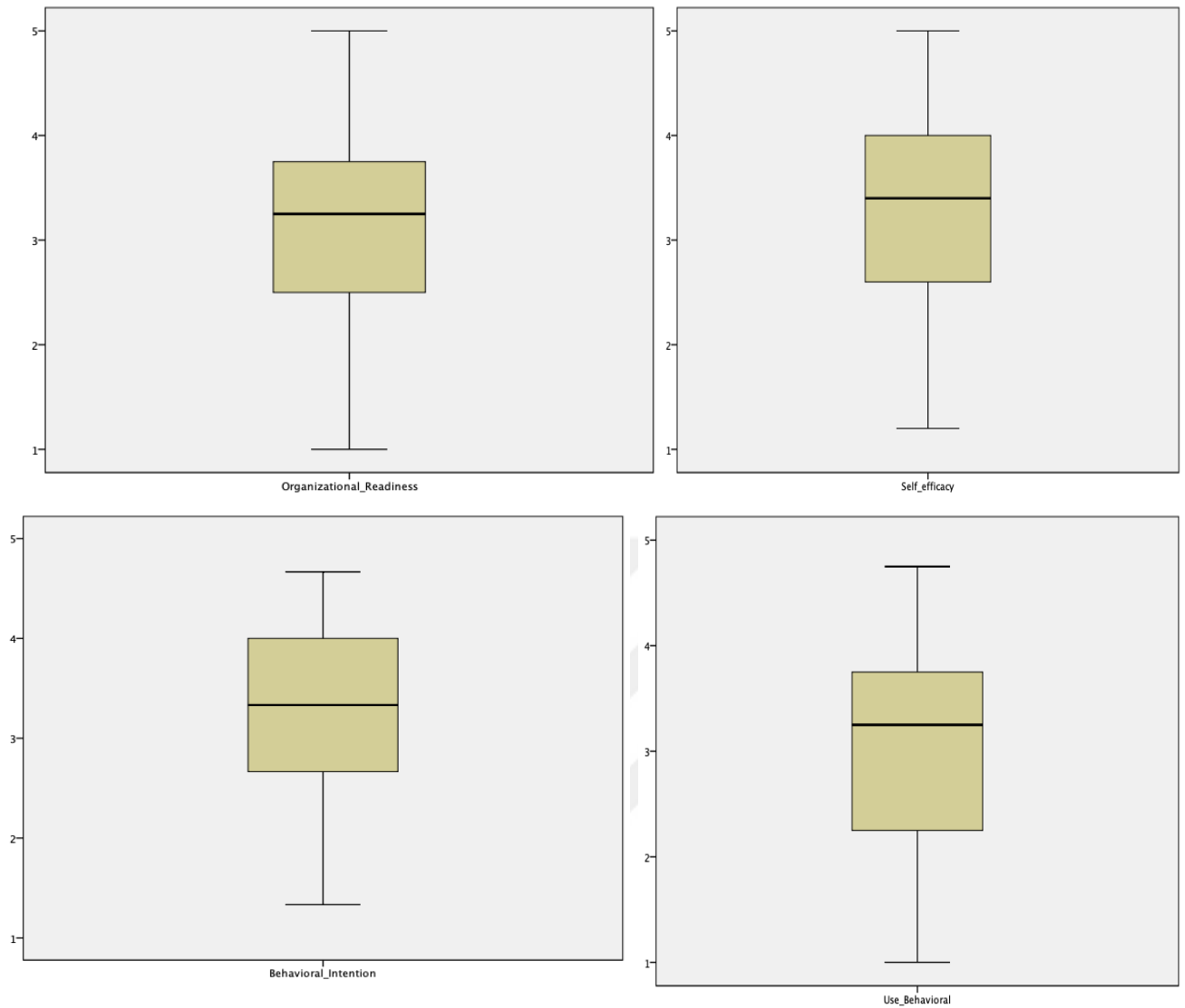
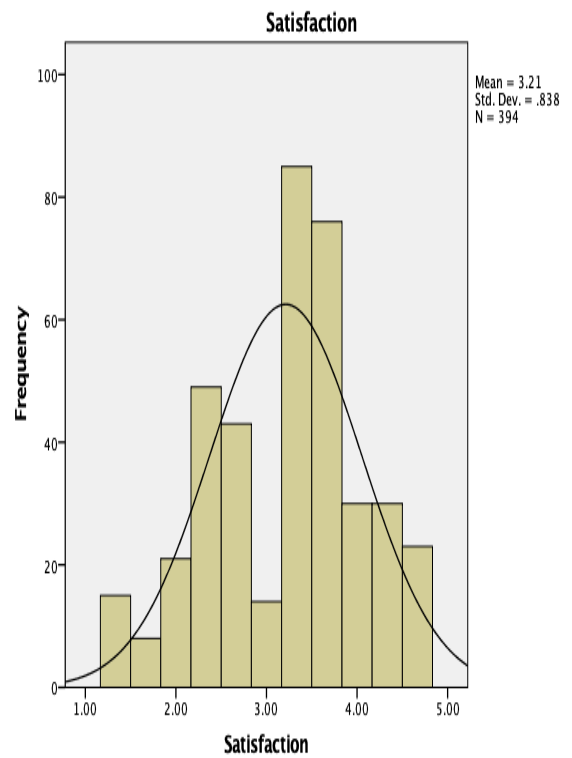
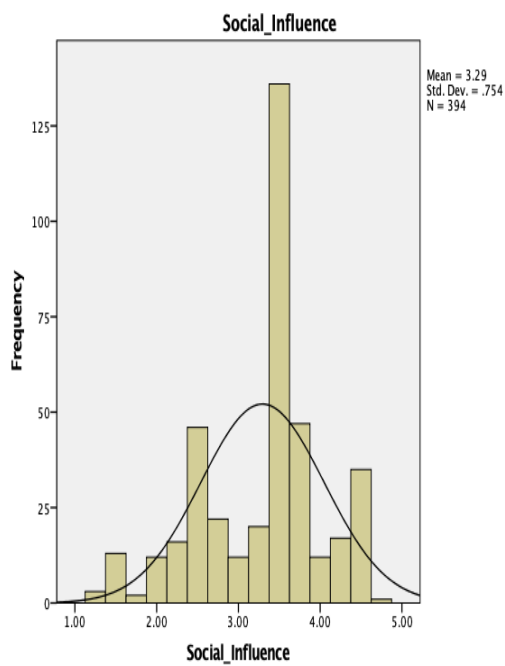
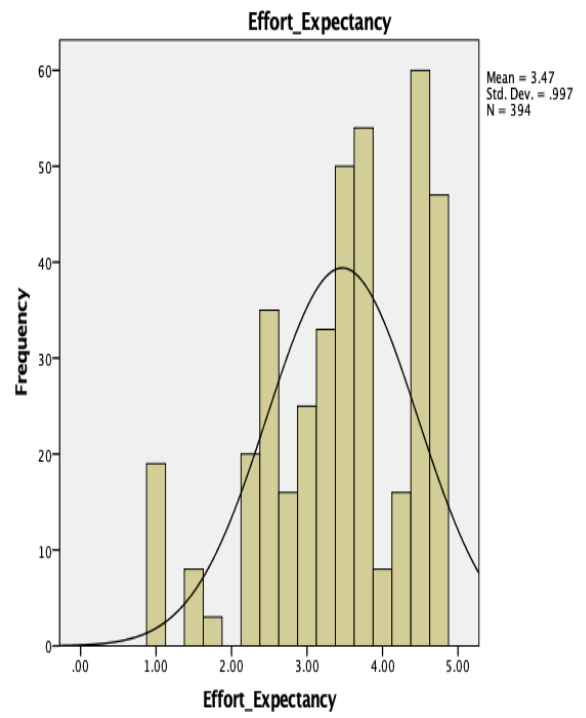
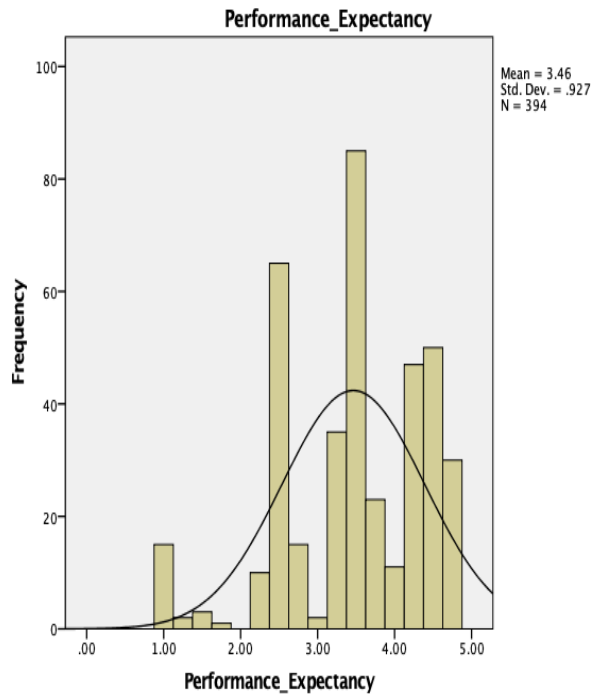


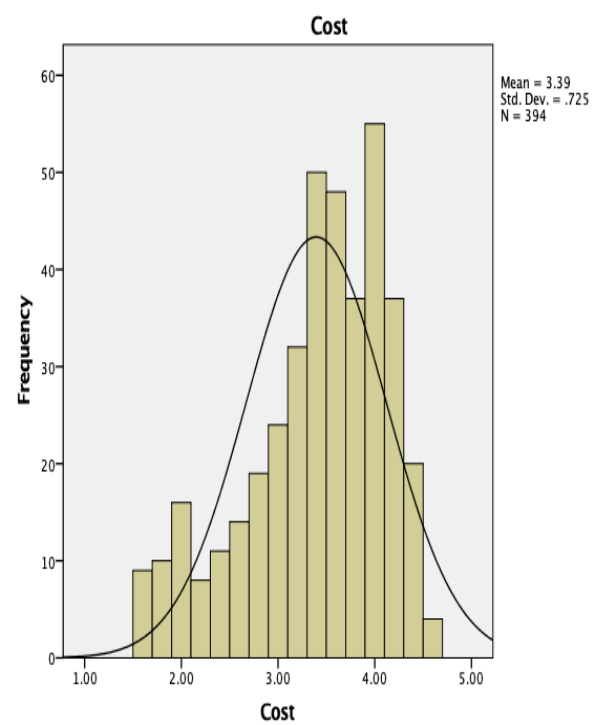
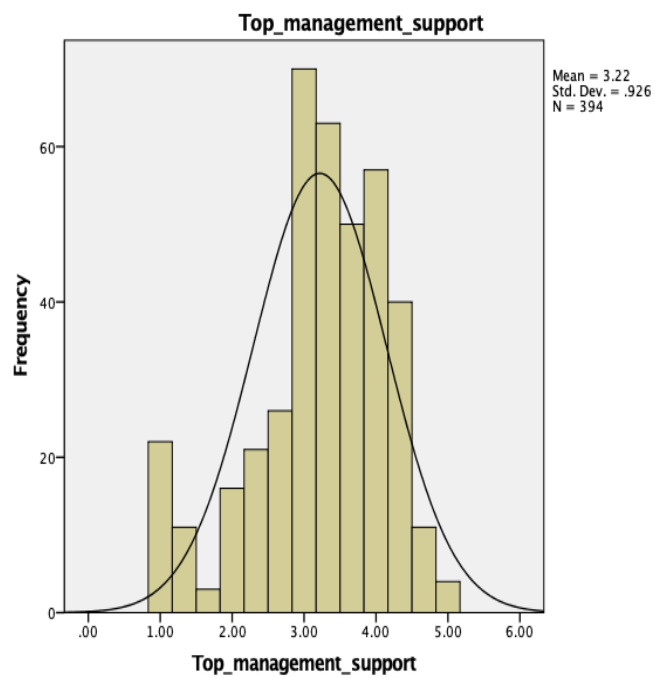
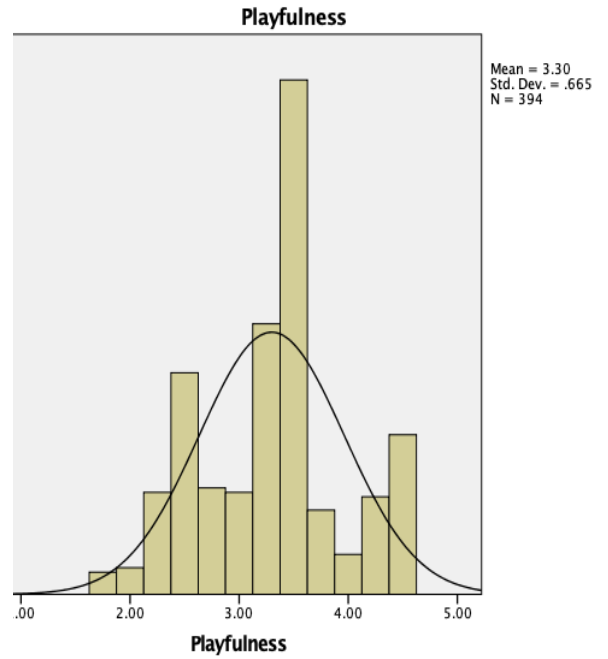
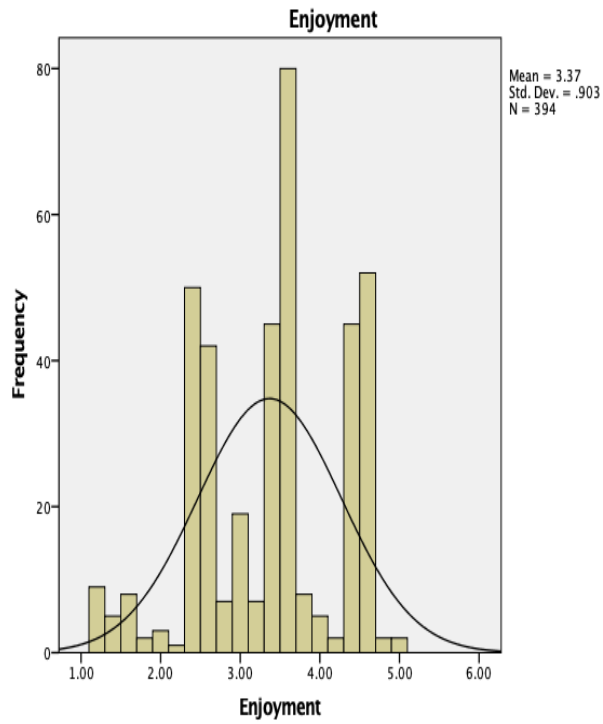
Figure 3. 2: Boxplot of the Variables

Removing 11 outliers resulted in $(405-11=394)$ 394 complete and usable responses.

3.8.1.3 Normality

Pallant [161] and [162] propose analysts to look at the shape of the histogram as well as the value of indicators such as Skewness and Kurtosis to decide on the normality. [In this research, the shapes of the histogram appeared that the data are normally distributed. All the factors have a bell-shaped bend as appeared in Figure 3.3.





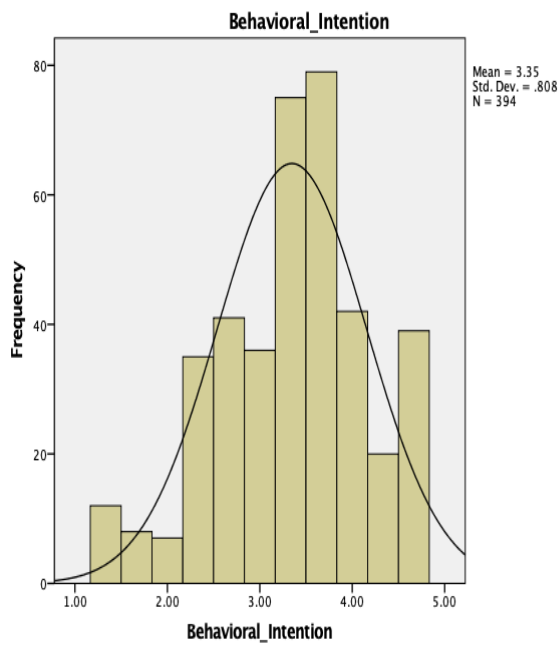
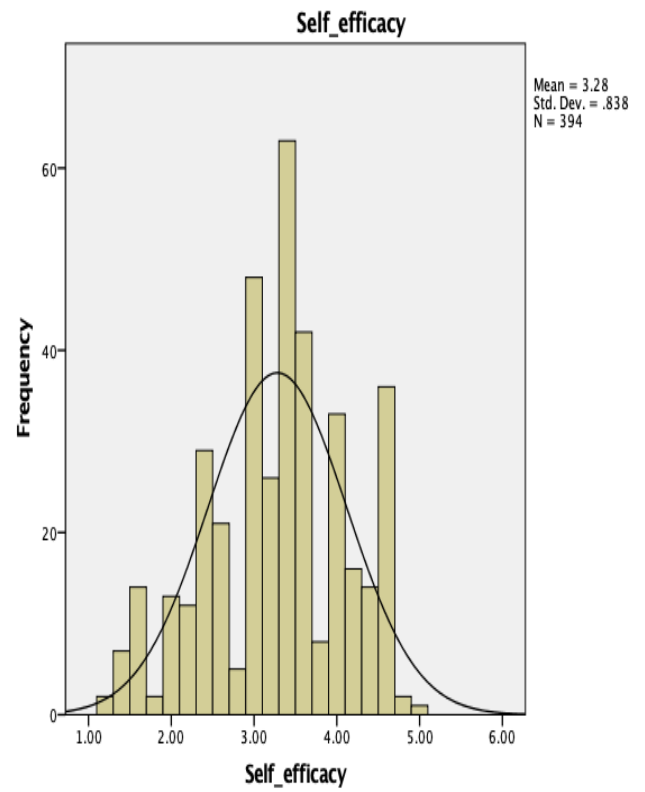
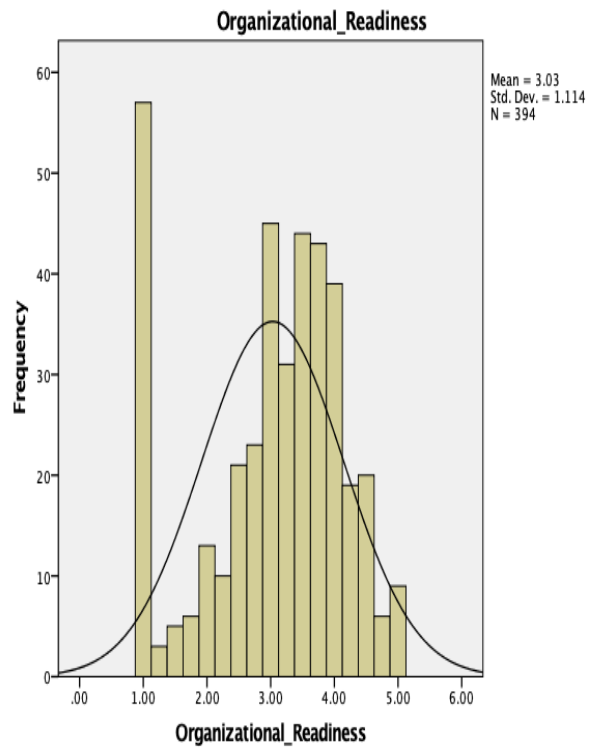


Figure 3. 3: Histograms of Normality

In expansion, Table 3.3 appears that the skewness and kurtosis of the factors. It appears that the esteem of Skewness and Kurtosis are less than one showing that the information are regularly dispersed.

Table 3. 3: Normality Analysis

Variables	Normality Analysis	
	Skewness<2	Kurtosis<2
PE	-.679	.108
EE	-.674	-.067
SI	-.538	-.067
Satisfaction	-.312	-.531
Playfulness	-.008	-.474
Enjoyment	-.322	-.572
TMS	-.741	.182
Cost	-.749	-.152
OR	-.544	-.618
SE	-.291	-.440
BI	-.391	-.138
Use behavior	-.289	-.818

3.8.1.4 Multicollinearity

Multicollinearity is one of the issues that must be avoided in the data analysis, and it is usually occurs when two or more independent variables are highly correlated. For example, the measurement of one variable similar to the measurement of another variable. This creates a high correlation and lead to multicollinearity among the variables. To check and verified that the variables have no collinearity, an examination that is conducted utilizing SPSS to guarantee that there are no collinearity issues between factors. Statisticians such as Hair et al. [161] pointed out that a multicollinearity issue will exist if two of the indicators are achieved. The

first is the variance inflation factor (VIF) is more noteworthy than 5 or the tolerance is less than 0.20. Table 3.4 appears the VIF and tolerance of the factors. It appears that the values are inside the recommended extend showing that the factors of this research are free from collinearity issue. In other words, none of the variables have VIF above 5 and none of the variable have tolerance below 0.20 and this clearly presents a fact that there is no high correlation among the variables and the multicollinearity among the variables of this research are not an issues to be concerned.

Table 3. 4: Multicollinearity

Variables	Multicollinearity Analysis	
	Tolerance>0.20	VIF<5
PE	.507	1.973
EE	.515	1.941
SI	.509	1.965
Satisfaction	.646	1.547
Playfulness	.750	1.333
Enjoyment	.728	1.374
TMS	.650	1.538
Cost	.876	1.141
OR	.813	1.230
SE	.911	1.098
BI	.754	1.326
UB	Dependent variable	

Dependent Variable: Use Behaviour

3.8.2 Smart PLS Analysis

Subgroup approach is the common approach to test moderating effects in covariance-based structural equation modeling (CB-SEM) [163]. This approach is preferable when the moderator is measured using categorical measurement (such as gender, age, education). Nevertheless, this approach may create difficulties when testing the moderation effect of continuous variables (such as when using five point Likert scale to measure the moderator) [163], [164]. However, PLS is designed to measure and test the continuous moderators variables and this can be conducted by using the function of product-indicator approach [165], [166]. [167] argued that PLS can be used when researchers are using well establish model and incorporate new variables to create new structural paths. This study deployed the PLS path modeling. This is because the study seeks to test the moderation effect of a continuous moderator variable and the study also is based on a well-established baseline model but incorporated new variables such as gamification. Thus, the use of PLS is a justifiable move.

Several researchers indicated the complexity of recent research models and pointed out that the constructs could be unidimensional (first order) or multidimensional (second order). In other words, there is a first order and second order construct. “A second-order latent variable is a latent variable whose indicators are themselves latent variables” [163], [168]. Three constructs in this study are multidimensional and second order constructs. The first construct is IC, and the second construct is OC and the third is gamification. Other variables are first order variables.

Second order construct could be a reflective or formative construct [169], [170]. In this study, all the second order and first order are reflective. This is because the items and the variables (second order) are interchangeable. Deleting one of the dimension or items will not cause any changes in the construct or the dimension. Thus, this study is using a reflective indicator approach.

3.8.2.1 Assessment of the Measurement Model

Using Smart PLS, the assessment should include two stage. The first stage is the assessment of the measurement model, and the second stage is the assessment of the structural model. In the first stage, the assessment of the measurement model includes five sub-assessments. First the research must assess and examine the factor loading of the items and the first order variables. The second assessment is to examine the reliability of the measurement as well as

the composite reliability in the third sub-assessment. Fourth sub-assessment includes the examination of the convergent validity. Lastly, in the measurement model, the discriminant validity must be assessed [165], [168]. For factor loading as well as for the composite reliability and Cronbach's Alpha, the loading and the reliability indicator respectively must be greater than 0.70 [172]. The factor loading should be greater than 0.70 to ensure the reliability of the indicator on its latent variables. Indicators that have factor loading less than 0.70 should be removed due to the fact that these indicators only add little of explanatory power to the measurement model of the study [172].

Other sub-assessment criteria using the measurement model are the convergent validity and the discriminant validity [166]. As such, the Average Variance Extracted (AVE) is used to assess convergent validity [173]. Discriminant validity is achieved when the loading of the variables is higher than the cross loading [163] [174]. Details of the analyses are given in Chapter 4.

3.8.2.2 Assessment of the Structural Model

One of the most important criteria is the assessment of the path coefficient of the structural model. The path coefficient indicates whether or not the specified hypothesis is significant and to what degree it can increase and cause the dependent variable. The assessment should include the path coefficient magnitude and the level of significance as well as the sign of the coefficient (Henseler et al., 2009). This is because when the proposed hypothesis is positive and significant while the result indicates that the hypothesis is positive but not significant, this will indicate that the hypothesis is partially supported due to the agreement of the sign in front of the coefficient. However, if the hypothesis match completely the assumption, then full support of the hypothesis is assumed [172]. Using the Smart PLS, there are some specifications that must be considered. These includes the number of bootstrap sampling should be at least 5000 and the number of cases should be similar to the number of the respondents in the study [172]. In addition, [172]indicated that the critical T-values for the path should be assessed based on the following values. If the t-value is 1.65 then the significance level should be 0.10, the t-value is 1.96, then the significance level should be 0.05. Lastly, if the t-value is 2.58, then the level of significance is 0.01. In other words, the hypothesis is considered significance if the t-value for example 1.96 or greater and the level of significance is 0.05 or less.

In this study, the bootstrapping was set at 5000 and number of observations was equal to the sample size (i.e., 394). The critical t-value of 1.96 as well as the p-value of 0.05 was used to determine the significance of the hypotheses. This is because Hair et al. (2017) suggested

accepting the critical t-value of 1.65 only when the sample size is small (100-150). In this study, the sample size is 394, which considered large sample size and thus the value of 1.96 and p-value of less than 0.05 are used as criteria to assess the significance of the hypotheses [176]. Latest Smart PLS 3.3.1 provides the f^2 as output of the PLS, which eliminates the need for calculating it manually.

Overall, to assess the measurement model and structural model, there are some important criteria must be considered. Table 3.5 summarizes the criteria of the assessment.

Table 3. 5: Criteria for Assessing the Measurement Model and Structural Model

Measurement Model	Structural model
Factor loading should be greater than 0.70	R-square 0.19 (weak), 0.33 (moderate), 0.60 (strong).
Cronbach's Alpha and Composite reliability should be greater than 0.70.	Coefficient (Hypotheses testing)
Convergent validity (average variance extracted >50)	Q-square (predictive relevance) should greater than 0
Discriminant validity (cross loading is lower than the loading of the variable)	F-square (effect size) value is 0.02 (weak), 0.15 (moderate), 0.35 (strong)

3.8.2.3 Mediation Testing

Researchers (Hair et al., 2017; Lowry & Gaskin, 2014) indicated that when using PLS, the mediator testing should first test the direct effect between the independent variable (IV) and the dependent variable (DV) without the mediator. Next, once the mediator included and reduced the effect of IV on the DV, then it can be concluded that the variable is mediating the effect of IV on DV. However, full mediator is assumed when the effect of IV on DV is no longer significant after including the mediator, and a partial mediation is assumed when the effect of IV on DV stays significant (Hair et al., 2017; Lowry & Gaskin, 2014). In this study, the mediating effect of satisfaction between OC and ICs, and BI to adopt gamified learning system was tested.

First, the direct effect of technological and ICs are tested. If the effect is significant, then the mediating effect of satisfaction will be tested and checked for changes in the direct effect as well as examining the indirect effect and conduct a comparison to identify the mediation whether it is full or partial mediation.

3.8.2.4 Moderator Testing

Product indicators approach was used to test the moderating effects in this study. When using this approach, the indicators of the independent variables (IV) denoted as “i” is multiplied by the indicators of the moderator denoted as “j”. The result is one indicator called the moderating effect or the interaction effect and denoted as “i*j”. In other words, it is the result of multiplying the indicators of the IV with the indicators of the moderator to create the interaction effect or the moderating effect [172]. To examine the moderating effect using the Smart PLS, the bootstrapping procedure is deployed. Number of bootstrapping is set to be 5000 and the significance level is 0.05 with t-value greater than 1.96. The direction of the moderating effect is dependent on the sign in front of the coefficient. Negative sign indicates that the moderating is negative and positive sign indicates positive moderating effect.

3.9 SUMMARY

This chapter has presented the methodology of this study. This study is a quantitative and an explanatory in nature. The population of this study is the smart classes in Iraq represented by their teachers, instructors, administrative and managerial level employees. The study uses a survey design. An online questionnaire is the instrument of this study. The instrument was validated, and a reliability analysis was conducted prior to data collection. A total of 412 responses were collected. Missing value were either removed or replaced with the mean score value and outliers were removed resulting in 394 complete and usable responses. A discussion of data analysis using SPSS and Smart PLS was given. Details of the SPSS analyses such as missing value, outliers, normality, and multicollinearity were discussed. The Smart PLS analyses, which include the assessment of the measurement model, structural model, mediation and moderation testing were discussed in this chapter.

4. DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This findings of this research are presented in this chapter. First section presents the introduction and provides overview about the topics that are discussed in this chapter. The second section shows the background information of the respondents. In the third section, the result of hypotheses are shown. Fourth section discusses the direct effect hypotheses followed by the mediating effect hypotheses of satisfaction in the fifth section. In the sixth and seventh sections, the moderating effect of gamification and cost respectively are discussed. The eighth section presents the effect of BI on UB. The ninth section presents the moderating effect of SE. A summary of hypotheses testing of all the effects in this study is given in the tenth section and the last section summarizes the findings of this study.

4.2 BACKGROUND INFORMATION OF RESPONDENTS

The foundation data of the respondents is displayed to illuminate the peruse (s) around those who have taken an interest in this study. It incorporates clear data approximately age, gender, major, utilize of gamified framework, and encounter. Table 4.1 presents the statistical data of the respondents. The age of the respondents extended between 25 and 54 with mean score of 38.23. The respondents are males (214 or 54.3%) instructing subjects such as math's, language, science and literature . A add up to of 17.8% or 70 of the respondents expressed “others” for their major demonstrating that they are administrative staff of the schools. They all have utilized or gotten to the GS and they have involvement of more than 11 years with mean score between 8 to 10 years.

Table 4. 1: Background of Respondents

Variable	Label	Frequency	Percent	Mean	Std.
Age	25-30	82	20.8	38.23	7.348
	31-35	80	20.2		

	36-40	57	14.6		
	41-45	112	28.5		
	46-50	42	10.8		
	51 and above	21	5.4		
Gender	Male	214	54.3	1.46	.499
	Female	180	45.7		
Major	Language	96	24.4	2.78	1.404
	Math	82	20.8		
	Literature	98	24.9		
	Science	48	12.2		
	Others	70	17.8		
Use of GS	Yes	394	100.0	1.00	.000
Experience	0-2 years	54	13.7	3.65	1.445
	2-4 years	46	11.7		
	5-7 years	42	10.7		
	8-10 years	94	23.9		
	11 years or more	158	40.1		

Note: N=394

4.3 SMART PLS ANALYSES

This section presents the assessment of the measurement model and the structural model. Lowry and Gaskin (2014) proposed the evaluation of estimation demonstrate and auxiliary demonstrate when utilizing Halfway Slightest Square (PLS). In this consider, both models (estimation and basic) are surveyed. Subtle elements of the evaluation were given in Chapter 3 and highlighted within the taking after segments.

4.3.1 Measurement Model

To look at and assess the measurement model (MM), Hair et al. (2017) recommended analyzing the factor loading (FL), reliabilities and validities. All things considered, in this research there are moment arrange and to begin with arrange and for this reason, there are estimation show for the moment arrange and estimation show for the primary arrange. In this way, the calculate stacking for to begin with arrange which incorporates the things is inspected as well as the figure stacking of the moment arrange which include the stacking of the primary arrange on the moment arrange is additionally inspected. Additionally, the validities and the reliabilities for both models are inspected. Models of this consider are intelligent since the expel of one things does not alter the variable. In other words, the things are conversely.

To check for FL, a few things were having moo FL. Thing SI1 from social impact (SI), thing CO1 from taken a toll (CO), and thing SE1 from SE were evacuated due to moo FL. Other things stacked well on their ICs. Table 4.2 appears the FL of the primary arrange show. The CA scored higher than 0.70 and the composite reliability (CR) is additionally larger than 0.70 supporting the reliabilities of the primary arrange estimation show. For the merged validities, the normal change extricated (AVE) is more prominent than 0.50 showing that the estimations have merged legitimacy.

4.3.1.1 Convergent Validity

The convergent validity is accomplished once the four criteria are accomplished. The primary measure is the figure stacking must be more noteworthy than 0.70 taken after by the Cronbach's Alpha (CA) and the Composite Unwavering quality (CR) must be more noteworthy than 0.70 as well. The final basis is the AVE must be more noteworthy than 0.50. Table 4.2 appears that the figure stacking of all things is more prominent than 0.70 and none of the things were erased. In expansion, the Cronbach's Alpha of all builds is more prominent than 0.70, which shows that the estimations are solid. Encourage, the composite unwavering quality of all develops is more noteworthy than 0.70. More imperatively, the AVE is more noteworthy than 0.50 and this demonstrates that the focalized legitimacy has been accomplished for all builds. Table 4.2 appears the figure stacking, CA, CR, and AVE.

Table 4. 2: Result of Evaluation the Measurement Model of First Order

Second order	First order	Items	FL >.70	CA>.70	CR>.70	AVE>.50
IC	PE	PE1	0.906	0.923	0.945	0.812
		PE2	0.894			
		PE3	0.889			
		PE4	0.915			
	EE	EE1	0.921	0.937	0.955	0.842
		EE2	0.903			
		EE3	0.918			
		EE4	0.929			
	SI	SI2	0.855	0.841	0.904	0.759
		SI3	0.858			
		SI4	0.900			
OC	TMS	TMS1	0.901	0.800	0.884	0.718
		TMS2	0.896			
		TMS3	0.736			
	OR	OR1	0.912	0.888	0.924	0.755
		OR2	0.926			
		OR3	0.721			
		OR4	0.899			
Gamification	Enjoyment	EN1	0.895	0.934	0.950	0.792
		EN2	0.879			
		EN3	0.889			
		EN4	0.884			
		EN5	0.903			

Second order	First order	Items	FL >.70	CA>.70	CR>.70	AVE>.50
	Playfulness	PL1	0.842	0.883	0.920	0.741
		PL2	0.873			
		PL3	0.854			
		PL4	0.874			
SA		SA1	0.907	0.890	0.932	0.820
		SA2	0.896			
		SA3	0.913			
Cost		CO2	0.749	0.851	0.900	0.692
		CO3	0.858			
		CO4	0.852			
		CO5	0.862			
SE		SE2	0.944	0.918	0.936	0.785
		SE3	0.880			
		SE4	0.840			
		SE5	0.877			
BI		BI1	0.894	0.886	0.929	0.814
		BI2	0.893			
		BI3	0.920			
UB		UB1	0.882	0.911	0.938	0.790
		UB2	0.872			
		UB3	0.895			
		UB4	0.906			

From the Table 4.2, it can be seen that all the four criteria for assessing the measurement model were achieved.

4.3.1.2 Discriminant Validity

The discriminant validity is accomplished in the event that the marker stacking is more noteworthy than its cross stacking. In another word, the corner-to-corner number (bold and highlighted in Table 4.3) ought to be more prominent than its push and column. In expansion, Hair et al. (2017) proposed that the square root of AVE ought to be bigger than the cross stacking to conclude that the estimation has discriminant legitimacy. Table 4.3 appears the square root of AVE in strong and underlined. It appears the esteem are more prominent than the cross stacking supporting the idea that the estimation accomplished the discriminant validity.

Table 4. 3: Discriminant Validity of First Order

	BI	CO	EE	EN	OR	PE	PL	SE	SI	SA	TMS	UB
BI	0.902											
CO	-0.110	0.832										
EE	0.482	-0.019	0.918									
EN	0.256	0.094	0.201	0.890								
OR	0.370	-0.038	0.264	0.073	0.869							
PE	0.497	-0.029	0.621	0.069	0.275	0.901						
PL	0.253	0.073	0.127	0.487	0.151	0.085	0.861					
SE	0.041	0.213	-0.009	0.065	-0.049	0.046	0.065	0.886				
SI	0.481	0.036	0.575	0.272	0.302	0.578	0.222	0.048	0.871			
SA	0.514	-0.046	0.423	0.236	0.223	0.440	0.341	-0.054	0.450	0.905		
TMS	0.398	0.109	0.407	0.152	0.331	0.371	0.184	-0.003	0.388	0.457	0.848	
UB	0.448	0.175	0.356	0.172	0.201	0.290	0.209	-0.041	0.365	0.428	0.485	0.889

Note: BI: behavioral intention, CO: Cost, EB: Effort expectancy, EN: enjoyment, OR: organizational readiness, PE: Performance expectancy, PL: Playfulness, SE: Self-efficacy, SI- social influence, SA: satisfaction, TMS: top management support, UB: behavior.

4.3.2 Assessment of Measurement Model for Second Order

Table 4.4 appears the comes about of assessing the moment arrange estimation demonstrates. It appears the FL of the primary arrange on the moment arrange is bigger than 0.70 supporting that the person setting incorporates three components that are PE, EE, and SI. In expansion, it affirms that the OC setting comprises two components that are TMS and OR. It moreover appears the energy and delight are the components of gamification. Advance, Table 4.4 appears that the reliabilities and the validities of the moment arrange estimation demonstrate are accomplished.

Table 4. 4: Results of Evaluating the MM of Second Order

Second order	First order	FL	CA	CR	AVE			
Gamification	Playfulness	0.810	0.907	0.924	0.578	0.760		
	Enjoyment	0.906						
IC Context	PE	0.875	0.931	0.941	0.594	0.210	0.771	
	EE	0.879						
	SI	0.796						
OC Context	TMS	0.750	0.830	0.874	0.504	0.191	0.468	0.707
	OR	0.892						

Based on the above discussion and filtration of the factor and items, Figure 4.1 shows the finalized measurement model of this study. It shows that the FL for all the variables are greater than 0.70.

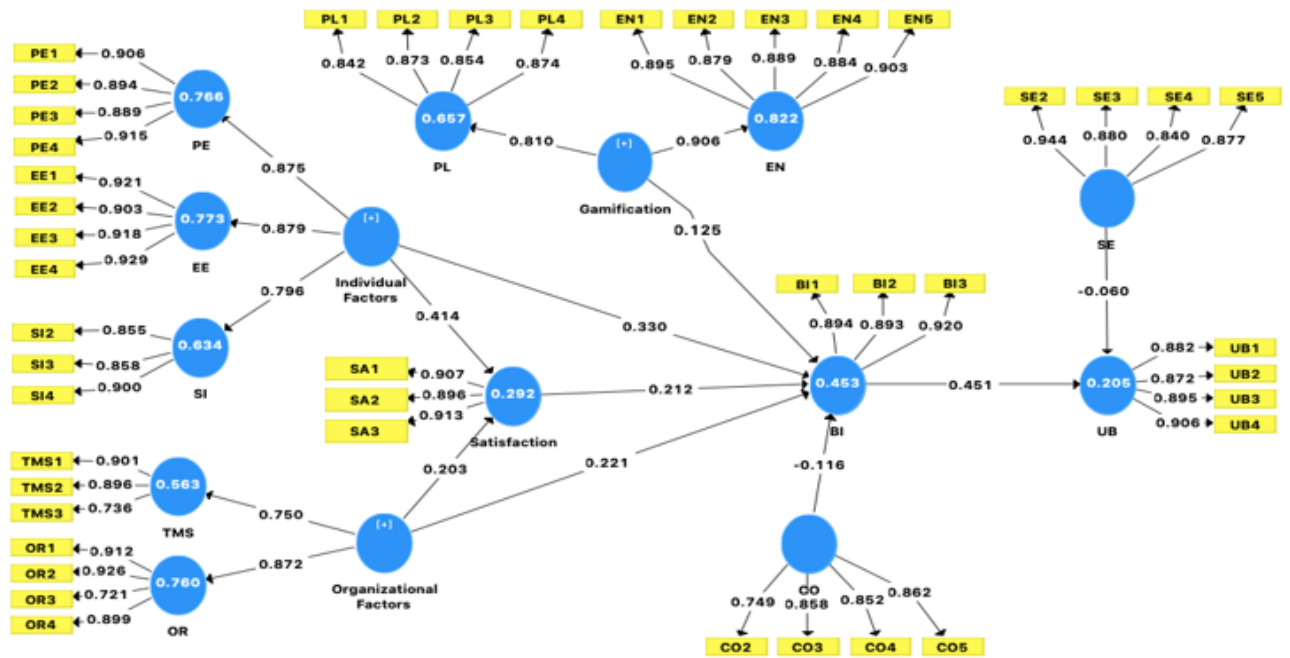


Figure 4. 1: Measurement Model

4.3.3 Structural Model

Hair et al. (2011) pointed out that there are four criteria to assess the basic show. These are the R-square (R²), the prescient significance (Q²), way coefficient (β) (theories testing will be examined in partitioned areas), and effect measure (F²). Within the following area, the four criteria are talked about.

4.3.3.1 R-Square

Hair et al. (2011) pointed out that R² values of 0.75, 0.50, or 0.25 for endogenous inactive factors within the basic show might be depicted as significant, direct, and frail separately. In this consider, there is coordinate impact show, interceding impact demonstrate, and directing impact demonstrate. Table 4.5 appears the R² of each show. It appears that the direct effect demonstrated has R² of 0.432 (41.9%), which is considered direct whereas within the intervening impact of satisfaction, the R² expanded to 0.49 and the directing show expanded to 0.499. The table appears moreover that the R² for utilizing behavior is 0.537 indicating that the factors of this consider are able to clarify 53.7% of the variety within the utilize behavior of gamified learning system. This rate is considered direct. Table 4.5 presents the R² of the models of this research.

Table 4. 5: R² of the Models

Model	BI	UB
Direct effect model	43.2	53.7
Mediating Effect model	49.4	
Moderating Effect model	49.9	

4.3.3.2 Predictive Relevance

Hair et al. (2011) proposed analysts to get the cross-validated repetition by utilizing the blindfolding in Shrewd PLS. The coming about prescient significance or Q² of the develop ought to be more prominent than zero (0). On the off chance that this condition accomplished, this shows that the exogenous builds (autonomous variable) have prescient significance for the endogenous develop (subordinate variable). A blindfolding examination was utilized to get the Q². Table 4.6 appears the develop cross-validated repetition. It appears that the esteem of Q²

is more noteworthy than zero. Q2 for conduct purposeful and utilize conduct is 0.235 and 0.363 individually. These values are more prominent than and presents a worthy cross-validated repetition.

Table 4. 6: Cross-Validated Redundancy

Endogenous (dependent variable)	Q2> 0
BI	0.307
UB	0.416

In the following sections, a discussion of the path coefficient (hypotheses testing) using the output of the structural model is given. The effect size is presented in the result of hypotheses.

4.4 DIRECT EFFECT

The study developed four main direct effect hypotheses and nine sub hypotheses. The first main hypothesis is related to the effect of IC and its dimension on the BI. The second main hypothesis is related to the effect of OC on the BI. Figure 4.2 shows the structural model of the main direct hypotheses. Repeated indicator approach was used based on the suggestion of Hair et al. (2017). Using this approach, the items of PE, EE, and SI were collectively inserted in the construct IC. Similar procedures were conducted on OC. In Figure 4.2, the coefficient and p-value in brackets are presented.

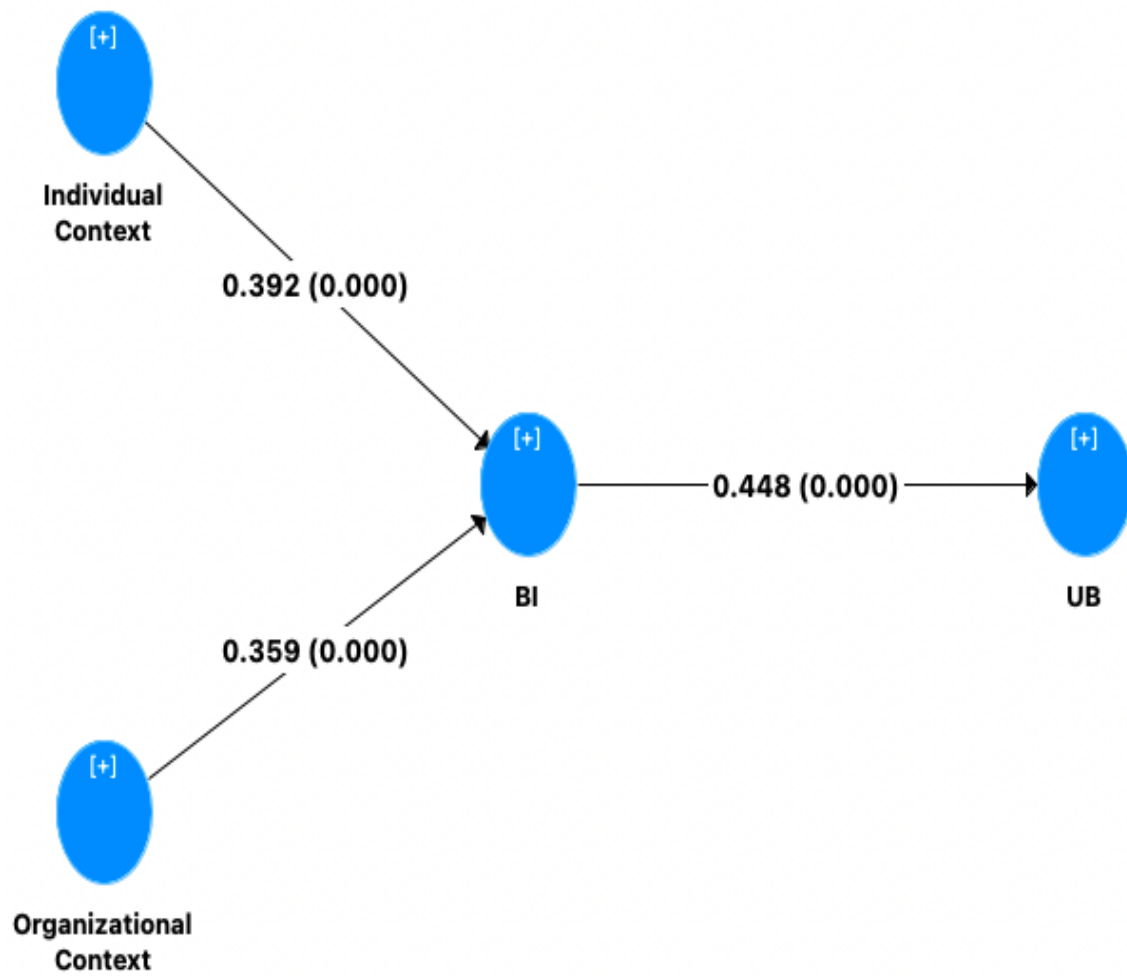


Figure 4. 2: Result of Direct Effect Constructs

For testing the sub-hypotheses, the constructs were removed, and indicators of the variables were presented to test their effects on the BI. Figure 4.3 shows the structural model of the sub-hypotheses. It shows the direct effect of PE, EE, SI, TMS, and OR, on BI.

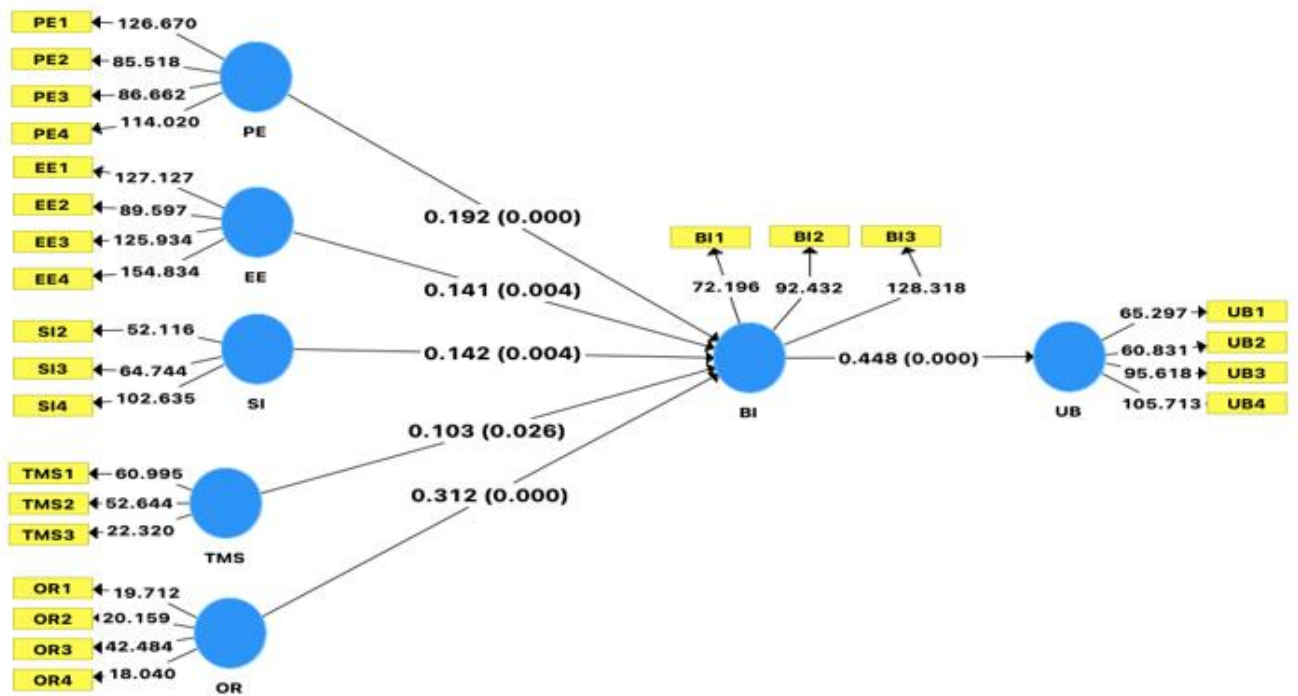


Figure 4. 3: Result of Direct Effect Variables

Table 4.7 shows the results of testing the hypotheses by combining the two figures of the direct effect.

Table 4. 7: Result of Testing the Direct Effect

H	Path	B	Std	T	P	f2	Significant
H1	Individual Context -> BI	0.39	0.05	8.41	0.00	0.20	Yes
H1a	PE -> BI	0.19	0.05	3.77	0.00	0.03	Yes
H1b	EE -> BI	0.14	0.05	2.95	0.00	0.02	Yes
H1c	SI -> BI	0.14	0.05	2.92	0.00	0.02	Yes
H2	Organizational Context -> BI	0.36	0.04	9.20	0.00	0.17	Yes
H2a	TMS -> BI	0.10	0.04	2.29	0.02	0.01	Yes
H2b	OR -> BI	0.31	0.04	7.46	0.00	0.14	Yes

Further discussion of the result of the hypotheses testing is given in the following sections.

4.4.1 Effect of ICs on BI

As shown in Table 4.7, the effect of IC on BI is significant indicated that there is a significant effect and the hypothesis supported. Similar conclusion derived regarding the effect of the components of ICs on BI.

4.4.2 Effect of OC on BI

OC also have significant effect on the BI as shown in Table 4.7. the component as well shown supported relationship with BI.

4.4.3 Mediating Role of Satisfaction

In this section, the mediating effect hypotheses of satisfaction is discussed. The second type of hypotheses is the mediating effect. Figure 4.4 shows the mediating effect of satisfaction between IC and OC, and the BI.

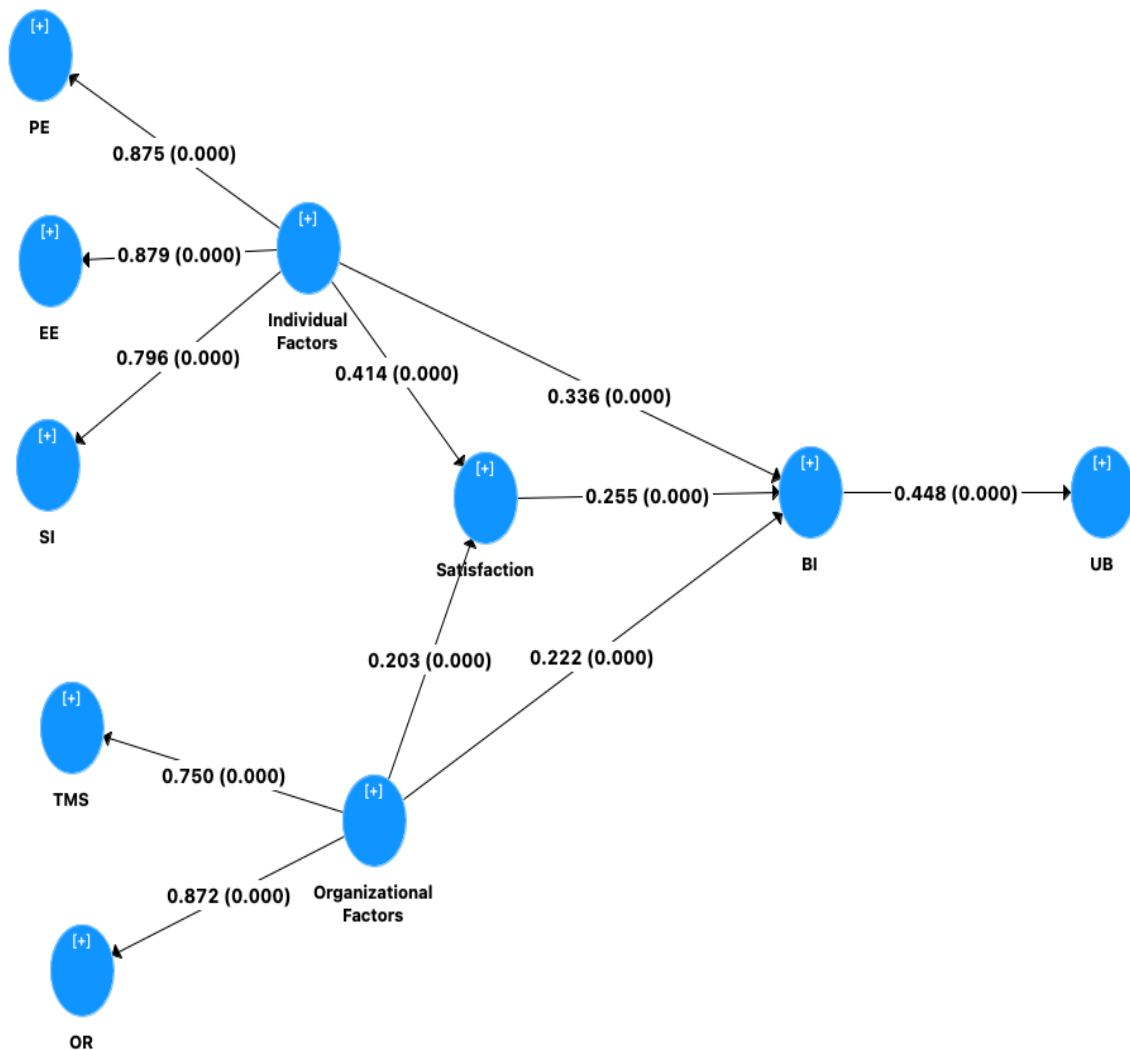


Figure 4. 4: Mediating Effect of Satisfaction

H3 and H4 suggested that satisfaction is a mediator. Results in Table 4.8 confirmed that satisfaction is a mediating variables between the two variables of IC and OC with BI.

Table 4.8: Shows a summary of mediation test.

H	Path	Direct effect		Indirect effect	Mediator?	Type
		Without mediator	With mediator			
H3	Individual Context -> Satisfaction -> BI	0.39***	0.34***	0.11***	Yes	Partial
H4	Organizational Context -> Satisfaction -> BI	0.36***	0.22***	0.05***	Yes	Partial

Note: *significant at 0.1, **significant at 0.05, ***significant at 0.001.

Thus, it is concluded as shown in Table 4.8 that both H3 and H4 are supported partially. This is because after inserting the mediator SA in the equation, the direct and indirect impact of the IC and OC on BI are still significant supporting the notion that SA is a partial mediator in the relationship between IC-SA-BI and in the relationship OC-SA-BI.

4.4.4 Moderating Effect of Gamification

The third type of hypothesis is the moderating effect. Figure 4.5 shows the moderating effect of gamification between the link IC-BI and OC-BI.

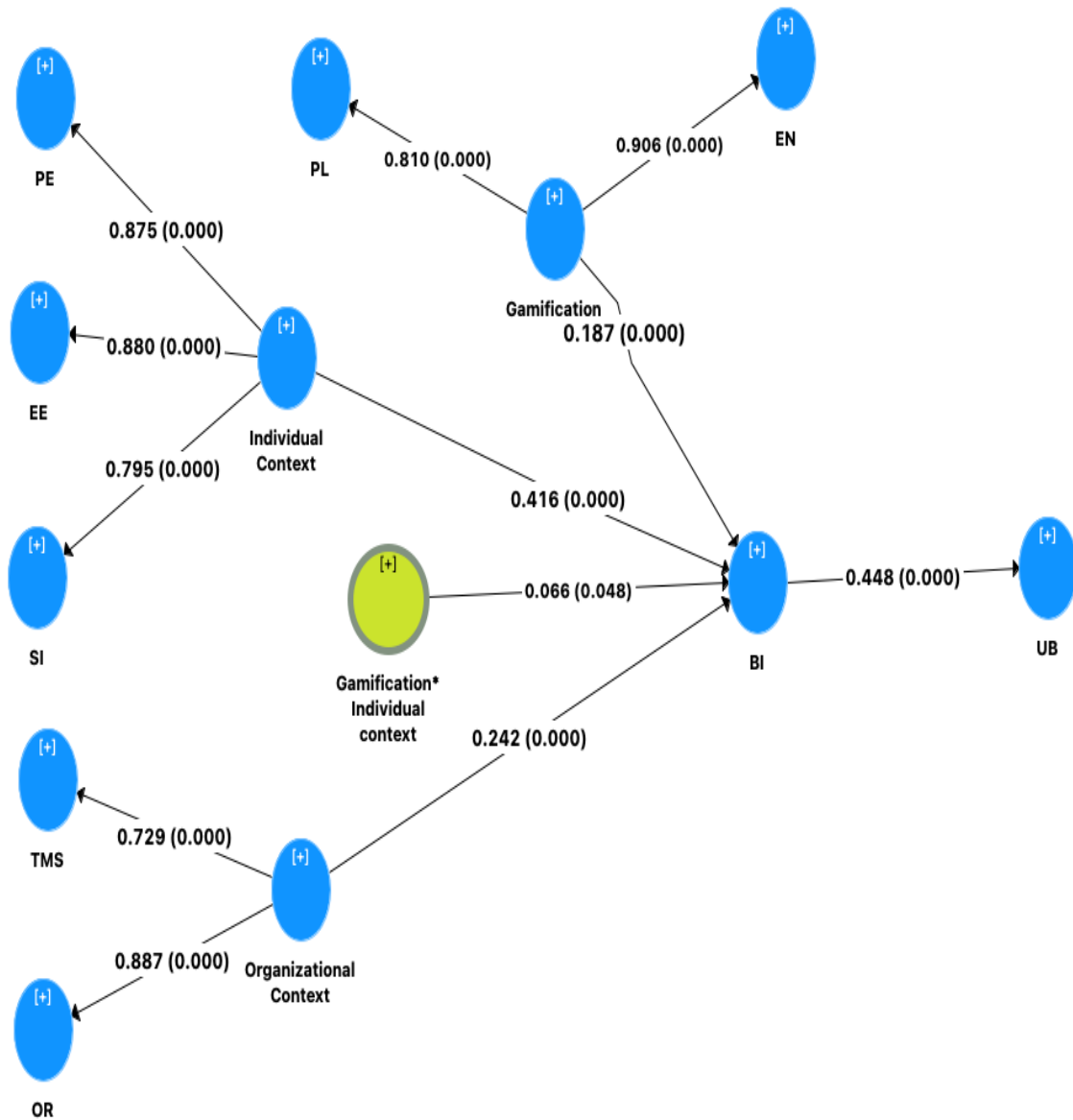


Figure 4. 5: Moderating Effect of IT Knowledge

In term of the moderating effect of gamification between IC and BI. The findings showed that gamification has moderated positively the effect of IC on BI indicating that the increase in the level of gamification lead to an improvement in the effect of IC on BI. Thus, H5 is supported.

Therefore, adding more feature to the GLS will enhance the perception of individual toward the BI.

4.4.5 Moderating Effect of Cost

For H6, the cost was proposed as a moderating variable between OC and BI. Findings as shown in Figure 4.4 shows the result of testing H6.

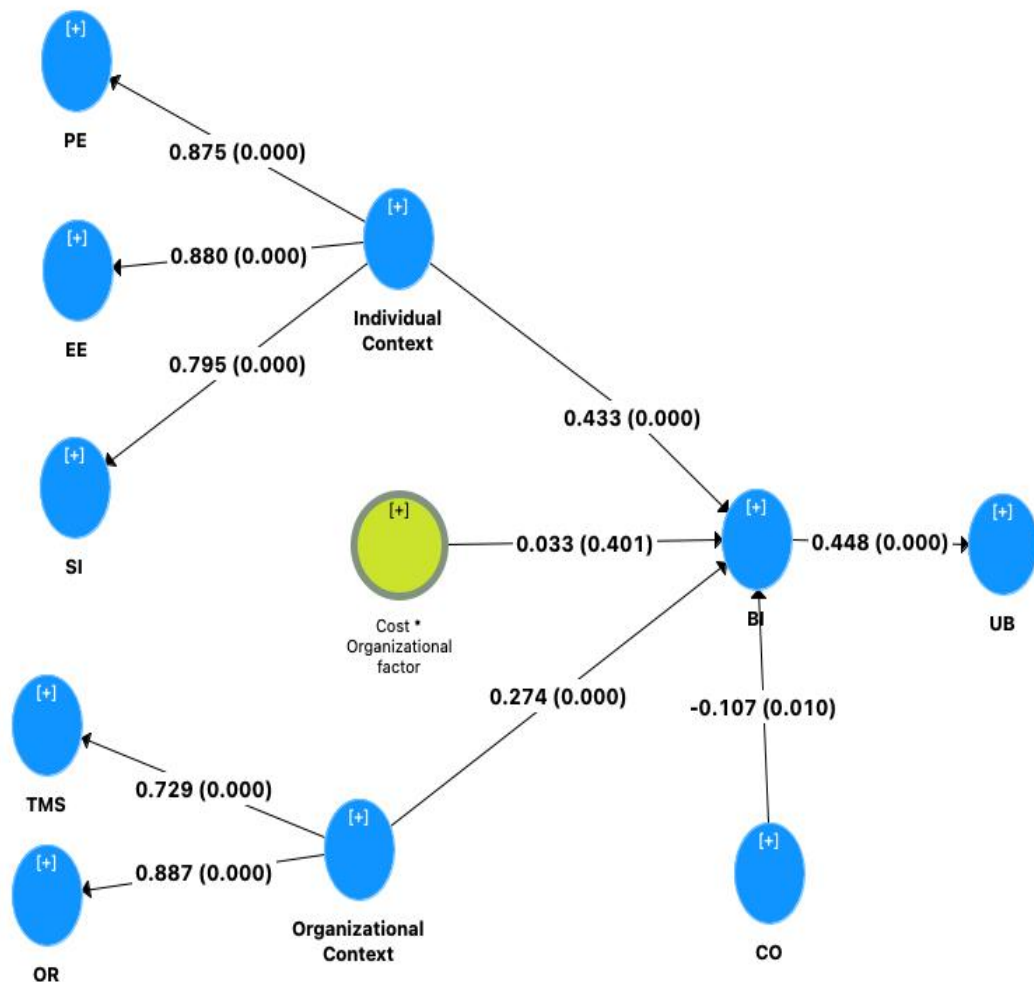


Figure 4. 6: Moderating Effect of Cost

Against the expectation, cost did not moderate the effect of OC on BI. Therefore, H6 is not supported. Interestingly, as shown in Figure 4.6, it can be noted that the direct impact of cost on the BI is -.107 and it has a significance level less than 0.05 which support the fact that cost has a negative effect on the BI toward using the GLS.

4.4.6 Effect of BI on UB

The seventh hypothesis is related to the effect of BI on UB. Table 4.9 shows the result of hypothesis testing of the direct effect of BI on UB of GAMIFIED LEARNING SYSTEM.

Table 4. 8: Result of Direct Effect of BI on UB

H	Path	Coefficient (β)	STDEV	T-value	P Values
H7	BI -> UB	0.45	0.04	11.14	0.00

The seventh hypothesis assumed that the effect of BI on UB is positive and significant. The findings showed that BI affected significantly the UB of gamified learning system ($B=0.45$, $T=11.14$, $P<0.001$). Hence, H7 is supported. This finding indicates that when the level of BI increases, the UB of teachers and managerial staff toward gamified learning system will increase.

4.4.7 Moderating effect of Self-efficacy

For H8, the assumption is the SE can moderate the effect of BI on UB. The findings showed that this assumption is true. SE did moderate the effect of BI on UB as shown in Figure 4.7.

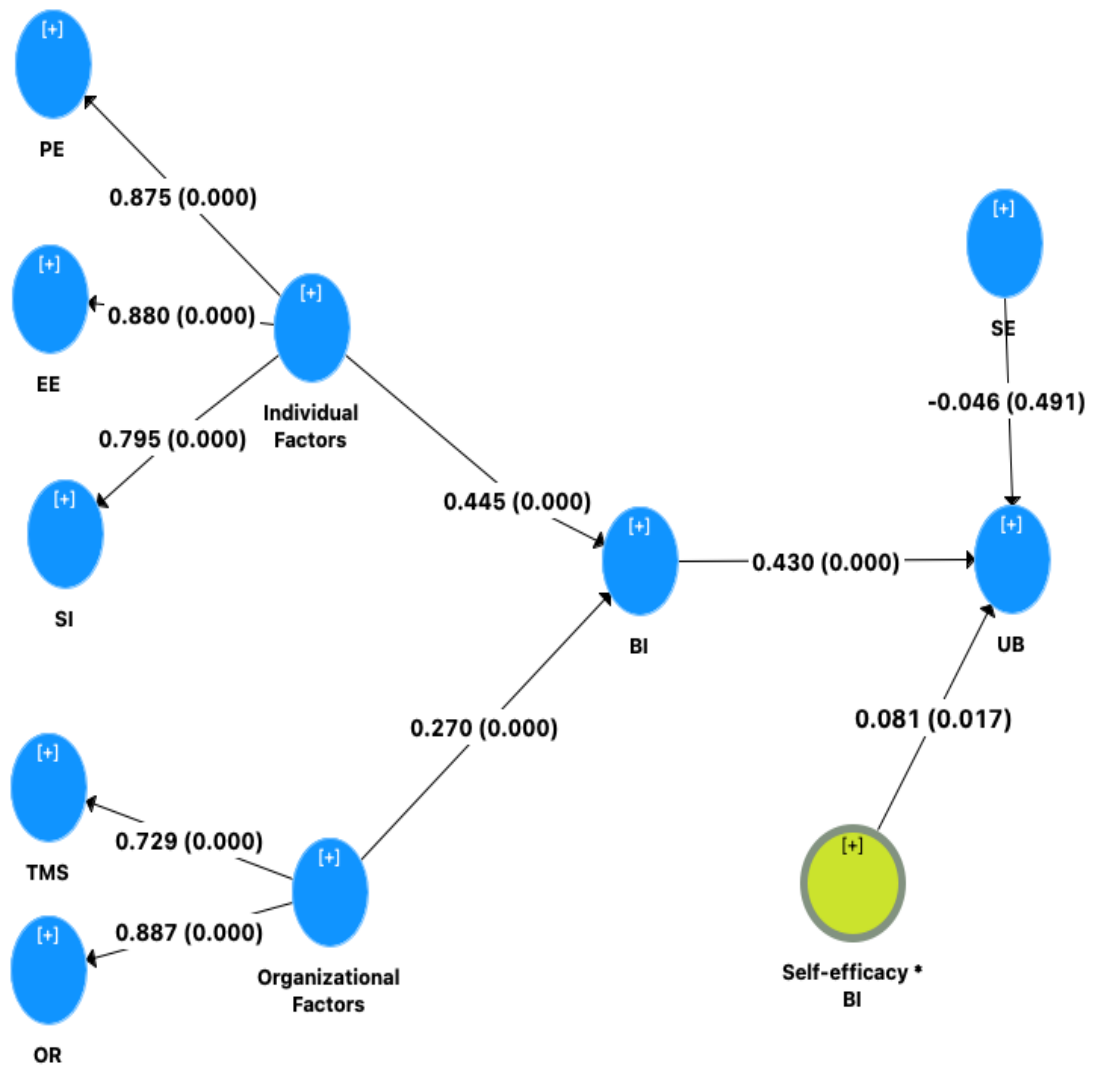


Figure 4. 7: Self-efficacy as a Moderator

4.4.8 Summary of Hypotheses Testing

This study developed direct effect hypotheses, mediating hypotheses and moderating hypotheses. In addition, the summary includes the f-square of the paths. Table 4.10 summarizes the hypotheses of this study.

Table 4. 9: Summary of the Result of Hypotheses Testing

H	Path	B	Std	T	P	f2	Significant
H1	Individual Context -> BI	0.39	0.05	8.41	0.00	0.20	Yes
H1a	PE -> BI	0.19	0.05	3.77	0.00	0.03	Yes
H1b	EE -> BI	0.14	0.05	2.95	0.00	0.02	Yes
H1c	SI -> BI	0.14	0.05	2.92	0.00	0.02	Yes
H2	Organizational Context -> BI	0.36	0.04	9.20	0.00	0.17	Yes
H2a	TMS -> BI	0.10	0.04	2.29	0.02	0.01	Yes
H2b	OR -> BI	0.31	0.04	7.46	0.00	0.14	Yes
H3	Individual Context -> Satisfaction -> BI	0.11	0.02	4.83	0.00	-	Yes
H4	Organizational Context -> Satisfaction -> BI	0.05	0.02	3.18	0.00	-	Yes
H5	Gamification* Individual context -> BI	0.07	0.03	1.97	0.05	0.01	Yes
H6	Cost * Organizational factor -> BI	0.03	0.04	0.85	0.40	0.00	No
H7	BI -> UB	0.45	0.04	11.14	0.00	0.25	Yes
H8	Self-efficacy*BI	0.08	0.03	2.61	0.01	0.01	Yes

Overall, all the proposed hypotheses were supported except for the moderating effect of cost (H6).

4.5 SUMMARY

Findings of this study were presented in this chapter. The findings includes descriptive information, data examination, and result of conducting the analysis using Smart PLS. Before conducting the analyses of this study, the data was first checked for several assumption to meet the requirement of using regression analysis in Smart PLS. The first step was to check for the missing value. This has been done by using the frequency analysis. The outliers was checked using the boxplot of the variables. The normality was checked by examining two indicators such as the skewness and kurtosis. The histogram of the variables were checked to examine the normality. The multicollinearity were checked by testing two indicators that are the VIF and the tolerance. By doing so, the study have fulfilled the requirement of using the smart PLS.

The FL of the items were all checked, and the validities and reliabilities of the variables were checked and confirmed. The result of testing the hypotheses was confirmed and the findings showed that IC and OC impacted BI. SA mediated partially the effect of IC and OC on the BI. In addition, the gamification was examined as a moderator and it is found that when the gamification is high, the impact of IC on BI increases. In addition, the cost is examined as a moderator, but the findings showed that cost did not work as a moderator as was proposed. Additional findings showed that the impact of cost is by itself is important and negatively was associated with BI. The self-efficacy was proposed and tested as moderating variable between BI and UB. Findings showed that this association and proposition is true. SE has a moderating effect between the two variables.

.

5. DISCUSSIONS AND CONCLUSIONS

5.1 INTRODUCTION

This chapter presents the discussions as well as the implications and conclusions of this study. The chapter consists of five sections. First section provides an overview of the chapter followed by second section, which provides a discussion of the findings of this study and compares the findings with findings of previous studies. Third section presents the implications of this study. The section provides the theoretical and practical implications. Fourth section discusses the limitations and direction of future work of this study. The last section presents the conclusion of this study.

5.2 DISCUSSION

The findings of this study are discussed by presenting the result first then compare the result with the findings of previous studies.

5.2.1 IC and BI

The first main hypothesis predicted that the effect of IC on BI toward gamified learning system is significant. The findings of hypotheses testing indicated that the effect is positive and significant. The increase in the IC will lead to increase in the BI toward using gamified learning system by teachers and managerial staff in smart classes in Iraq.

IC in this study consists of three variables namely PE, EE, and SI. PE was the most important variables in term of the coefficient. The result of IC as a second order construct can be interpreted as the increase in the level of the three sub-constructs (PE, EE, and SI) will enhance the explanatory power of IC, which in turn will increase its effect on BI.

Possible explanation of the significant direct effect of second order IC is the fact that when teachers and managerial staff perceived that their performance increases due to the use of the gamified learning system and their mental and physical effort to use it is minimal, thus, they will be satisfied

with the service and their evaluation will increase, which will lead to increase in the construct IC and thus, increase in the BI to use gamified learning system by teachers and managerial staff.

Previous studies agreed with the findings of this study. [47] indicated that IC is a critical for the adoption of new technology. In addition, the study of [100] agreed with the findings of this study. In term of the effect of PE on BI. The findings of hypotheses testing showed that the effect is significant. PE is the most important IC for the BI to use gamified learning system. The increase in PE will lead the teachers to develop a positive perception about BI toward gamified learning system. PE is the most important IC variable, and it has a significant effect on BI toward gamified learning system. This finding could be due to the fact that teachers considered gamified learning system as useful in accomplishing their tasks quickly and more efficiently. The teacher also considered gamified learning system as effective, and it makes learning easier. The gamified learning system makes accomplishing tasks and duties less time consuming and less effort.

This finding is in agreement with the findings of the literature. Previous studies in gamified learning system adoption found that the PE affect the BI toward using gamified learning system [18]–[20], [98]. This study predicted that EE has a significant effect on the BI to adopt gamified learning system. The findings indicated that EE significantly affects the BI of teachers in Iraq to adopt the gamified learning system. High level of EE will cause increase in the BI of teachers to adopt the gamified learning system.

An explanation of this finding is that the teachers perceived learning to use gamified learning system is easy and their interaction and transactions using the gamified learning system is clear and understandable. In addition, the teachers feel that there is flexibility in using the gamified learning system and it is easy for the teacher to become skillful and expert in utilizing the gamified learning system. This easiness in using the gamified learning system reduced the physical and mental burden and increased their BI toward using the gamified learning system.

Previous studies showed that EE is an important factor of UTAUT when decision made to adopt new technology. Studies of [20] [98] [19] reached similar conclusion regarding the link between EE and BI. SI was predicted to have a significant effect on the BI toward gamified learning system. The findings of this study showed that the prediction is true. SI affected the BI of teachers toward the use of gamified learning system. This finding agreed with the findings of the majority of

previous studies. Previous studies indicated that SI is an important factor for the adoption of technology. Findings of the study of [25], [21], [19] and [20] [28]. A possible explanation of this significant effect is the fact that gamified learning system is being used in these smart classes by teachers. The gamified learning system is helpful in reducing tension and anxiety in the time of COVID19 and this might increase the intention to use it among teachers in Iraq.

5.2.2 OC and BI

The second main hypothesis of this study proposed that the effect of OC factors on BI is significant. The findings indicated that OC have a significant effect on BI toward gamified learning system. This indicated that the increase in the level of OC will cause increase in BI toward gamified learning system. OC in this study consisted of two variables namely, TMS and OR. Improvement in TMS and OR will cause enhancement in the OC which in turn will increase the effect of this construct on the BI toward gamified learning system. The positive effect of OC could be due to the assumption of the teachers that the organization is ready, and the management are in full support to implement this type of learning and teaching to confront the negative effect of COVID19.

Similar to the findings of this study, the prior literature which investigated the effect of OC using TOE model such as [18] [46] showed that OC is critical for the BI of technology adoption. The first factor of OC is TMS. In this study, it was proposed that TMS has a significant effect on BI toward gamified learning system. The findings of hypotheses testing confirmed that the effect is significant. TMS will increase the BI of teachers to use the gamified learning system. The increase in TMS will cause an increase in the BI of teachers in Iraq toward the gamified learning system. This findings is in agreement with the findings of previous studies. Findings of the study of [47] indicated that TMS is an essential factor for the gamified technology adoption among SMEs. Similar findings were derived by [46] who found that the TMS is a critical factors for the use of GS in the acquisition of talent.

The second hypothesis of OC predicted that the effect of OR on BI is significant. The findings of hypotheses testing showed that OR has a significant effect on the BI of teachers toward gamified

learning system. Higher OR of the smart class will enhance the BI toward using gamified learning system. In line with this findings, the findings of previous studies showed that OR is one of the important OC in the TOE as pointed out by researchers [52], [109][125]. Previous studies such as [124] found that OR is important for the adoption of new technology. [46] also indicated that OR is important for adopting GS for talent acquisition. OR is the most important enablers of blockchain adoption [126].

5.2.3 Mediating Role of Satisfaction

The third and fourth hypotheses were related to the mediating effect of satisfaction between IC and OCs, and the BI toward gamified learning system. Findings of the mediating analysis showed that satisfaction partially mediated the effect of IC and OC on BI toward gamified learning system. This indicates that increasing the satisfaction with the gamified learning system will enhance the relationship between IC and OC with BI toward gamified learning system.

In line with this finding, the IS success suggested that satisfaction is a critical factors for the adoption of any technology. Researchers found that satisfaction with the gamified learning system is important predictors of the adoption [97] [100]. SA mediated the effect of PU and PEOU on the BI to use online learning system [129]. Studies also confirmed that satisfaction fully mediated the effect of experiential value drives on actual use of advanced mobile services [130]. In addition, SA also mediated the effect of website usability on use intention of a website [131].

5.2.4 Moderating role of Gamification

The fifth hypothesis proposed gamification will moderate the effect of IC on BI toward gamified learning system. Gamification moderated the effect of IC on BI toward gamified learning system. The increase in gamification level will increase the positive effect of IC on the BI toward the gamified learning system. Having gamified elements in the teaching of subject will enhance the attractiveness and reduce the tension during the difficult time of COVID19.

In line with the findings, previous studies indicated that the gamification could play a moderating role. For instance, in the study of [100], the study found that gamification moderated the IC impact on the OC impact. Other studies also confirmed the role of gamification as a moderating variables.

For example, gamification moderated the effect of intention to use on intention to recommend [18]; [19].

5.2.5 Moderating role of Cost

The sixth hypothesis proposed cost as a moderating variable between OC and BI toward gamified learning system. The findings showed that cost did not moderate the effect of OC on BI toward gamified learning system. Nevertheless, cost has a negative direct effect on the BI toward gamified learning system. The direct negative effect is in line with the findings of previous studies [46]; [47] which indicate that the cost of adopting the GS affects the adoption of the technology negatively. However, in term of the moderating effect of cost, the findings contradicts with previous studies such as [132]. Nevertheless, in the context of this study, cost is not significant because the benefit of gamified learning system will pay off the cost in the short term.

5.2.6 BI and UB

The seventh hypotheses proposed that the effect of BI on UB is positive and significant. The findings showed that the effect is positive and significant. Thus, the increase in BI will lead to an increase in the UB toward gamified learning system. This findings is in line with the findings of previous studies and models such as TAM, UTAUT, TRA, and TPB [64], [66], [133], [134]. In addition, the findings are also in line with the [20] who found a positive link between BI and UB.

5.2.7 Moderating role of Self-efficacy

The last hypothesis proposed that SE will moderate the effect of BI on UB. The findings showed that SE moderated positively the effect of BI on UB. The increase in the level of SE as a moderator will increase the effect of BI on UB. SE is important and researchers found that high level of SE will lead to more positive perception about using the technology (Harmandaoğlu Baz, Cephe, & Balçıkanlı, 2019; Liza & Andriyanti, 2019). Researchers also found that the level of SE among teachers is critical to use the technology such as gamified learning system [142][55], [56]. This is in line also with a review studies that showed the importance of SE for gamification and gamified learning system [37].

5.3 IMPLICATIONS

The implications of this study are discussed in this section. Mainly, this study discusses the theoretical implications of this study for the body of knowledge and existing literature. It also discusses the practical implications of this study for decision and policy makers in education.

5.3.1 Theoretical Implications

This study made a theoretical contribution to the literature by examining the gamified learning system in the context of developing countries such as Iraq. Studies of gamified learning system in these countries are limited and this research has enriched the literature of the developing countries. Another important contribution has been done by this research is to examine the gamified learning system using different set of theories. Prior literature in gamified learning system is mostly conducted using TAM model and this study differently have examined the gamified learning system using theories of TOE, UTAUT, and IS success to enhance the explain more the variation in the gamified learning system adoption by higher education.

In this sense the study contributed to the literature by examining this topic in educational setting while prior literature was mainly conducted in business and for-profit organization. In term of the combination among theories, the study confirmed that UTAUT is a valid theoretical model to be used in gamified learning system. Additionally, the TOE is also important model to be used in the context of gamified learning system. Furthermore, the IS success is also important and vital and can be used to explain the role of satisfaction with using the technology. all these theories together have explained large portion of the variation in the gamified learning system adoption.

The study contributed to the literature in term of the variables. Satisfaction with the gamified learning system has been examined by few studies and this study have extend the literature on the role of satisfaction as a mediating variables. The study confirmed that satisfaction is critical for the adoption of gamified learning system and affected the IC and OC and their relationships with BI. Additionally, the moderating variable of gamification has been shown to be effective between IC and BI in the gamified learning system settings. The study confirmed that gamification is vital

for enhance the gamified learning system and improving the perception of individual regarding the adoption of gamified learning system.

The study also explained the role of cost as a moderating variable. Important findings were derived. Cost did not work as a moderator, but it had a negative direct effect on the adoption indicating that cost is critical variable for the gamified learning system adoption. Further, the study also examined the self-efficacy as a moderator between the BI and UB and presented important findings regarding the self-efficacy and its critical role in enhancing the BI toward the UB of gamified learning system.

5.3.2 Practical Implications

gamified learning system and is more imperative than the OC. In this manner, choice creators in Iraqi schools are proposed to center on the IC and in specific, the PE since expanding the benefits of utilizing gamified learning system will lead more schools and instructors to utilize the framework. Having fun whereas educating could be a characteristic that all instructors need to have amid the time of COVID 19. Hence, the utilization of the gamified learning system framework will offer assistance in upgrading the learning environment and decrease the push and uneasiness. This advantage among others ought to empower the choice producers to shift toward a gamified learning system in instruction. Alongside the PE, EE, and SI are too basic variables that in the event that combined together will degree the IC conduct toward the gamified learning system. Having an ease to utilize gamified learning system and a positive social impact from the community will lead more schools to utilize the gamified learning system and contribute to instructive learning and instructing.

The findings moreover appeared that OC is vital, and the foremost critical components is OR followed by TMS bolster. Within the setting of Iraq, framework and power as well as the speed of web must be well set up and be arranged for utilizing the innovation. High speed web and well-established foundation will contribute to the quality of instructing and learning and have the potential to play a positive part in time of COVID 19 and bad habit versa. In expansion, the administration of the school ought to bolster fiscally and non-financially the exertion to utilize the gamified learning system within the Iraqi keen schools. For the victory of any extend, the back of the administration is basic.

Satisfaction with the gamified learning system is vital and can clarify the relationship of IC and OC with BI to utilize gamified learning system. In this way, having satisfied users will upgrade their inspiration to utilize the gamified learning system. Choice creators got to improve the fulfillment. This may be done by administrating a study of satisfaction to the clients and recognizing the zone that drives fulfillment and disappointment and bargain with the issue that causes the disappointment. Including the gamification to the substance of instructing is basic and can improve the IC's relationship with BI. Choice creators are suggested to include components of playfulness and satisfaction to all subjects. Remunerate can be allowed for understudies and high-performing instructors within the frame of identifications and focus to distinguish them from others. Especially, within the time of COVID19 and with the development of the modern series, a keen school in Iraq ought to be arranged to confront up-and-coming challenges and center on the mental portion of instruction by including fun and bliss to the learning preparation.

Cost of embracing and utilizing gamified learning system is imperative for the administration. The taken toll has inconsequential directing impact, but it encompasses a critical negative coordinate impact. This is especially vital for self-funded schools and private schools. It is too imperative for the open school as the Iraqi schools are upheld in part by the Joined together Countries organizations and taken a toll of setting up the gamified environment from a computer program to equipment and organizing might altogether influence the choice of the administration. In any case, the negative coordinate impact of fetched demonstrates that the increment in fetched will lead to lower BI toward the gamified learning system. Utilizing gamified learning system successfully can be expensive within the brief run. Be that as it may, within the long run, the gamified learning system is able to pay off the taken toll and decrease the operational taken toll of savvy schools in Iraq.

SE of the instructors is basic for the utilize of gamified learning system. High SE of Iraqi instructors will increment their BI toward utilizing gamified learning system. Choice producers in Iraqi smart schools are exhorted to start preparing courses to extend the SE of instructors. Training need analysis (TNA) can be conducted to distinguish the area where instructors ought to reinforce their abilities and capabilities of educating, planning courses, and managing with gamified learning system. Instructors get the material of the course but their capabilities in planning courses utilizing gamified learning system might decrease the BI toward the system. Having specialized planning

courses in all subjects will lead to more utilization of the gamified learning system framework and allow the instructors the capacity to adjust and alter the substance of the courses to be happier. The discoveries of this research can be utilized by choice creators to get the indicators of gamified learning system and move forward the utilization of this innovation to progress the execution of understudies, instructors, and the schools. Receiving gamified learning system is the arrangement that can diminish the negative effect of COVID19 and increase the engagement and participation of all stakeholders.

5.4 LIMITATIONS AND FUTURE WORK

There are some limitations that worthwhile to be mentioned in this study. This study was conducted on smart classes and schools in Iraq. Findings of this study are limited to such institutions. The findings cannot be generalized on other organization such as business organizations.

This study investigated the adoption of gamified learning system in 250 smart classes universities. The study was limited to these classes due to the fact that these classes are using the gamified learning system. Thus, findings of this study can be generalized on these smart classes and other classes that share the same characteristics.

The study collected data from teachers and managerial level employees. Thus, the findings of this study are limited to the respondents. The finding cannot be generalized to students or technical workers. Lastly, this study deployed random sampling techniques which allow the generalization of the findings on the population of this study. However, the study was conducted in Iraq which is a developing country. Finding can be generalized on countries that share with Iraq similar characteristic in term the level of IT knowledge, education, age, and experience. Nevertheless, the findings cannot be generalized on developed countries due to the technological gaps in term of technological infrastructure and the speed and coverage of the internet.

By and large, the findings is restricted to smart schools that are utilizing completely or mostly the gamified framework. Generalization of the findings can be on schools of developing nations that share comparable characteristic with the Iraqi smart schools in term of framework, foundation, and instruction. As a way forward, future studies are recommended to look at the BI of understudies to utilize the gamified learning system. Encourage considers is additionally proposed to look at

the selection of gamified learning system among non-adopters. Illustrative control of this research was direct and to overcome this issue, future researches are proposed to incorporate more factors such as the interaction between understudies and gamified learning system and the interaction between instructors and understudies in the gamified learning system environment. More considers are required in gamified learning system in creating and rising economies particularly amid this high-tension time of COVID 19 where online learning has gotten to be the unused typical for nearly all countries.

5.5 CONCLUSION

This study inspected the predictors of utilizing gamified learning system in Iraqi schools. Data was collected from 394 instructors and administrative staff in 250 smart schools in Iraq. The data examination was conducted utilizing SEM-PLS. The findings appeared that both IC and OC are basic with IC outflanked the OC in terms of significance. OR is the foremost vital components of OC while performance expectancy is the foremost basic variable within the IC. Satisfaction mediated mostly the effect of IC and OC on BI toward utilizing gamified learning system. The gamification includes a double part. It may be a directing variable between IC and BI, and it features a direct impact on BI toward utilizing gamified learning system. Cost did not moderate the impact, but it includes a direct negative impact on BI. Further, the SE could be a basic moderating variable between BI and UB.

Policy makers need to pay consideration to the IC characteristic and discernment with respect to the gamified learning system. The benefits, effortlessness, as well as positive recognition of the community, are basic for using gamified learning system in keen school. OC and in specifically within the setting of Iraq, the status in terms of the framework, web association, and equipment and computer program can contribute unequivocally to the appropriation of gamified learning system. SE of instructors in planning content and managing with the courses in gamified learning system environment is basic and choice producers should center on giving specialized courses to reinforce the capabilities of instructors.

REFERENCES

- [1] D. A. Mohammed, "Gamification in e-learning: the effect on student performance and perception at an iraqi university," no. April, 2018.
- [2] D. Shi, T. Wang, H. Xing, and H. Xu, "A learning path recommendation model based on a multidimensional knowledge graph framework for e-learning," *Knowledge-Based Syst.*, vol. 195, p. 105618, 2020.
- [3] S. Sukendro *et al.*, "Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context," *Heliyon*, vol. 6, no. 11, p. e05410, 2020.
- [4] T. Leclercq, I. Poncin, and W. Hammedi, "Opening the black box of gameful experience: Implications for gamification process design," *J. Retail. Consum. Serv.*, vol. 52, no. July 2019, 2020.
- [5] F. Inocencio, "Using Gamification in Education : A Systematic Literature Review Using Gamification in Education : A Systematic Literature Review," no. September, 2019.
- [6] L. F. Rodrigues, A. Oliveira, and H. Rodrigues, "Main gamification concepts: A systematic mapping study," *Heliyon*, vol. 5, no. 7, p. e01993, 2019.
- [7] F. Noorbehbahani, F. Salehi, and R. Jafar Zadeh, "A systematic mapping study on gamification applied to e-marketing," *J. Res. Interact. Mark.*, vol. 13, no. 3, pp. 392–410, 2019.
- [8] L. F. Rodrigues, C. J. Costa, and A. Oliveira, "The adoption of gamification in e-banking," *ACM Int. Conf. Proceeding Ser.*, pp. 47–55, 2013.
- [9] J. Koivisto and J. Hamari, "The rise of motivational information systems: A review of gamification research," *Int. J. Inf. Manage.*, vol. 45, no. June 2017, pp. 191–210, 2019.
- [10] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: defining" gamification"," in *Proceedings of the 15th international academic*

MindTrek conference: Envisioning future media environments, 2011, pp. 9–15.

- [11] N. Takashima, “Cooperative R&D investments and licensing breakthrough technologies: International environmental agreements with participation game,” *J. Clean. Prod.*, vol. 248, p. 119233, 2020.
- [12] M. Vasser and J. Aru, “Guidelines for immersive virtual reality in psychological research,” *Curr. Opin. Psychol.*, vol. 36, pp. 71–76, 2020.
- [13] M. Sailer, J. U. Hense, S. K. Mayr, and H. Mandl, “How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction,” *Comput. Human Behav.*, vol. 69, pp. 371–380, 2017.
- [14] W. Wang, Y. Liu, Y. Liang, and K. He, “The Influential Factors of Organization Adoption of E-government Cloud,” in *International Conference on Financial Management, Education and Social Science (FMESS)*, 2017, no. Fmess, pp. 283–288.
- [15] J. Koivisto and J. Hamari, “Demographic differences in perceived benefits from gamification,” *Comput. Human Behav.*, vol. 35, pp. 179–188, 2014.
- [16] M.-S. Kuo and T.-Y. Chuang, “How gamification motivates visits and engagement for online academic dissemination—An empirical study,” *Comput. Human Behav.*, vol. 55, pp. 16–27, 2016.
- [17] C. Li, Z. Dong, R. H. Untch, and M. Chasteen, “Engaging Computer Science Students through Gamification in an Online Social Network Based Collaborative Learning Environment,” *Int. J. Inf. Educ. Technol.*, vol. 3, no. 1, pp. 72–77, 2013.
- [18] S. Rahi and M. Abd. Ghani, “The role of UTAUT, DOI, perceived technology security and game elements in internet banking adoption,” *World J. Sci. Technol. Sustain. Dev.*, vol. 15, no. 4, pp. 338–356, 2018.
- [19] R. Samar and A. G. Mazuri, “Does gamified elements influence on user’s intention to adopt internet banking with integration of UTAUT and general self-confidence?,” *Int. J. Bus. Excell.*, vol. 19, no. 3, pp. 394–414, 2019.

- [20] G. Baptista and T. Oliveira, “Why so serious? Gamification impact in the acceptance of mobile banking services,” *Internet Res.*, vol. 27, no. 1, pp. 118–139, 2017.
- [21] L. F. Rodrigues, A. Oliveira, and C. J. Costa, “Playing seriously - How gamification and social cues influence bank customers to use gamified e-business applications,” *Comput. Human Behav.*, vol. 63, pp. 392–407, 2016.
- [22] J. Hamari and M. Sjöblom, “What is eSports and why do people watch it?,” *Internet Res.*, vol. 27, no. 2, pp. 211–232, 2017.
- [23] G. Huang and Y. Ren, “Linking technological functions of fitness mobile apps with continuance usage among Chinese users: Moderating role of exercise self-efficacy,” *Comput. Human Behav.*, vol. 103, no. March 2019, pp. 151–160, 2020.
- [24] J. Hamari and J. Koivisto, “‘Working out for likes’: An empirical study on social influence in exercise gamification,” *Comput. Human Behav.*, vol. 50, pp. 333–347, 2015.
- [25] J. Hamari and J. Koivisto, “Why do people use gamification services?,” *Int. J. Inf. Manage.*, vol. 35, no. 4, pp. 419–431, 2015.
- [26] A. Lunney, N. R. Cunningham, and M. S. Eastin, “Wearable fitness technology: A structural investigation into acceptance and perceived fitness outcomes,” *Comput. Human Behav.*, vol. 65, pp. 114–120, 2016.
- [27] C. H. Jin, “The effects of mental simulations, innovativeness on intention to adopt brand application,” *Comput. Human Behav.*, vol. 54, pp. 682–690, 2016.
- [28] Y. Yang, Y. Asaad, and Y. Dwivedi, “Examining the impact of gamification on intention of engagement and brand attitude in the marketing context,” *Comput. Human Behav.*, vol. 73, pp. 459–469, 2017.
- [29] S. Jang, P. J. Kitchen, and J. Kim, “The effects of gamified customer benefits and characteristics on behavioral engagement and purchase: Evidence from mobile exercise application uses,” *J. Bus. Res.*, vol. 92, no. January, pp. 250–259, 2018.
- [30] A. Tanouri, R. Mulcahy, and R. Russell-Bennett, “Transformative gamification services for

- social behavior brand equity: a hierarchical model,” *J. Serv. Theory Pract.*, vol. 29, no. 2, pp. 122–141, 2019.
- [31] M. Li, P. Y. K. Chau, and L. Ge, “Meaningful gamification for psychological empowerment: exploring user affective experience mirroring in a psychological self-help system,” *Internet Res.*, no. 71771046, 2020.
- [32] M. T. De la Cuadra, N. Vila-Lopez, and A. Hernandez-Fernández, “Could gamification improve visitors’ engagement?,” *Int. J. Tour. Cities*, vol. 6, no. 2, pp. 317–334, 2019.
- [33] A. M. Toda, R. M. C. do Carmo, A. P. da Silva, I. I. Bittencourt, and S. Isotani, “An approach for planning and deploying gamification concepts with social networks within educational contexts,” *Int. J. Inf. Manage.*, vol. 46, no. October, pp. 294–303, 2019.
- [34] H. Rodrigues, F. Almeida, V. Figueiredo, and S. L. Lopes, “Tracking e-learning through published papers: A systematic review,” *Comput. Educ.*, vol. 136, no. March, pp. 87–98, 2019.
- [35] A. Jabbar, R. B. Gasser, and J. Lodge, “Can New Digital Technologies Support Parasitology Teaching and Learning?,” *Trends Parasitol.*, vol. 32, no. 7, pp. 522–530, 2016.
- [36] V. Z. Vanduhe *et al.*, “Students’ evidential increase in learning using gamified learning environment,” in *Proceedings of the Future Technologies Conference*, 2018, vol. 1, no. 880, pp. 333–342.
- [37] R. J. R. da Silva, R. G. Rodrigues, and C. T. P. Leal, “Gamification in management education: A systematic literature review,” *BAR - Brazilian Adm. Rev.*, vol. 16, no. 2, 2019.
- [38] P. Herzig, S. Strahringer, and M. Ameling, “Gamification of ERP systems - Exploring gamification effects on user acceptance constructs,” *Multikonferenz Wirtschaftsinformatik 2012 - Tagungsband der MKWI 2012*, pp. 793–804, 2012.
- [39] G. Jipa and I. Marin, “Proceedings Of The 8 Th International Management Conference Enterprise Gamification In Business To Consumer (B2c) Engagement Model,” *Manag. Challenges Sustain. Dev.*, pp. 489–496, 2014.

- [40] G. Aydin, "Adoption of gamified systems: a study on a social media gamification website," *Int. J. Online Mark.*, vol. 5, no. 3, pp. 18–37, 2015.
- [41] D. B. Köse, B. Morschheuser, and J. Hamari, "Is it a tool or a toy? How user conceptions of a system's purpose affect their experience and use," *Int. J. Inf. Manage.*, vol. 49, no. June, pp. 461–474, 2019.
- [42] C. E. Höllig, A. Tumasjan, and I. M. Welp, "Individualizing gamified systems: The role of trait competitiveness and leaderboard design," *J. Bus. Res.*, vol. 106, no. October 2018, pp. 288–303, 2020.
- [43] L. E. Nacke and C. S. Deterding, "The maturing of gamification research," *Comput. Hum. Behav.*, pp. 450–454, 2017.
- [44] V. Venkatesh, M. Morris, G. Davis, and F. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Q.*, vol. 27, no. 3, pp. 425–478, 2003.
- [45] A. Shachak, C. Kuziemy, and C. Petersen, "Beyond TAM and UTAUT: Future directions for HIT implementation research," *J. Biomed. Inform.*, vol. 100, p. 103315, 2019.
- [46] R. Pillai and B. Sivathanu, "Adoption of artificial intelligence (AI) for talent acquisition in IT/ITeS organizations," *Benchmarking*, 2020.
- [47] A. O. Ikumoro and M. S. Jawad, "Intention to Use Intelligent Conversational Agents in e-Commerce among Malaysian SMEs: An Integrated Conceptual Framework Based on Tri-theories including Unified Theory of Acceptance, Use of Technology (UTAUT), and T-O-E," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 9, no. 11, pp. 205–235, 2019.
- [48] K. Rosli, P. Yeow, and E.-G. Siew, "Factors Influencing Audit Technology Acceptance by Audit Firms: A New I-TOE Adoption Framework," *J. Account. Audit. Res. Pract.*, vol. 2012, pp. 1–11, 2012.
- [49] J. W. Lian, D. C. Yen, and Y. T. Wang, "An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital," *Int. J. Inf. Manage.*, vol. 34, no. 1, pp. 28–36, 2014.

- [50] M. H. Alkharusi and A. H. Al-badi, "IT Personnel Perspective of the Slow Adoption of Cloud Computing in Public Sector: Case Study in Oman," in *3rd MEC International Conference on Big Data and Smart City IT*, 2016, pp. 7–16.
- [51] C. Low, Y. Chen, and M. Wu, "Understanding the determinants of cloud computing adoption," *Ind. Manag. Data Syst.*, vol. 111, no. 7, pp. 1006–1023, 2011.
- [52] M. S. Musawa and E. Wahab, "The adoption of electronic data interchange (EDI) technology by Nigerian SMEs: A conceptual framework," *J. Bus. Manag. Econ.*, vol. 3, no. 2, pp. 55–68, 2012.
- [53] S. K. Sharma, A. H. Al-Badi, S. M. Govindaluri, and M. H. Al-Kharusi, "Predicting motivators of cloud computing adoption: A developing country perspective," *Comput. Human Behav.*, vol. 62, pp. 61–69, 2016.
- [54] H. Gangwar, H. Date, and R. Ramaswamy, "Understanding determinants of cloud computing adoption using an integrated TAM-TOE model," *J. Enterp. Inf. Manag.*, vol. 28, no. 1, pp. 107–130, 2015.
- [55] T. D. Susanto, M. M. Diani, and I. Hafidz, "User Acceptance of e-Government Citizen Report System (a Case Study of City113 App)," *Procedia Comput. Sci.*, vol. 124, pp. 560–568, 2017.
- [56] A. Adukaite, I. van Zyl, Ş. Er, and L. Cantoni, "Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools," *Comput. Educ.*, vol. 111, pp. 172–190, 2017.
- [57] M. H. Hussein, S. H. Ow, I. Ibrahim, and M. A. Mahmoud, "Measuring instructors continued intention to reuse Google Classroom in Iraq: a mixed-method study during COVID-19," *Interact. Technol. Smart Educ.*, 2020.
- [58] P. K. Senyo, E. Addae, and R. Boateng, "Cloud computing research: A review of research themes, frameworks, methods and future research directions," *Int. J. Inf. Manage.*, vol. 38, no. 1, pp. 128–139, 2018.

- [59] M. Dečman, "Modeling the acceptance of e-learning in mandatory environments of higher education: The influence of previous education and gender," *Comput. Human Behav.*, vol. 49, pp. 272–281, 2015.
- [60] R. N. Landers, "Developing a theory of gamified learning: Linking serious games and gamification of learning," *Simul. Gaming*, vol. 45, no. 6, pp. 752–768, 2014.
- [61] K. Felker and E. Phetteplace, "Gamification in libraries: The state of the art," *Ref. User Serv. Q.*, vol. 54, no. 2, pp. 19–23, 2014.
- [62] S. Okai, M. Uddin, A. Arshad, R. Alsaqour, and A. Shah, "Cloud Computing Adoption Model for Universities to Increase ICT Proficiency," *SAGE Open*, vol. 4, no. 3, p. 2158244014546461, 2014.
- [63] H. M. Sabi, F. M. E. Uzoka, K. Langmia, and F. N. Njeh, "Conceptualizing a model for adoption of cloud computing in education," *Int. J. Inf. Manage.*, vol. 36, no. 2, pp. 183–191, 2016.
- [64] F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *Source MIS Q.*, vol. 13, no. 3, pp. 319–340, 1989.
- [65] B. Šumak, M. Heričko, and M. Pušnik, "A meta-analysis of e-learning technology acceptance: The role of user types and e-learning technology types," *Comput. Human Behav.*, vol. 27, no. 6, pp. 2067–2077, 2011.
- [66] M. Fishbein and I. Ajzen, "Understanding attitudes and predicting social behavior," *Englewood Cliffs*, 1980.
- [67] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Q.*, vol. 36, no. 1, pp. 157–178, 2012.
- [68] I. Ajzen, "From Intentions to Actions: A Theory of Planned Behavior," in *Action Control*, 1985.
- [69] G. A.-M. Taufiq-Hail, H. Ibrahim, and S. A. M. Yusof, "SAAS CLOUD COMPUTING AS

A MEANS OF GREEN IT ACCEPTANCE MODEL: A THEORY OF PLANNED BEHAVIOR MODEL AT MALAYSIAN PUBLIC UNIVERSITIES'CONTEXT," *J. Inf.*, vol. 2, no. 4, pp. 1–17, 2017.

- [70] I. Arpaci, K. Kilicer, and S. Bardakci, "Effects of security and privacy concerns on educational use of cloud services," *Comput. Human Behav.*, vol. 45, pp. 93–98, 2015.
- [71] J. Marchewka and K. Kostiwa, "An Application of the UTAUT Model for Understanding Student Perceptions Using Course Management Software," *Commun. IIMA*, vol. 7, no. 2, pp. 93–104, 2007.
- [72] D. Burda and F. Teuteberg, "The role of trust and risk perceptions in cloud archiving - Results from an empirical study," *J. High Technol. Manag. Res.*, vol. 25, no. 2, pp. 172–187, 2014.
- [73] E. Park and K. J. Kim, "An integrated adoption model of mobile cloud services: Exploration of key determinants and extension of technology acceptance model," *Telemat. Informatics*, vol. 31, no. 3, pp. 376–385, 2014.
- [74] J.-W. Lian, "Critical factors for cloud based e-invoice service adoption in Taiwan: An empirical study," *Int. J. Inf. Manage.*, vol. 35, no. 1, pp. 98–109, 2015.
- [75] Y. Cao, X. Bi, and L. Wang, "A Study on User Adoption of Cloud Storage Service in China: A Revised Unified theory of Acceptance and Use of Technology Model," *2013 Int. Conf. Inf. Sci. Cloud Comput. Companion*, no. 2012, pp. 287–293, 2013.
- [76] C. K. Flack and P. Dembla, "Influence of Cloud-Based Computing on User Productivity," *Proc. South. Assoc. Inf. Syst. Conf. (SAIS 2014)*, Macon, GA, USA, March 21st–22nd, 2014., pp. 1–7, 2014.
- [77] K. der Schyff and K. E. M. Krauss, "Higher education cloud computing in South Africa: towards understanding trust and adoption issues," *South African Comput. J.*, vol. 55, no. 55, pp. 40–55, 2014.
- [78] S. T. Al-harbi, "Trust and acceptance of cloud computing: A revised UTAUT model," *Proc.*

- 2014 *Int. Conf. Comput. Sci. Comput. Intell. CSCI 2014*, vol. 2, no. Mm, pp. 131–134, 2014.
- [79] S. Singh and D. Chand, “[SiCh14] Trust evaluation in cloud based on friends and third party’s recommendations,” *2014 Recent Adv. Eng. Comput. Sci.*, pp. 1–6, 2014.
- [80] W. H. DeLone and E. R. McLean, “Information systems success: The quest for the dependent variable,” *Inf. Syst. Res.*, 1992.
- [81] W. H. DeLone and E. R. McLean, “The DeLone and McLean Model of Information Systems Success : A Ten-Year Update,” *J. Manag. Inf. Syst.*, vol. 19, no. 4, pp. 9–30, 2003.
- [82] W. H. DeLone and McLean E.R., *Information Systems Success Measurement*, vol. 2, no. 1. 2016.
- [83] C. Tam and T. Oliveira, “Understanding the impact of m-banking on individual performance: DeLone & McLean and TTF perspective,” *Comput. Human Behav.*, vol. 61, pp. 233–244, 2016.
- [84] C. K. Flack, P. Dembla, and S. Petter, “Extending the DeLone and McLean IS Success Model to Cloud Computing,” *Twenty-first Am. Conf. Inf. Syst.*, p. 2015, 2015.
- [85] L. Tornatzky and M. Fletscher, “The Deployment of Technology,” in *The Processes of Technological Innovation*, 1990, pp. 118–147.
- [86] K. Zhu, K. L. Kraemer, S. Xu, and J. Dedrick, “Information Technology Payoff in E-Business Environments : An International Perspective on Value Creation of E-Business in the Financial Services Industry,” *J. Manag. Inf. Syst.*, vol. 21, no. 1, pp. 17–54, 2004.
- [87] T. Oliveira and M. F. Martins, “Information Technology Adoption Models at Firm Level: Review of Literature,” *Proc. 4Th Eur. Conf. Inf. Manag. Eval.*, no. Wade, pp. 312–323, 2010.
- [88] N. Al-khater, G. Wills, and R. Walters, “Factors Influencing an Organisation ’ s Intention to Adopt Cloud Computing in Saudi Arabia,” no. January, 2015.

- [89] M. I. Salwani, G. Marthandan, M. D. Norzaidi, and S. C. Chong, "E-commerce usage and business performance in the Malaysian tourism sector: empirical analysis," *Inf. Manag. Comput. Secur.*, vol. 17, no. 2, pp. 166–185, 2009.
- [90] J. Dedrick and J. West, "Why firms adopt open source platforms: a grounded theory of innovation and standards adoption," *MISQ Spec. Issue Work. Stand. Mak. A Crit. Res. Front. Inf. Syst.*, no. April, pp. 236–257, 2003.
- [91] Y. M. Wang, Y. S. Wang, and Y. F. Yang, "Understanding the determinants of RFID adoption in the manufacturing industry," *Technol. Forecast. Soc. Change*, vol. 77, no. 5, pp. 803–815, 2010.
- [92] I. O. J. do Amaral and M. Kang, "Gamification effects on users' motivation to contribute knowledge in a Portuguese Q&A community," *Aslib J. Inf. Manag.*, 2021.
- [93] Q. Zhao, C. Der Chen, and J. L. Wang, "The effects of psychological ownership and TAM on social media loyalty: An integrated model," *Telemat. Informatics*, vol. 33, no. 4, pp. 959–972, 2016.
- [94] D. A. Haris and E. Sugito, "Analysis of factors affecting user acceptance of the implementation of ClassCraft E-Learning: Case studies faculty of information technology of Tarumanagara university," *ICACSYS 2015 - 2015 Int. Conf. Adv. Comput. Sci. Inf. Syst. Proc.*, pp. 73–78, 2016.
- [95] A. Sanchez-Mena, C. Queiro-Ameijeiras, A. Galbis-Cordova, J. Martí-Parreño, and J. A. Alvarez-Jareño, "Student Teachers' Intention To Use Gamification," *ICERI2016 Proc.*, vol. 1, no. November, pp. 4488–4494, 2016.
- [96] S. Karimi, "Do learners' characteristics matter? An exploration of mobile-learning adoption in self-directed learning," *Comput. Human Behav.*, vol. 63, pp. 769–776, 2016.
- [97] H. C. Lin *et al.*, "Continued use of an interactive computer game-based visual perception learning system in children with developmental delay," *Int. J. Med. Inform.*, vol. 107, pp. 76–87, 2017.

- [98] J. C. M. Siluk, T. B. Garlet, R. Marcuzzo, C. de F. Michelin, and I. F. Minello, "Technology-based Entrepreneurship in South Brazil," *Rev. Adm. UFSM*, vol. 11, no. 2, pp. 471–488, 2018.
- [99] C. H. H. Tsay, A. Kofinas, and J. Luo, "Enhancing student learning experience with technology-mediated gamification: An empirical study," *Comput. Educ.*, vol. 121, pp. 1–17, 2018.
- [100] M. Aparicio, T. Oliveira, F. Bacao, and M. Painho, "Gamification: A key determinant of massive open online course (MOOC) success," *Inf. Manag.*, vol. 56, no. 1, pp. 39–54, 2019.
- [101] H. Siala, E. Kutsch, and S. Jagger, "Cultural influences moderating learners' adoption of serious 3D games for managerial learning," *Inf. Technol. People*, vol. 33, no. 2, pp. 424–455, 2019.
- [102] V. Z. Vanduhe, M. Nat, and H. F. Hasan, "Continuance Intentions to Use Gamification for Training in Higher Education: Integrating the Technology Acceptance Model (TAM), Social Motivation, and Task Technology Fit (TTF)," *IEEE Access*, vol. 8, pp. 21473–21484, 2020.
- [103] S. K. Sharma, A. H. Al-Badi, S. M. Govindaluri, and M. H. Al-Kharusi, "Predicting motivators of cloud computing adoption: A developing country perspective," *Comput. Human Behav.*, vol. 62, pp. 61–69, 2016.
- [104] M. Kayali, N. Safie, and M. Mukhtar, "The Effect of Individual Factors Mediated by Trust and Moderated by IT Knowledge on Students' Adoption of Cloud Based E-learning," *Int. J. Innov. Technol. Explor. Eng.*, vol. 9, no. 2, 2019.
- [105] M. Kayali and S. Alaaraj, "Adoption of Cloud Based E-learning in Developing Countries : A Combination A of DOI , TAM and UTAUT," *Int. J. Contemp. Manag. Inf. Technol.*, vol. 1, no. 1, pp. 1–7, 2020.
- [106] N. Sasmita, J., & Mohd Suki, "Young consumers' insights on brand equity: Effects of brand association, brand loyalty, brand awareness, and brand image," *Int. J. Retail Distrib. Manag.*, vol. 43, no. 3, pp. 276–292, 2015.

- [107] A. Suman, K. Mathur, and T. V Dhulla, "Factors Influencing Professionals ' Decision for Cloud Computing Adoption," vol. 2, no. 4, pp. 397–401, 2014.
- [108] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Q. Manag. Inf. Syst.*, vol. 27, no. 3, pp. 425–478, 2003.
- [109] M. Alamgir Hossain and M. Quaddus, "The adoption and continued usage intention of RFID: an integrated framework," *Inf. Technol. People*, vol. 24, no. 3, pp. 236–256, 2011.
- [110] A. Kang, L. Barolli, J. D. Lee, J. H. Park, and H. Y. Jeong, "Information success model for learning system in cloud computing environment," *2013 Int. Jt. Conf. Aware. Sci. Technol. Ubi-Media Comput. (iCAST 2013 UMEDIA 2013)*, pp. 764–768, 2013.
- [111] M. Bellaaj, I. Zekri, and M. Albugami, "The continued use of e-learning system: An empirical investigation using UTAUT model at the University of Tabuk," *J. Theor. Appl. Inf. Technol.*, vol. 72, no. 3, pp. 464–474, 2015.
- [112] T. D. Nguyen, T. M. Nguyen, Q. T. Pham, and S. Misra, "Acceptance and use of E-learning based on cloud computing: The role of consumer innovativeness," in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, vol. 8583 LNCS, no. PART 5, 2014, pp. 159–174.
- [113] S. S. Al-Gahtani, "Empirical investigation of e-learning acceptance and assimilation: A structural equation model," *Appl. Comput. Informatics*, vol. 12, no. 1, pp. 27–50, 2014.
- [114] N. Aharony, "An exploratory study on factors affecting the adoption of cloud computing by information professionals," *Electron. Libr.*, vol. 33, no. 2, pp. 308–323, 2015.
- [115] N. Gupta and S. Thakur, "The factors affecting adoption of cloud computing technology in education institutions," *Int. J. Adv. Res. Comput. Commun. Eng.*, vol. 3, no. 6, pp. 7229–7235, 2014.
- [116] M. B. Al-otaibi, "Exploring Users Attitudes and Intentions Toward the Adoption of Cloud Computing in Saudi Arabia: an Empirical Investigation," *J. Comput. Sci.*, vol. 10, no. 11,

pp. 2315–2329, 2014.

- [117] E. M. Rogers, “A prospective and retrospective look at the diffusion model,” *J. Health Commun.*, vol. 9 Suppl 1, no. July 2015, pp. 13–19, 2004.
- [118] N. M. Sabah, “Exploring students’ awareness and perceptions: Influencing factors and individual differences driving m-learning adoption,” *Comput. Human Behav.*, vol. 65, pp. 522–533, 2016.
- [119] S. C. Park and S. Y. Ryoo, “An empirical investigation of end-users’ switching toward cloud computing: A two factor theory perspective,” *Comput. Human Behav.*, vol. 29, no. 1, pp. 160–170, 2013.
- [120] N. M. Suki and N. M. Suki, “Determining students’ behavioural intention to use animation and storytelling applying the UTAUT model: The moderating roles of gender and experience level,” *Int. J. Manag. Educ.*, vol. 15, no. 3, pp. 528–538, 2017.
- [121] S. Chauhan and M. Jaiswal, “Determinants of acceptance of ERP software training in business schools: Empirical investigation using UTAUT model,” *Int. J. Manag. Educ.*, vol. 14, no. 3, pp. 248–262, 2016.
- [122] E. Senyo, P. K., Effah, J., & Addae, “Preliminary insight into cloud computing adoption in a developing country,” *J. Enterp. Inf. Manag.*, vol. 29, no. 4, 2016.
- [123] P. K. Senyo, J. Effah, and E. Addae, “Preliminary insight into cloud computing adoption in a developing country,” *J. Enterp. Inf. Manag.*, vol. 29, no. 4, pp. 505–524, 2016.
- [124] Z. Yang, J. Sun, Y. Zhang, and Y. Wang, “Understanding SaaS adoption from the perspective of organizational users: A tripod readiness model,” *Comput. Human Behav.*, vol. 45, pp. 254–264, 2015.
- [125] T. Oliveira and M. F. Martins, “Literature review of information technology adoption models at firm level,” *Electron. J. Inf. Syst. Eval.*, vol. 14, no. 1, p. 110, 2011.
- [126] T. Clohessy and T. Acton, “Investigating the influence of organizational factors on blockchain adoption,” *Ind. Manag. Data Syst.*, 2019.

- [127] D. A. Yousef, "Organizational commitment, job satisfaction and attitudes toward organizational change: A study in the local government," *Int. J. Public Adm.*, vol. 40, no. 1, pp. 77–88, 2017.
- [128] S. Ding, Z. Wang, D. Wu, and D. L. Olson, "Utilizing customer satisfaction in ranking prediction for personalized cloud service selection," *Decis. Support Syst.*, vol. 93, pp. 1–10, 2017.
- [129] Y. J. Joo, H. J. So, and N. H. Kim, "Examination of relationships among students' self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs," *Comput. Educ.*, vol. 122, pp. 260–272, 2018.
- [130] D. Tojib and Y. Tsarenko, "Post-adoption modeling of advanced mobile service use," *J. Bus. Res.*, vol. 65, no. 7, pp. 922–928, 2012.
- [131] D. Belanche, L. V. Casaló, and M. Guinalíu, "Website usability, consumer satisfaction and the intention to use a website: The moderating effect of perceived risk," *J. Retail. Consum. Serv.*, vol. 19, no. 1, pp. 124–132, 2012.
- [132] N. Adnan, S. M. Nordin, and A. M. Rasli, "A possible resolution of Malaysian sunset industry by green fertilizer technology: factors affecting the adoption among paddy farmers," *Environ. Sci. Pollut. Res.*, vol. 26, no. 26, pp. 27198–27224, 2019.
- [133] Venkatesh, Morris, Davis, and Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Q.*, 2003.
- [134] I. Ajzen, "The theory of planned behavior," *Organ. Behav. Hum. Decis. Process.*, 1991.
- [135] C. W. TAYLOR and D. S. HUNSINGER, "Cloud Computing At the University Level: a Study of Student Use of Cloud Computing Applications," *J. Inf. Technol. Manag.*, vol. XXII, no. May, pp. 36–50, 2011.
- [136] F. Ali, P. K. Nair, and K. Hussain, "An assessment of students' acceptance and usage of computer supported collaborative classrooms in hospitality and tourism schools," *J. Hosp. Leis. Sport Tour. Educ.*, vol. 18, pp. 51–60, 2016.

- [137] T. S. Behrend, E. N. Wiebe, J. E. London, and E. C. Johnson, "Cloud computing adoption and usage in community colleges," *J. Behav. Inf. Technol.*, vol. 30, no. 2, pp. 231–240, 2011.
- [138] M. Saghafi-Asl, S. Aliasgharzadeh, and M. Asghari-Jafarabadi, "Factors influencing weight management behavior among college students: An application of the Health Belief Model," *PLoS One*, vol. 15, no. 2, pp. 1–15, 2020.
- [139] W. Zeng, "Information Teaching Ability of EFL Teachers in Application-oriented College," *J. Phys. Conf. Ser.*, vol. 1533, no. 4, 2020.
- [140] E. Harmandaoğlu Baz, P. T. Cephe, and C. Balçıkanlı, "Understanding EFL pre-service teachers' behavioral intentions to use cloud applications," *E-Learning Digit. Media*, vol. 16, no. 3, pp. 221–238, 2019.
- [141] K. Liza and E. Andriyanti, "Digital Literacy Scale of English Pre-Service Teachers and Their Perceived Readiness Toward the Application of Digital Technologies," *J. Educ. Learn.*, vol. 14, no. 1, pp. 74–79, 2019.
- [142] J. O. Etcuban, D. E. Marcial, and C. S. Abellanos, "UNP Research Journal, Vol. XXV January – December 2016 ISSN 0119-3058," *UNP Res. J.*, vol. XXV, no. December, pp. 1–17, 2016.
- [143] U. Sekaran and R. Bougie, *Research methods for business: A skill building approach*. John Wiley & Sons, 2016.
- [144] W. Zikmund, B. Babin, J. Carr, and M. Griffin, *Business research methods*, 7th ed. Cengage Learning, 2013.
- [145] U. Sekaran and R. Bougie, "Research methods for business," in *Research methods for business*, 2013, p. 436.
- [146] M. Saunders, P. Lewis, and A. Thornhill, *for Business Students Fi Fth Edition*. 2009.
- [147] J. R. Fraenkel and N. E. Wallen, "Validity and reliability," in *How to design and evaluate resaerch in education with PowerWeb*, 2005, pp. 152–171.

- [148] R. V Krejcie and D. W. Morgan, "Determining Sample Size For Research Activities, Educational And Psychological Measurement," *Educ. Psychol. Meas.*, no. 30, pp. 607–610, 1970.
- [149] S. Dolnicar, B. Grün, and F. Leisch, "Increasing sample size compensates for data problems in segmentation studies," *J. Bus. Res.*, vol. 69, no. 2, pp. 992–999, 2016.
- [150] S. A. Hassan and R. Ghazali, *Conducting Quantitative Research*, 1st ed. Bangi - Selangor, Malaysia, 2012.
- [151] J. Dawes, "Do data characteristics change according to the number of scale points use? And experiment using 5 point 7 point and 10 point scales," *Int. J. Mark. Res.*, vol. 50, no. 1, pp. 1–20, 2008.
- [152] J. C. F. de Winter and D. Dodou, "Five-Point Likert Items : t test versus Mann-Whitney-Wilcoxon," *Pract. Assessment, Res. Eval.*, vol. 15, no. 11, pp. 1–16, 2010.
- [153] B. Morschheuser, J. Hamari, and A. Maedche, "Cooperation or competition – When do people contribute more? A field experiment on gamification of crowdsourcing," *Int. J. Hum. Comput. Stud.*, vol. 127, no. October 2018, pp. 7–24, 2019.
- [154] A. Karahoca, D. Karahoca, and M. Aksöz, "Examining intention to adopt to internet of things in healthcare technology products," *Kybernetes*, vol. 47, no. 4, pp. 742–770, 2018.
- [155] I. Mashal and A. Shuhaiber, "What makes Jordanian residents buy smart home devices?: A factorial investigation using PLS-SEM," *Kybernetes*, vol. 48, no. 8, pp. 1681–1698, 2019.
- [156] U. Sekaran and R. Bougie, *Research methods for business: A skill building approach*. John Wiley & Sons, 2019.
- [157] C. L. Kimberlin and A. G. Winterstein, "Validity and reliability of measurement instruments used in research," *Am. J. Heal. Pharm.*, vol. 65, no. 23, pp. 2276–2284, 2008.
- [158] J. F. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, "Multivariate Data Analysis (6th ed.)," *Analysis*, pp. 4–4, 2006.

- [159] N. R. Lackey, A. L. Wingate, P. J. Brink, and M. J. Wood, *Advanced design in nursing research*, 2nd ed. California: Thousand Oaks, CA: Sage, 1998.
- [160] Hair, T. M. Hult, C. M. Ringle, and M. Sarstedt, *A primer on partial least squares structural equation modeling*, 2nd ed. Thousand Oakes, 2017.
- [161] J. Pallant, *SPSS survival manual: a step by step guide to data analysis using SPSS*. 2016.
- [162] D. George and P. Mallery, *SPSS for Windows step by step: A simple guide and reference.*, no. 1365-2141 (Electronic) LA-eng PT-Journal Article SB-IM. 2008.
- [163] P. B. Lowry and J. Gaskin, "Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it," *IEEE Trans. Prof. Commun.*, vol. 57, no. 2, pp. 123–146, 2014.
- [164] J. M. Cortina, G. Chen, and W. P. Dunlap, "Testing Interaction Effects in LISREL: Examination and Illustration of Available Procedures," *Organ. Res. Methods*, vol. 4, no. 4, pp. 324–360, 2001.
- [165] J. Henseler, C. M. Ringle, and R. R. Sinkovics, "The use of partial least squares path modeling in international marketing," *Adv. Int. Mark.*, vol. 20, pp. 277–319, 2009.
- [166] J. Henseler and W. Chin, "A comparison of approaches for the analysis of interaction effects between latent variables using partial least squares path modeling," *Struct. Equ. Model. A Multidiscip. J.*, vol. 17, no. 1, pp. 82–109, 2010.
- [167] V. E. Vinzi, W. W. Chin, J. Henseler, and H. Wang, *Handbook of Partial Least Squares: Concepts, Methods and Applications*. 2010.
- [168] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a Silver Bullet," *J. Mark. Theory Pract.*, vol. 19, no. 2, pp. 139–152, 2011.
- [169] J. F. Hair Jr, M. Sarstedt, C. M. Ringle, and S. P. Gudergan, *Advanced issues in partial least squares structural equation modeling*. saGe publications, 2017.
- [170] J. F. Hair, G. T. M. Hult, C. M. Ringle, M. Sarstedt, and K. O. Thiele, "Mirror, mirror on

- the wall: a comparative evaluation of composite-based structural equation modeling methods,” *J. Acad. Mark. Sci.*, vol. 45, no. 5, pp. 616–632, 2017.
- [171] K. A. Bollen, “Evaluating effect, composite, and causal indicators in structural equation models,” *MIS Q.*, vol. 35, no. 2, pp. 359–372, 2011.
- [172] J. F. Hair, C. M. Ringle, and M. Sarstedt, “PLS-SEM: Indeed a silver bullet,” *J. Mark. theory Pract.*, vol. 19, no. 2, pp. 139–152, 2011.
- [173] J. F. Hair, R. E. Anderson, B. J. Babin, and W. C. Black, “Multivariate data analysis: A global perspective (Vol. 7): Pearson Upper Saddle River.” NJ, 2010.
- [174] C. Fornell and D. F. Larcker, “Evaluating structural equation models with unobservable variables and measurements error,” *J. Mark. Res.*, vol. 18, pp. 39–50, 1981.
- [175] J. F. Hair Jr, M. Sarstedt, L. Hopkins, and V. G. Kuppelwieser, “Partial least squares structural equation modeling (PLS-SEM),” *Eur. Bus. Rev.*, vol. 26, no. 2, pp. 106–121, 2014.
- [176] J. Cohen, “The Effect Size index: d,” in *Statistical Power Analysis for the Behavioral Sciences*, 1988, pp. 20–26.

APPENDIX

A.1 : QUESTIONNAIRE

Questionnaire of Gamified Learning System

The purpose of this questionnaire is to collect data related to the factors that affect the adoption of gamified learning system at Iraqi schools. Mainly, the study aims to collect data from teachers using or intend to use the gamified learning system. Since you have the required knowledge and you are teachers or managerial staff at these schools, you are invited to participate in this study.

I would like to assure you that the answers given would be treated with strict confidentiality. No one except the researcher and his supervisor would be able to view your answers. The answer that you give will be used for statistical purposes. The estimated time to answer the questionnaire is 15-20 minutes.

I really appreciate your time, efforts, and cooperation in furthering the endeavor of this research.

الغرض من هذا الاستبانة هو جمع البيانات المتعلقة بالعوامل التي تؤثر على تبني نظام التعلم عن طريق التلعيب في المدارس العراقية. بشكل أساسي، تهدف الدراسة إلى جمع البيانات من المعلمين الذين يستخدمون أو يعتزمون استخدام نظام التعلم المحبب. نظرًا لأن لديك المعرفة المطلوبة وأنت مدرس أو موظف إداري في هذه المدارس، فأنت مدعو للمشاركة في هذه الدراسة.

أود أن أؤكد لكم أن الإجابات المقدمة ستعامل بسرية تامة. لن يتمكن أحد باستثناء الباحث ومشرفه من عرض إجاباتكم. سيتم استخدام الإجابة التي تقدمها لأغراض إحصائية. الوقت المقدر للإجابة على الاستبانة هو 15-20 دقيقة.

إنني أقدر حقًا وقتك وجهودك وتعاونك في تعزيز مساعي هذا البحث.

Please answer the following questions:

Section A: Background Information:

1. Please specify your age.
2. What is your gender?
☐ Male
☐ Female
3. Major
☐ Language
☐ Mathematic
☐ Literature
☐ Science
☐ Other (please specify)
4. Have you ever used gamified learning system?
☐ Yes
☐ No
5. If the answer Yes, how long have you been using the gamified learning system?
Please specify

الرجاء الإجابة على الأسئلة التالية

القسم أ: معلومات أساسية

الرجاء تحديد عمرك؟

ما هو جنسك؟

☐ ذكر

☐ أنثى

الرائد

☐ اللغة

☐ رياضيات

☐ الأدب

☐ علم
(أخرى) يرجى التحديد ☐

هل سبق لك استخدام نظام التعلم عن طريق الألعاب؟

☐ نعم
☐ لا

إذا كانت الإجابة "نعم" ، فكم من الوقت كنت تستخدم نظام التعلم عن طريق الألعاب؟ 5.
..... رجاء حدد

Section B: Factors affect the adoption of Gamified Learning Systems

Please indicate your level of agreement for each statement below based on the following scale:

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

القسم ب: العوامل التي تؤثر على تبني نظم التعلم المحاكاة
يرجى الإشارة إلى مستوى موافقتك على كل عبارة أدناه بناءً على المقياس التالي:

- (1)أرفض بشدة
- (2)لا أوافق
- (3)لا أوافق ولا أختلف
- (4)أوافق
- (5)أوافق بشدة

توقع الأداء [59] PE					
Gamified learning system will be useful in everyday study.					

سيكون نظام التعلم اللّاعِب مفيدًا في الدراسة اليومية.					
With gamified learning system, I will achieve study goals better. مع نظام التعلم المحبب، سأحقق أهداف الدراسة بشكل أفضل.					
With gamified learning system, I will increase study efficiency. مع نظام التعلم المحبب، سأزيد من كفاءة الدراسة.					
With gamified learning system, I gain more competencies. مع نظام التعلم المحبب، أكسب المزيد من الكفاءات.					

توقع الجهد EE [59]					
It is easy to learn how to use gamified learning system. من السهل تعلم كيفية استخدام نظام التعلم المحبب.					
Usage of gamified learning system is clear and understandable. استخدام نظام التعلم اللّاعِب واضح ومفهوم.					
It is easy to use gamified learning system. من السهل استخدام نظام التعلم المحفز.					
It is easy to become skillful at using gamified learning system. من السهل أن تصبح ماهرًا في استخدام أنظمة التعلم المحاكاة.					

تأثير الاجتماعي [59] Social influence					
People, who are important to me think I should use gamified learning system. يعتقد الأشخاص المهمون بالنسبة لي أنني يجب أن أستخدم نظام التعلم المحبب.					
People who are superior to me will help me in using gamified learning system. سيساعدني الأشخاص المتفوقون علي في استخدام نظام التعلم المحفز.					
In general, the members of my community think I should use gamified learning system. بشكل عام، يعتقد أعضاء مجتمعي أنه يجب على استخدام نظام التعلم المحبب.					
The general opinion in society is that gamified learning system is a good method of education. الرأي العام في المجتمع هو أن نظام التعلم المحبب هو طريقة جيدة للتعليم.					

المرح [97] Playfulness					
I feel that students are happy to use the gamified learning system. أشعر أن الطلاب سعداء باستخدام نظام التعلم المحبب					
I feel that students enjoy their learning using gamified learning system. أشعر أن الطلاب يستمتعون بتعلمهم باستخدام نظام التعلم المحبب					
I feel that the gamified learning system stimulates the curiosity of students. أشعر أن نظام التعلم المحبب يثير فضول الطلاب					
I feel that the gamified learning system encourages students explore. أشعر أن نظام التعلم المحبب يشجع الطلاب على الاستكشاف					

التمتع [153] Enjoyment					
I find using the gamified learning system is interesting أجد أن استخدام نظام التعلم المحبب أمر مثير للاهتمام					
I find using the gamified learning system is not a waste of time أجد أن استخدام نظام التعلم المحبب ليس مضيعة للوقت					
I find using the gamified learning system is fun أجد أن استخدام نظام التعلم المحبب ممتع					
I find using the gamified learning system is not boring أجد أن استخدام نظام التعلم المحبب ليس مملاً					
I find using the gamified learning system is enjoyable أجد أن استخدام نظام التعلم المحبب ممتع					

التكلفة [155], [154] Cost					
I think using gamified learning system could be expensive أعتقد أن استخدام نظام التعلم المحبب قد يكون مكلفاً					
I think the school would not be able to use gamified learning system أعتقد أن المدرسة لن تكون قادرة على استخدام نظام التعلم المحبب					

Using gamified learning system devices could be expensive قد يكون استخدام أجهزة نظام التعلم اللعابي مكلفاً					
The amount of money the school pay for gamified learning system has a direct effect on its intention to adopt it إن المبلغ الذي تدفعه المدرسة مقابل نظام التعلم المحبب له تأثير مباشر على نيتها لاعتماده					
My school will prefer not to use gamified learning system if it costs a lot ستفضل مدرستي عدم استخدام نظام التعلم المحبب إذا كان يكلف الكثير					

Satisfaction [97] الرضى					
I am satisfied with the contents of the gamified learning system. أنا راضٍ عن محتويات نظام التعلم المحبب					
I am satisfied with the functions of the gamified learning system. أنا راضٍ عن وظائف نظام التعلم المحبب					
I am satisfied with the effectiveness of the gamified learning system for improving cognitive development in students. أنا راضٍ عن فعالية نظام التعلم المحفز لتحسين التطور المعرفي لدى الطلاب					

OR [46] الاستعداد التنظيمي					
My school has financial budget to adopt gamified learning system. مدرستي لديها ميزانية مالية لاعتماد نظام تعليمي محبب					
My school has the expert personnel to use gamified learning system. مدرستي لديها موظفين خبراء لاستخدام نظام التعلم المحبب					
My school has technical resources for using gamified learning system. مدرستي لديها موارد تقنية لاستخدام نظام التعلم المحبب					
leaders in my school are willing to invest in gamified learning system. القادة في مدرستي على استعداد للاستثمار في نظام التعلم المحبب					

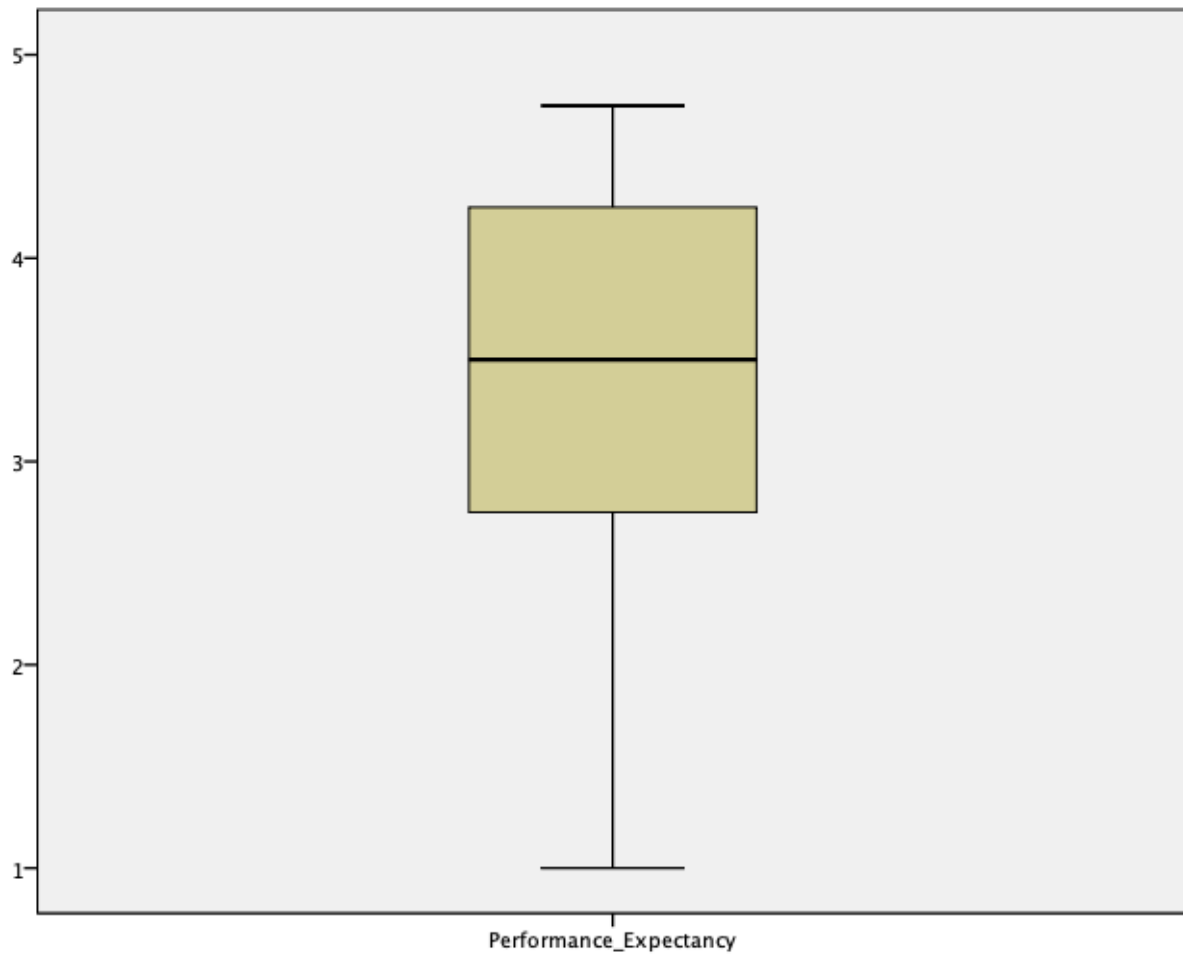
TMS [46]الإدارة العليا					
Top management provide support for the adoption of gamified learning system. تقدم الإدارة العليا الدعم لاعتماد نظام التعلم المحبب.					
Top management offer funds for adoption of gamified learning system. تقدم الإدارة العليا الأموال اللازمة لاعتماد نظام التعلم المحبب.					
Top management knows the benefits of adoption of gamified learning system. تعرف الإدارة العليا فوائد اعتماد نظام التعلم المحبب.					

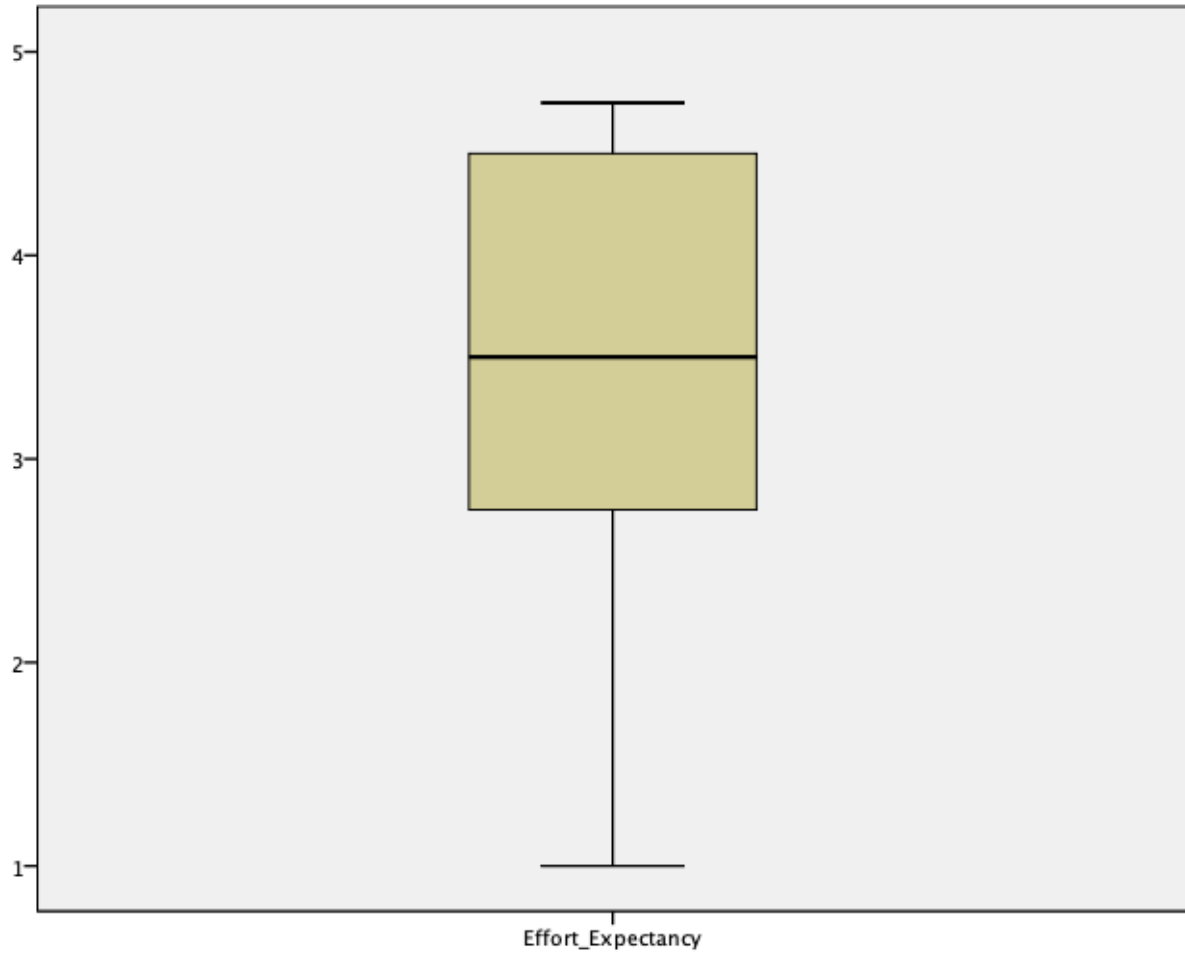
Self-efficacy [56]الكفاءة الذاتية					
I feel confident using gamified learning system even if there was no one around to show me how to do it أشعر بالثقة في استخدام نظام التعلم المحبب، حتى لو لم يكن هناك أحد ليريني كيفية القيام بذلك					
I felt confident using gamified learning system even if I have never did it before شعرت بالثقة في استخدام نظام التعلم المحبب، حتى لو لم أفعل ذلك من قبل					
I felt confident using gamified learning system if I had only the online rules as a reference شعرت بالثقة في استخدام نظام التعلم المحبب إذا كان لدي فقط القواعد عبر الإنترنت كمرجع					
I would feel more confident using gamified learning system if someone showed me how to do it first سأشعر بمزيد من الثقة في استخدام نظام التعلم المحبب إذا أظهر لي أحدهم كيفية القيام بذلك أولاً					
I would know how to use gamified learning system in teaching classes سأعرف كيفية استخدام نظام التعلم المحبب في فصول التدريس					

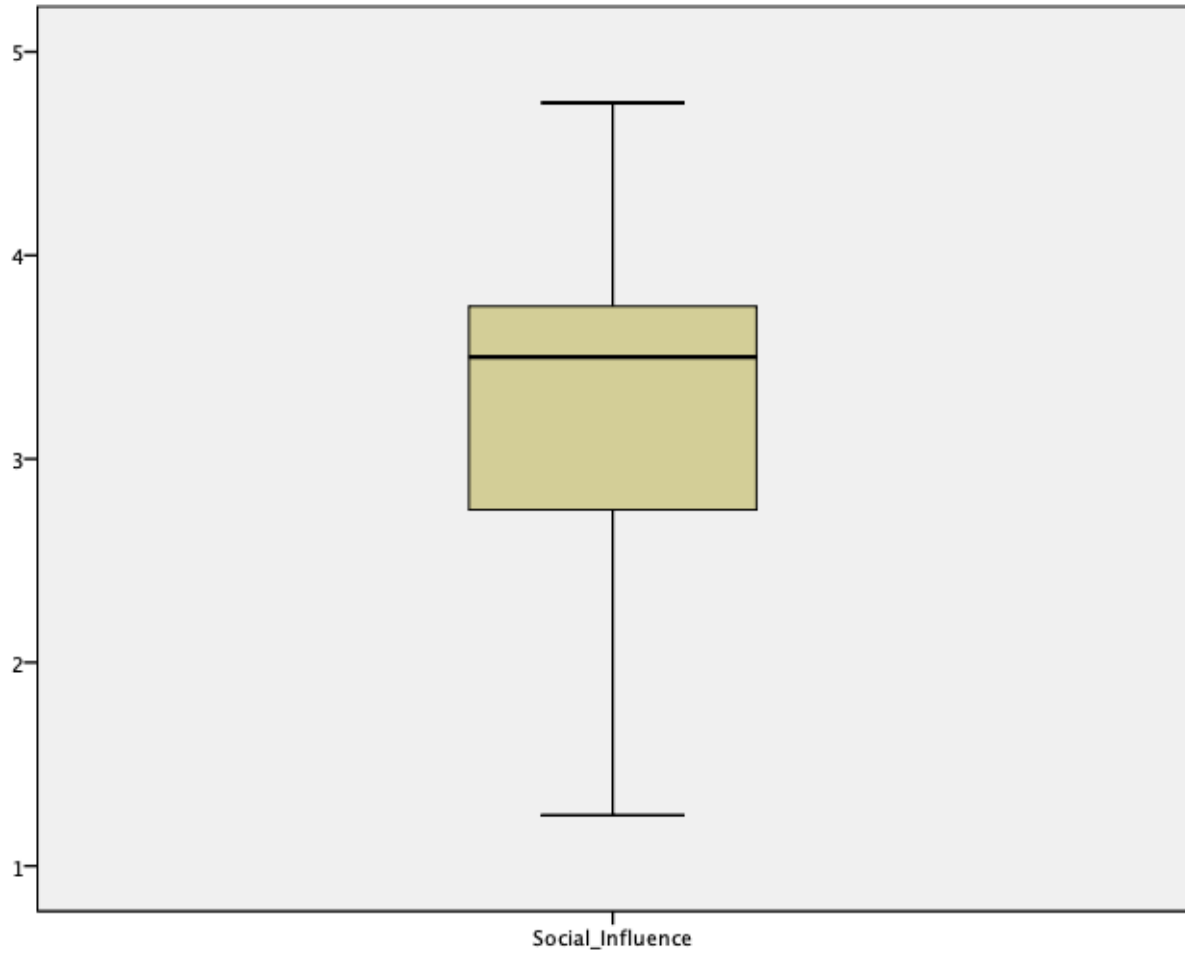
Behavioral intention [59] النية السلوكية					
I think I will use gamified learning system. أعتقد أنني سأستخدم نظام التعلم المحبب					
I intend to use gamified learning system. أنوي استخدام نظام التعلم اللّاعِب					
I plan to use gamified learning system. أخطط لاستخدام نظام التعلم المحبب					

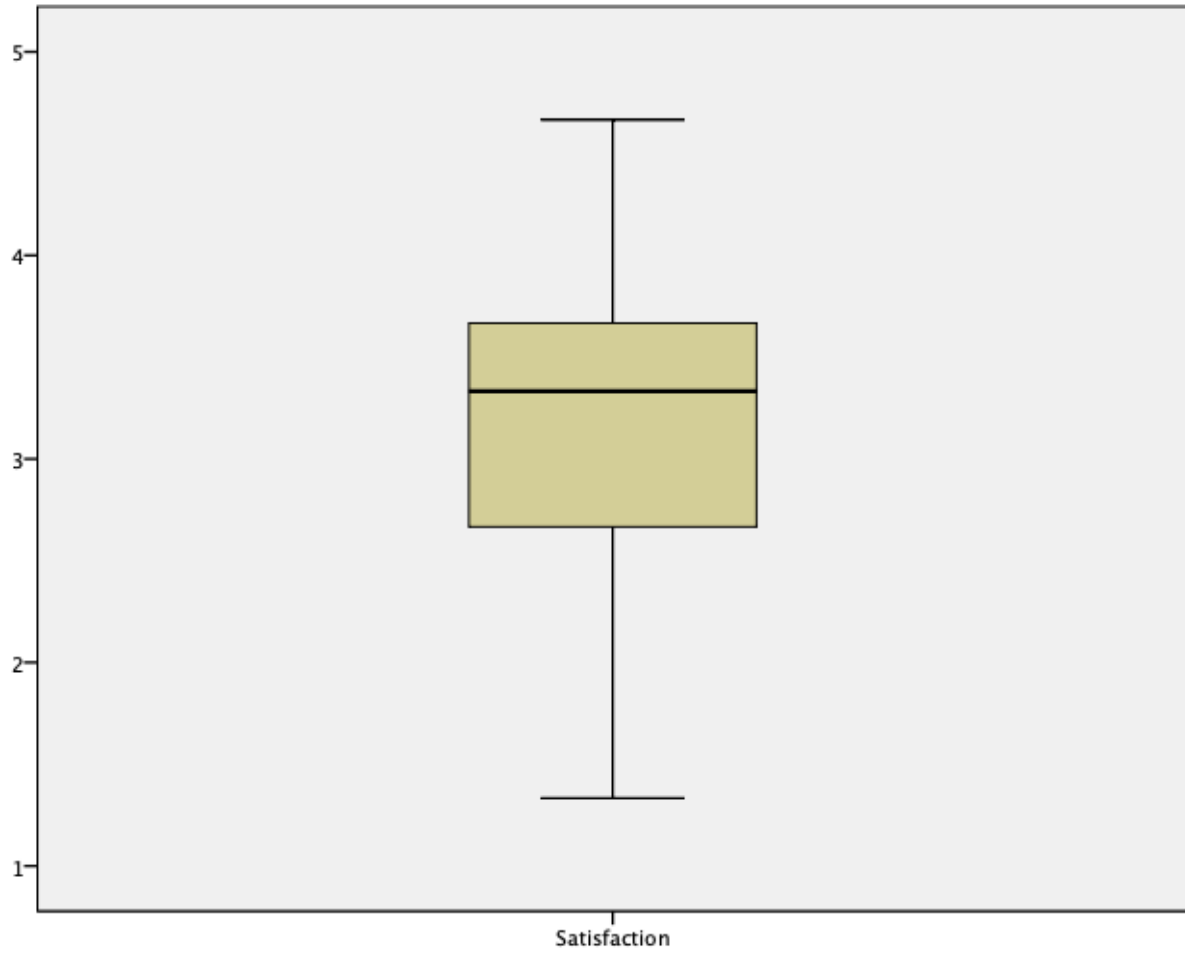
Use Behavior [46] سلوك الاستخدام					
We regularly use gamified learning system for education. نحن نستخدم بانتظام نظام التعلم المحبب للتعليم					
We regularly gamified learning system to increase the students' engagement. لقد قمنا بتدوير نظام التعلم بشكل منتظم لزيادة مشاركة الطلاب					
We regularly use gamified learning system to attract students نستخدم بانتظام نظام تعليمي محبب لجذب الطلاب					
We frequently use gamified learning system in explaining materials. كثيرا ما نستخدم نظام التعلم المحبب في شرح المواد					

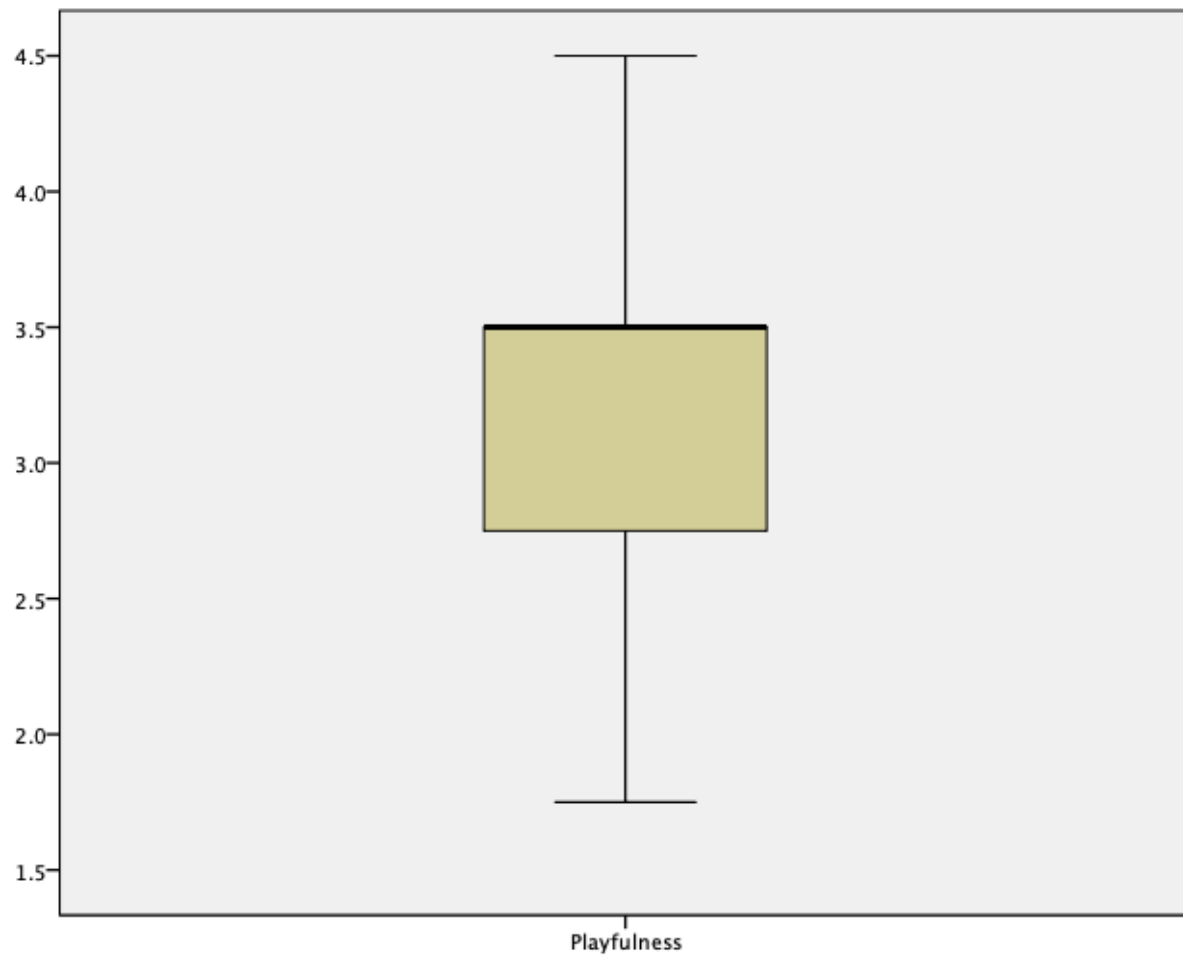
A.2 : OUTLIERS

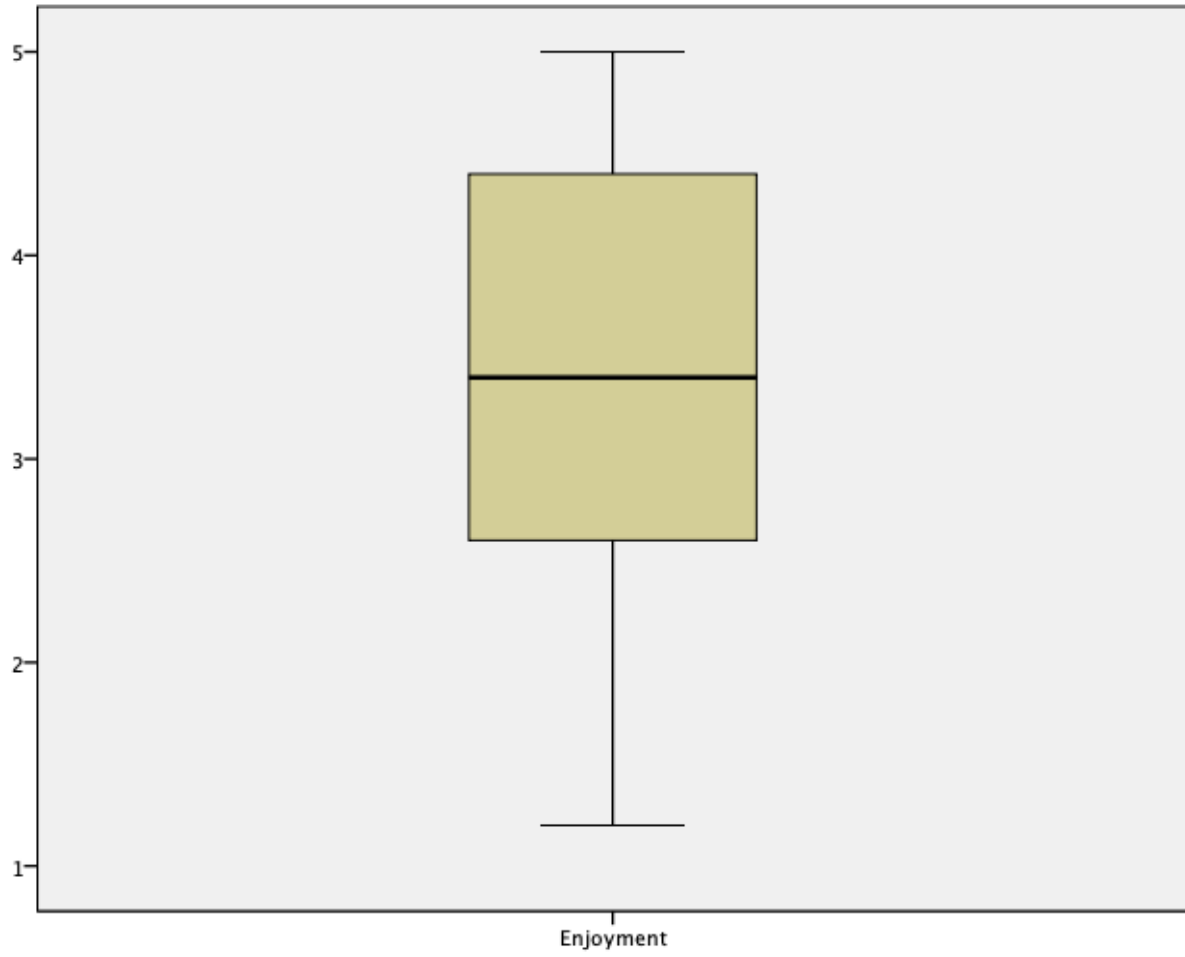


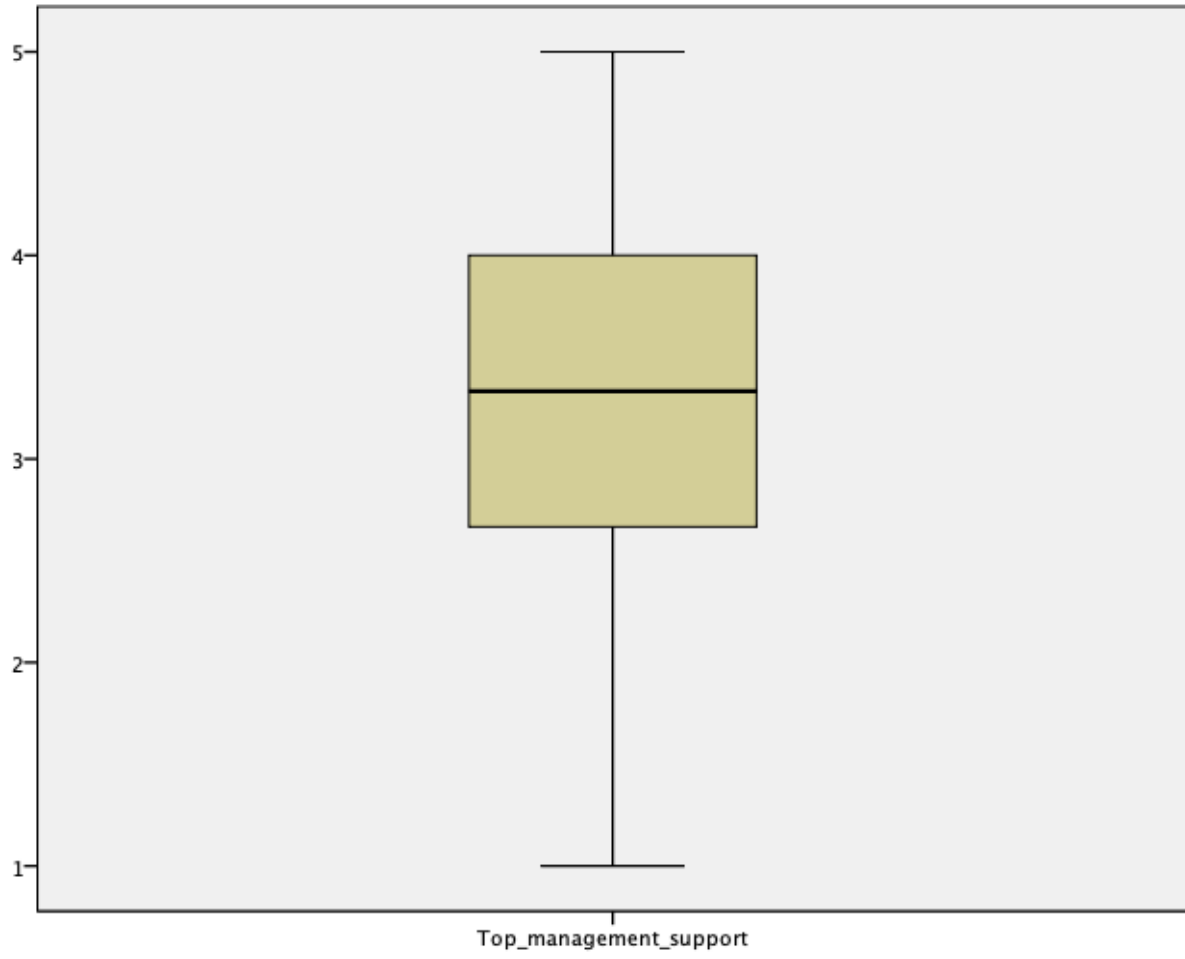


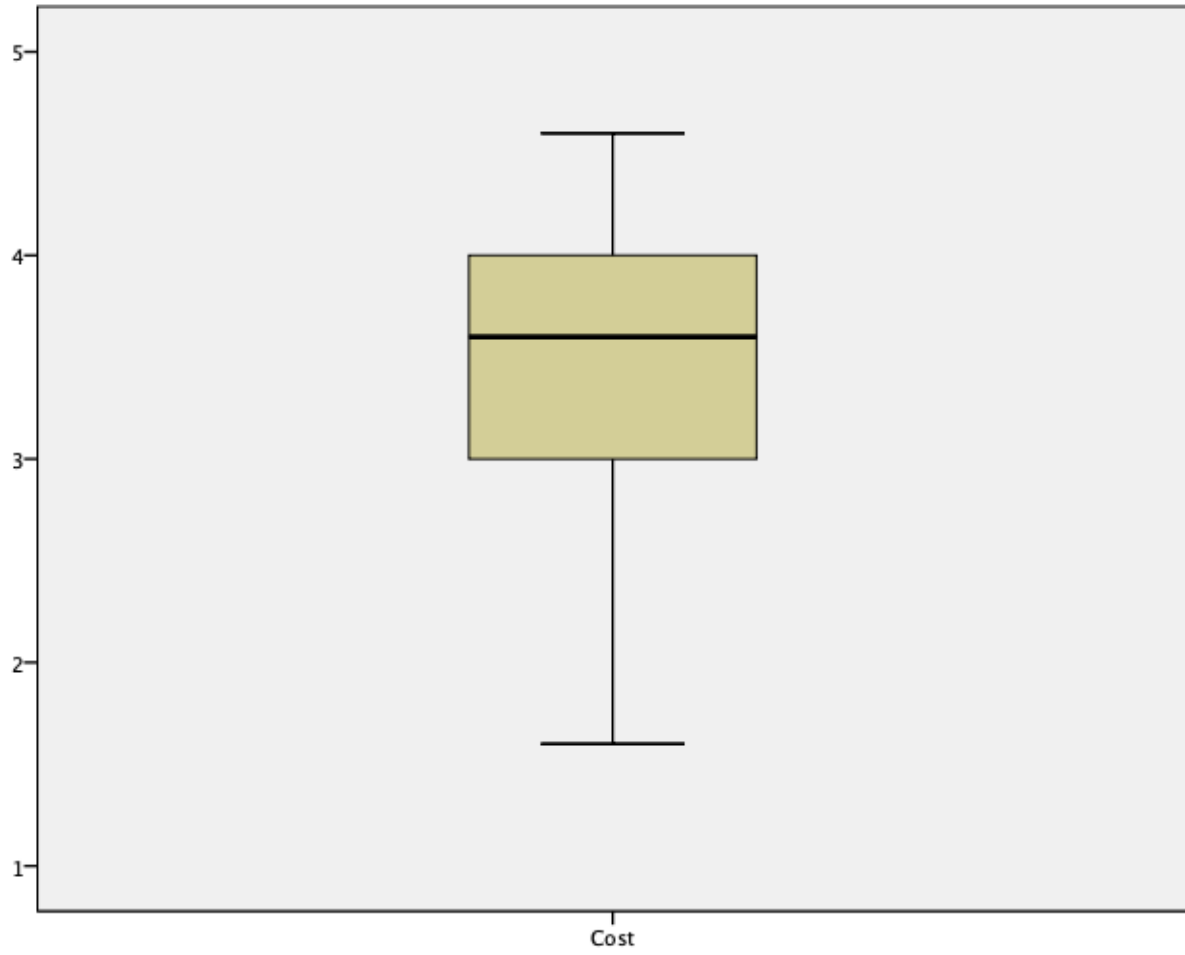


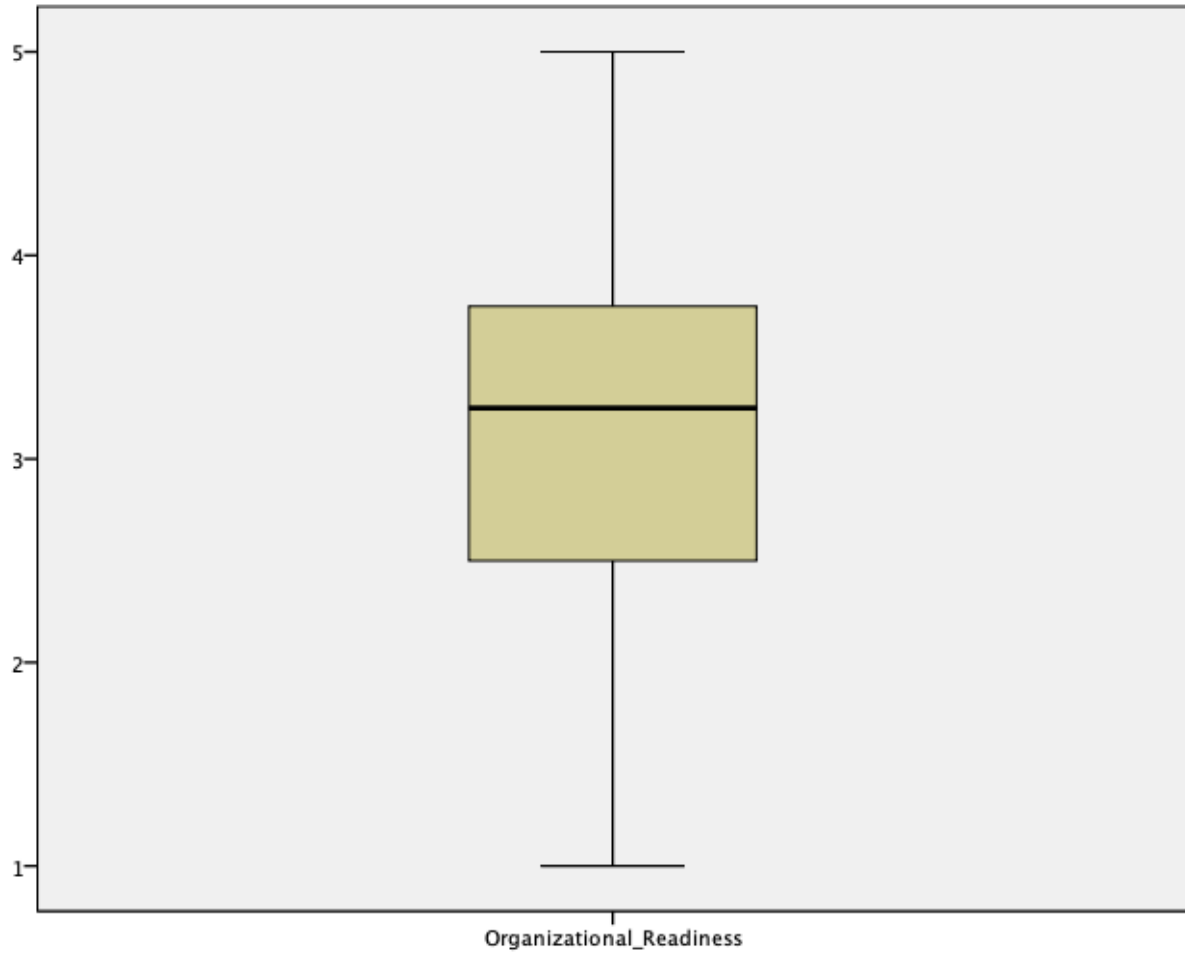


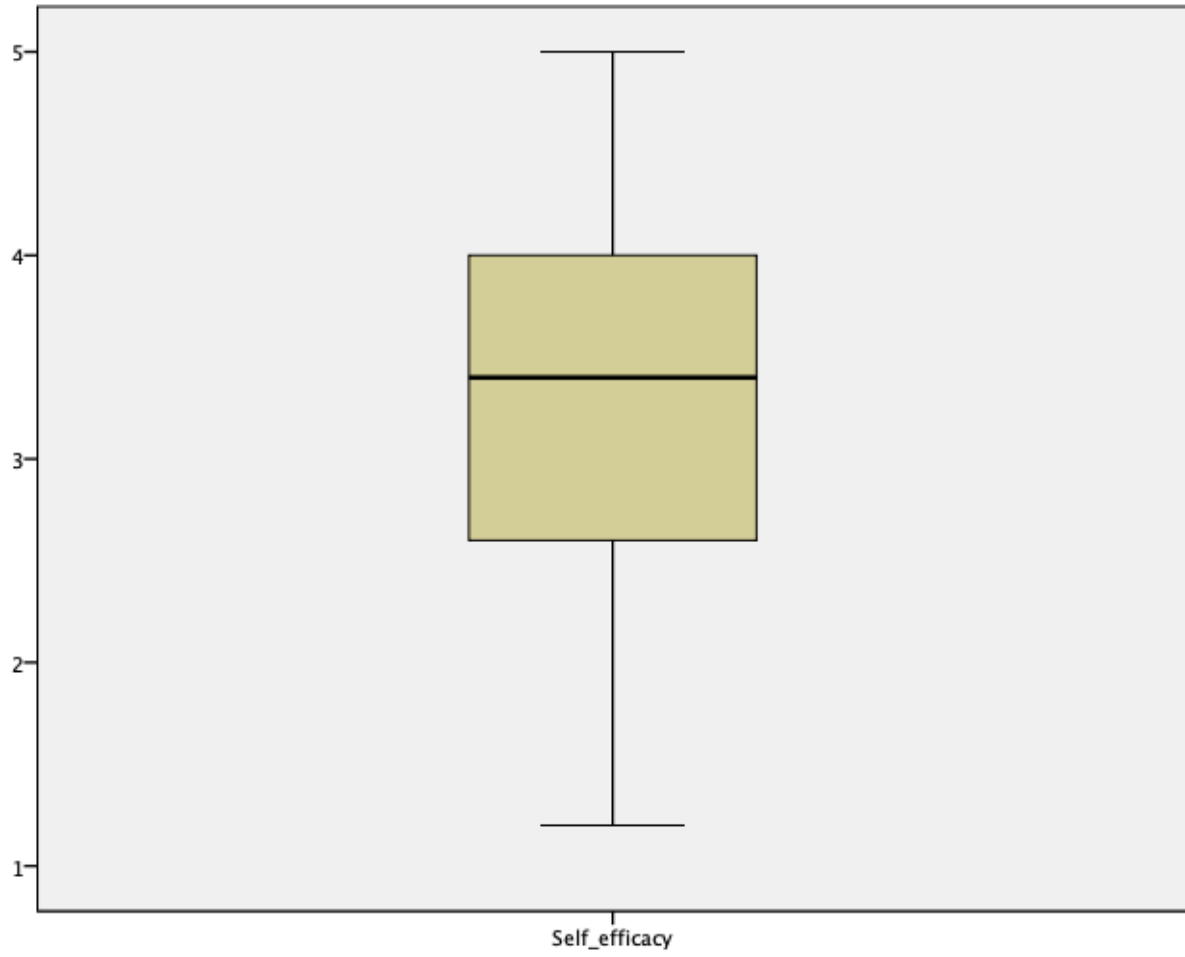


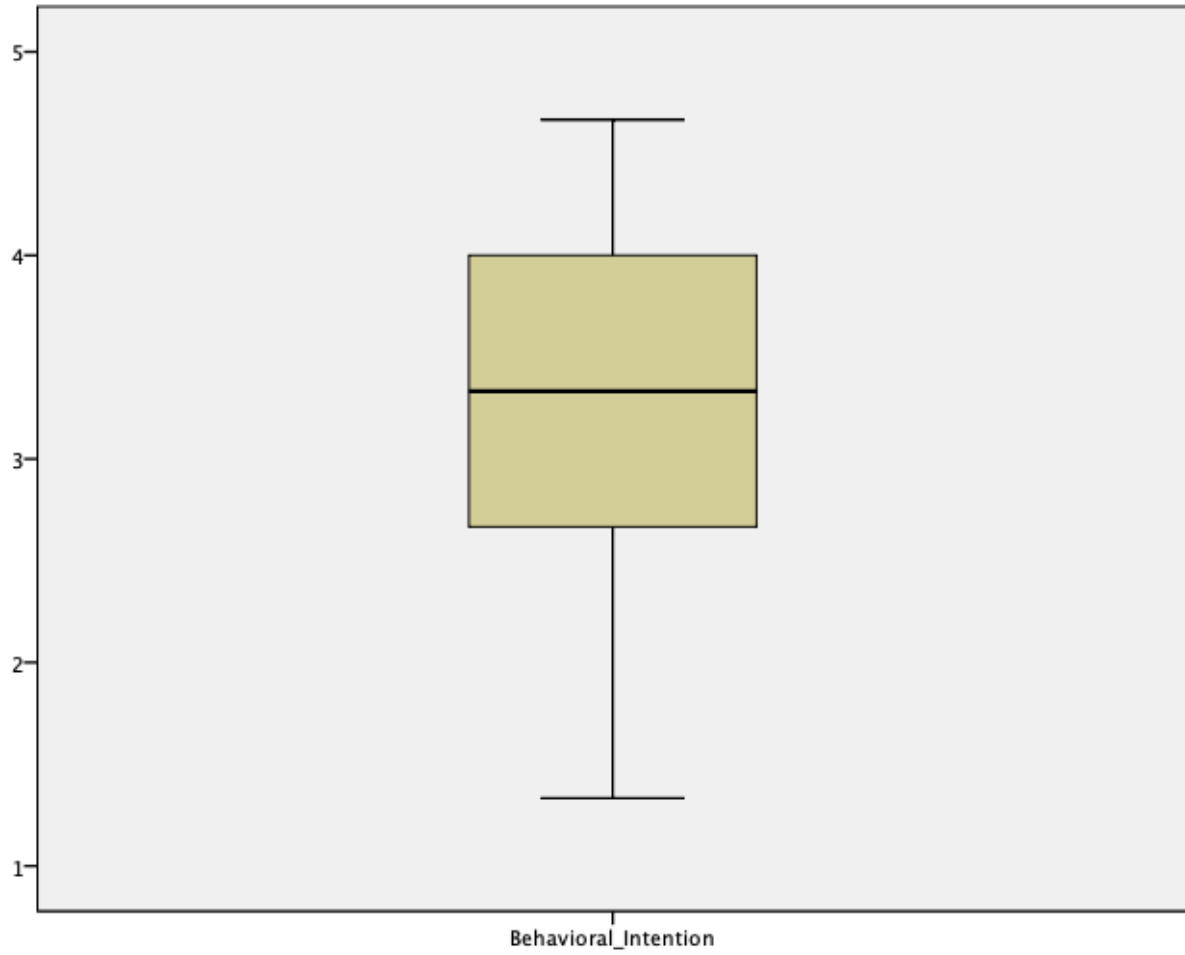


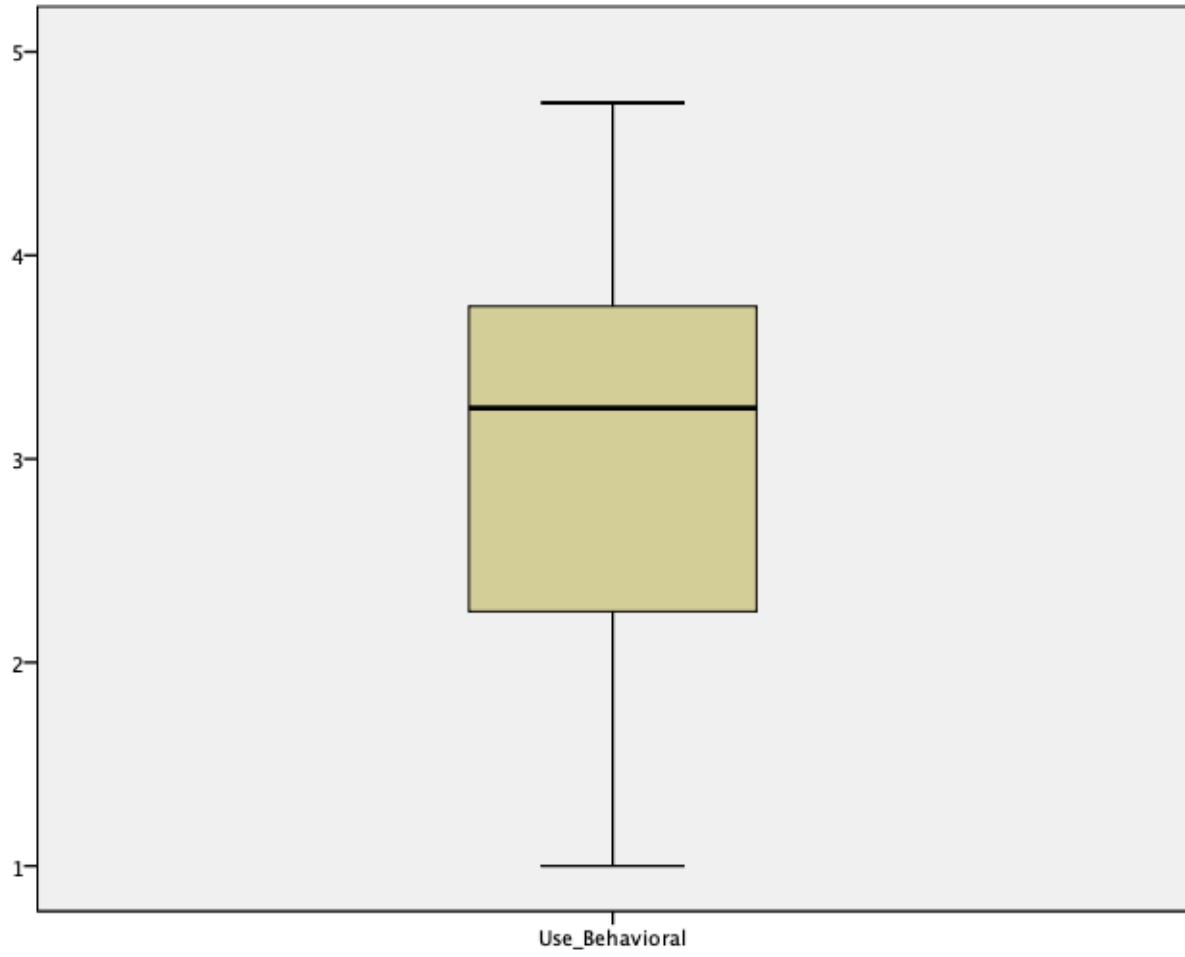




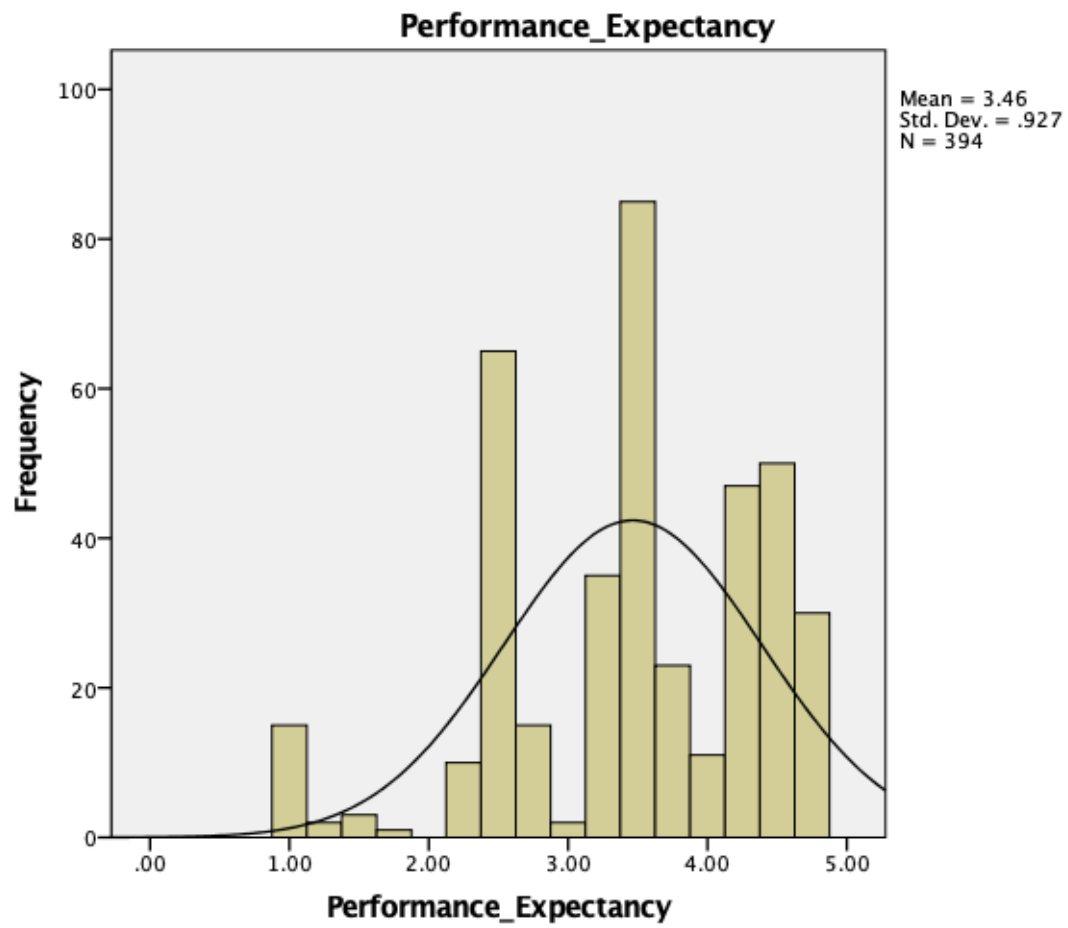


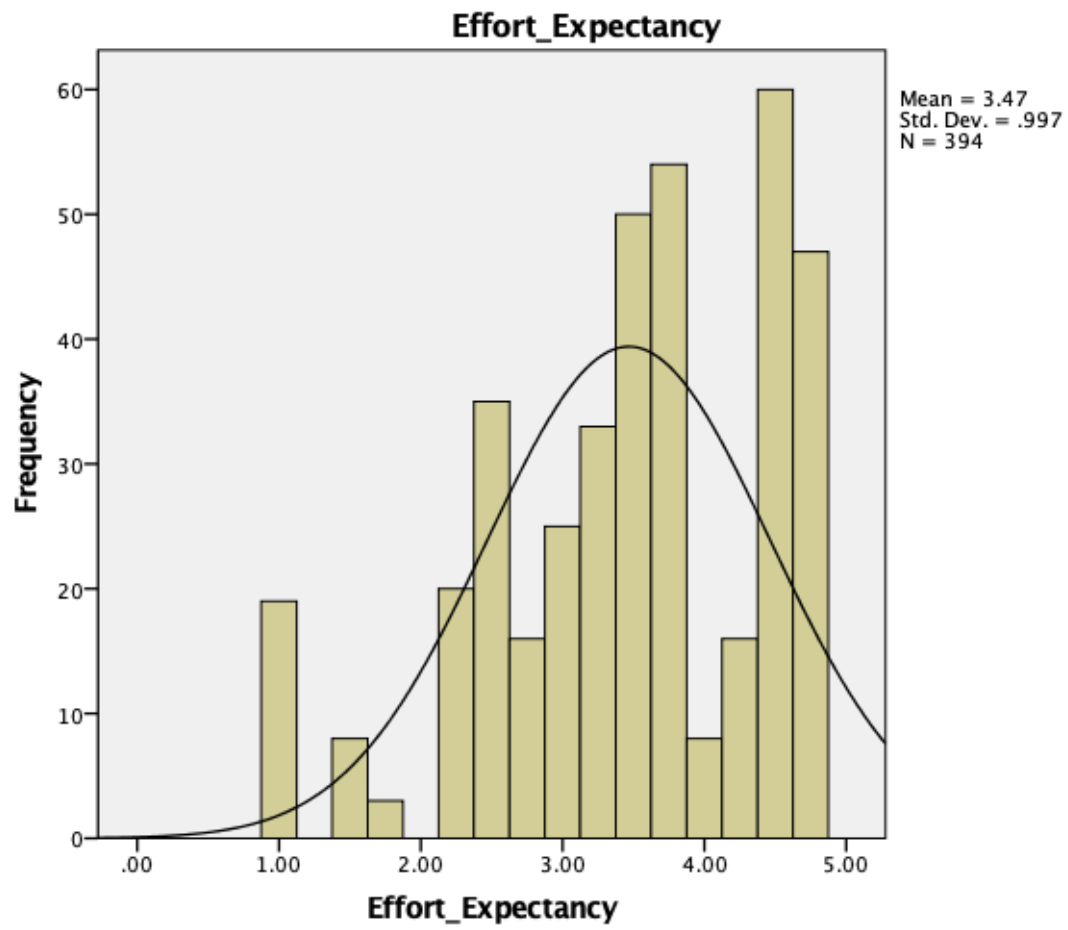


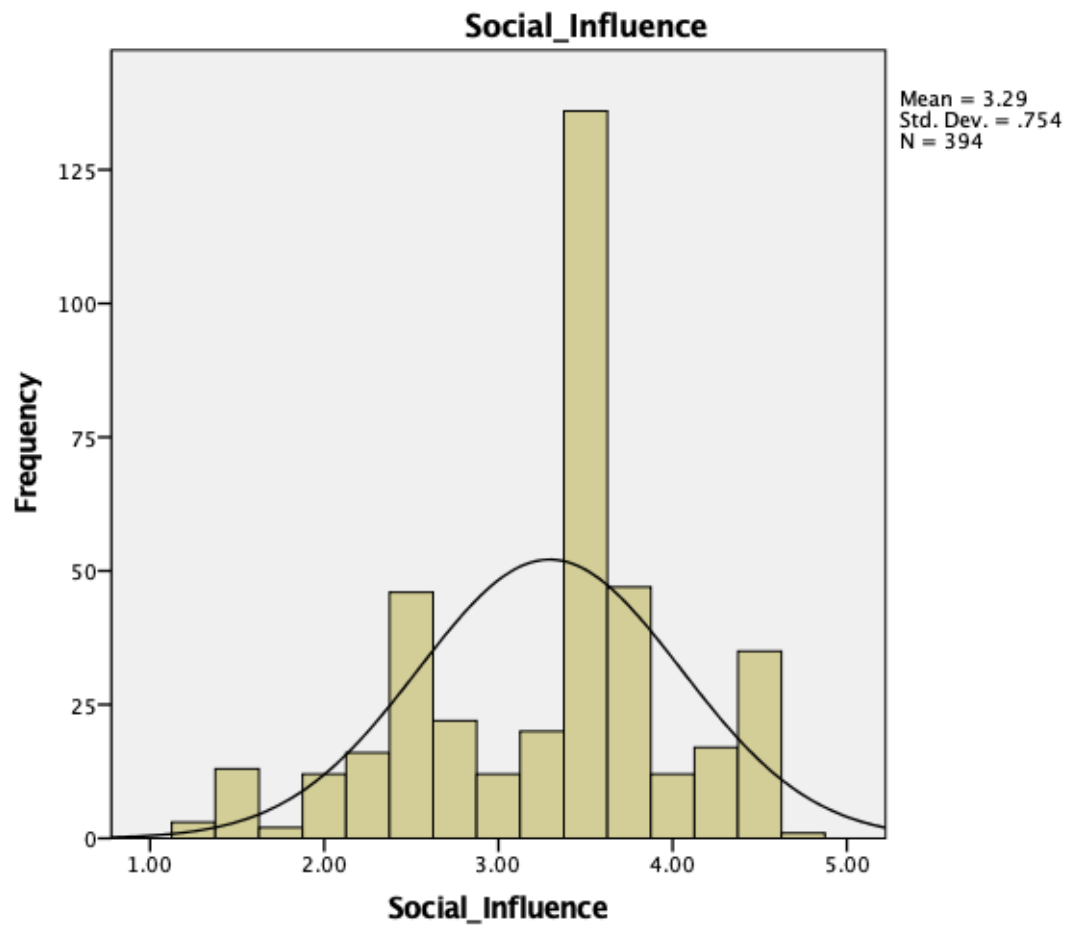


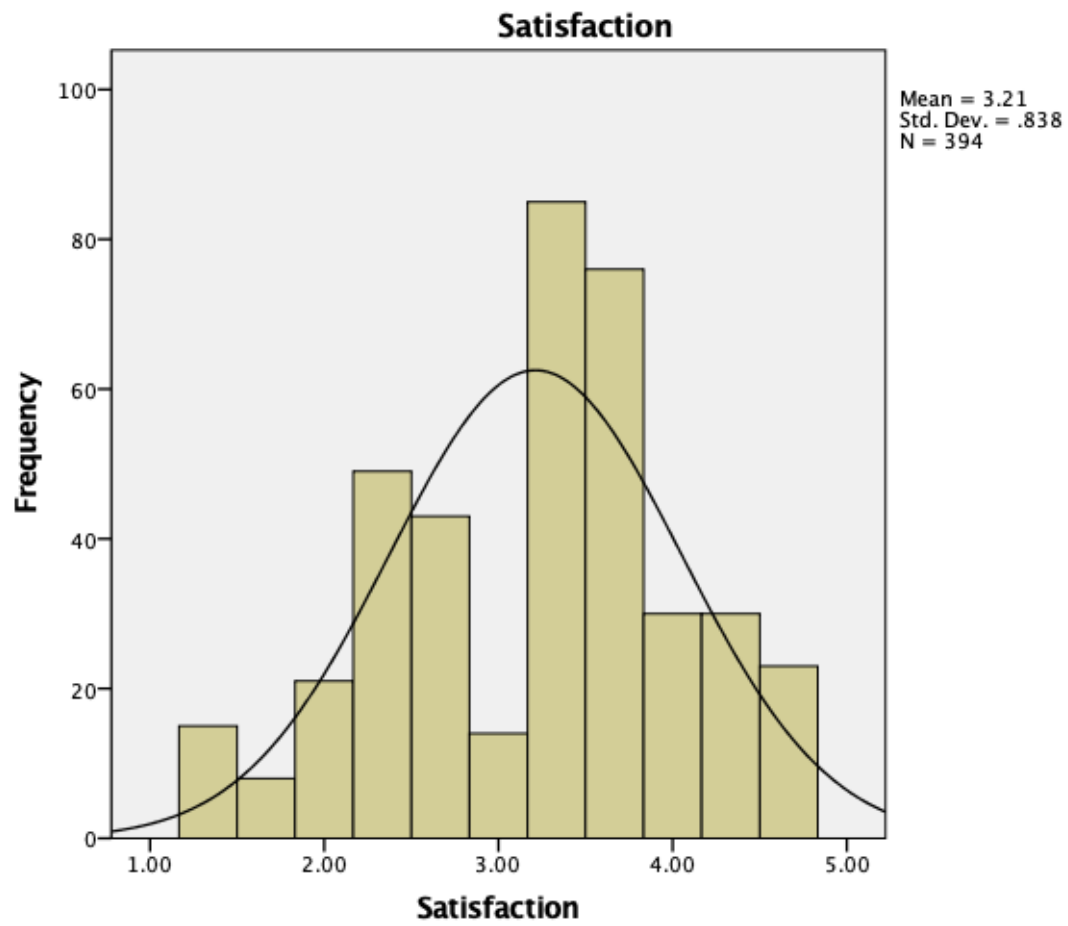


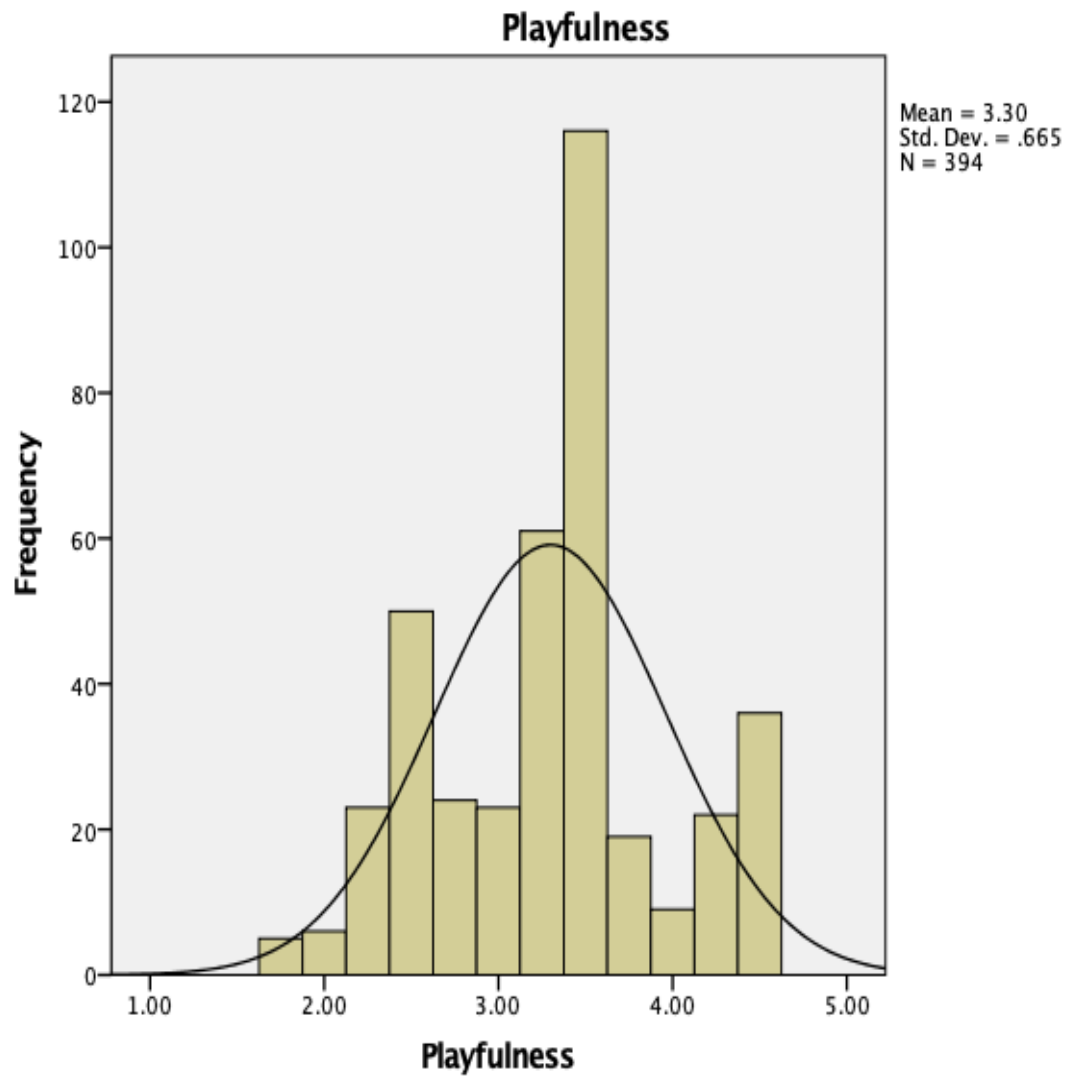
A.3 : NORMALITY

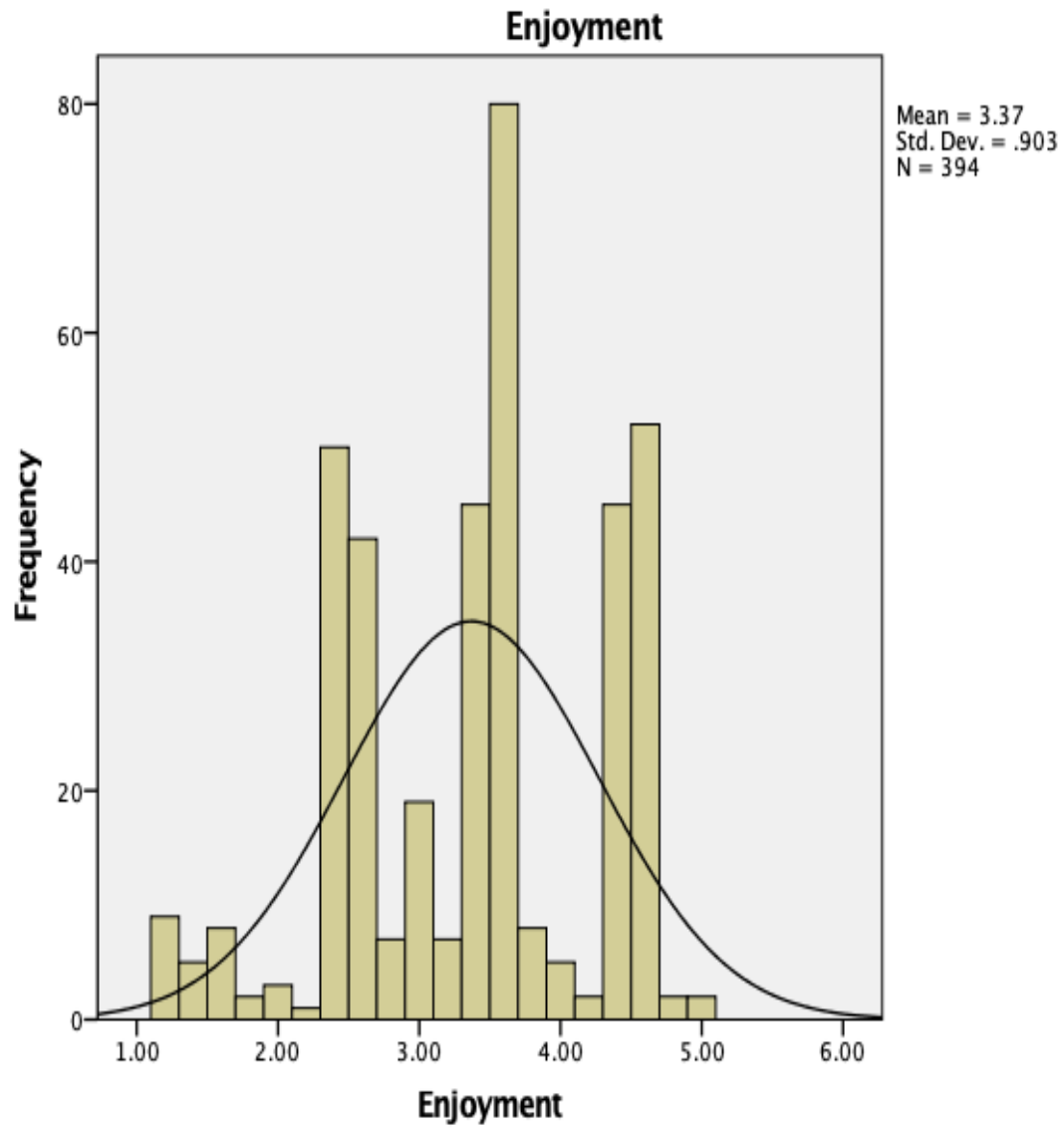


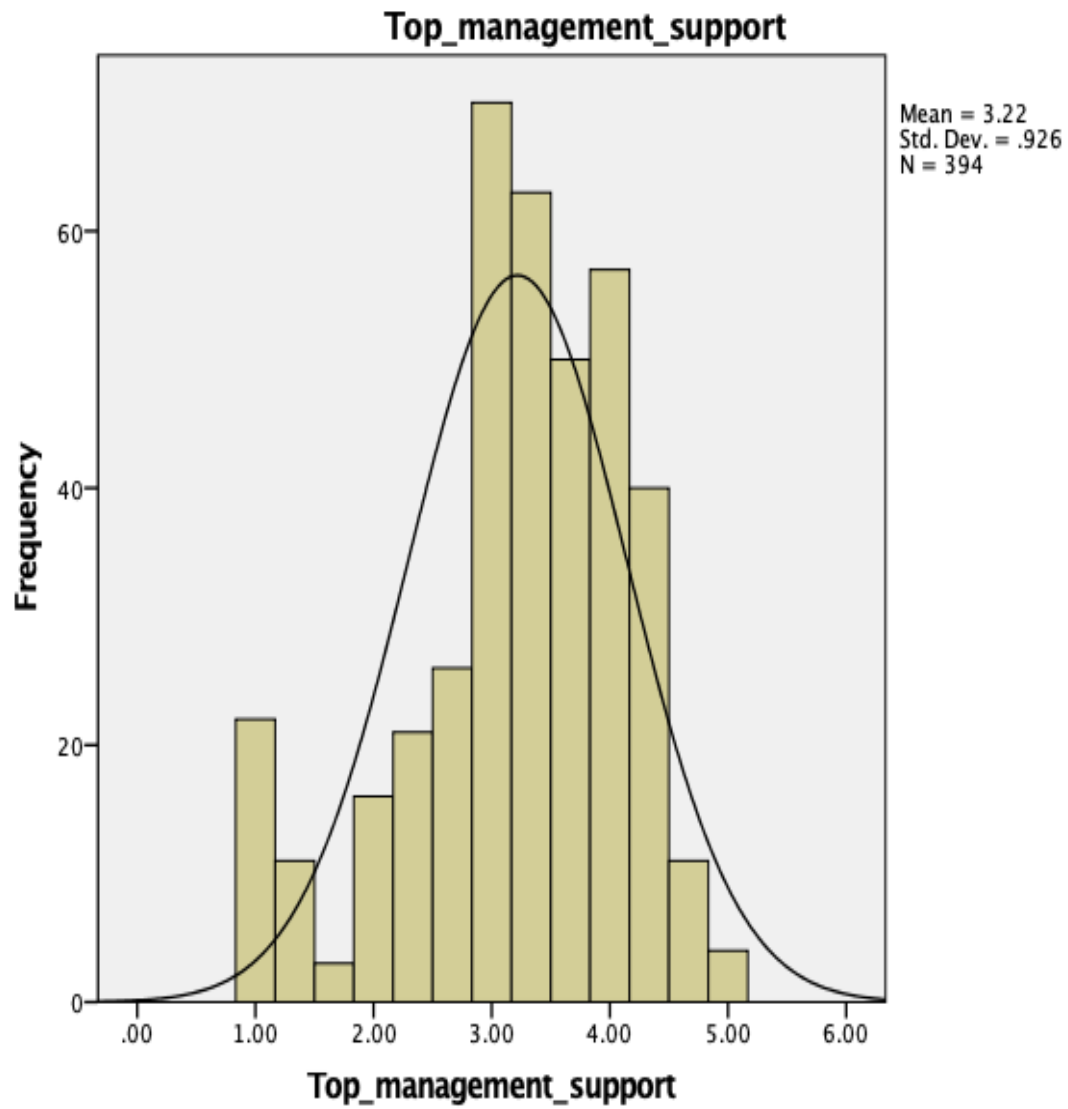


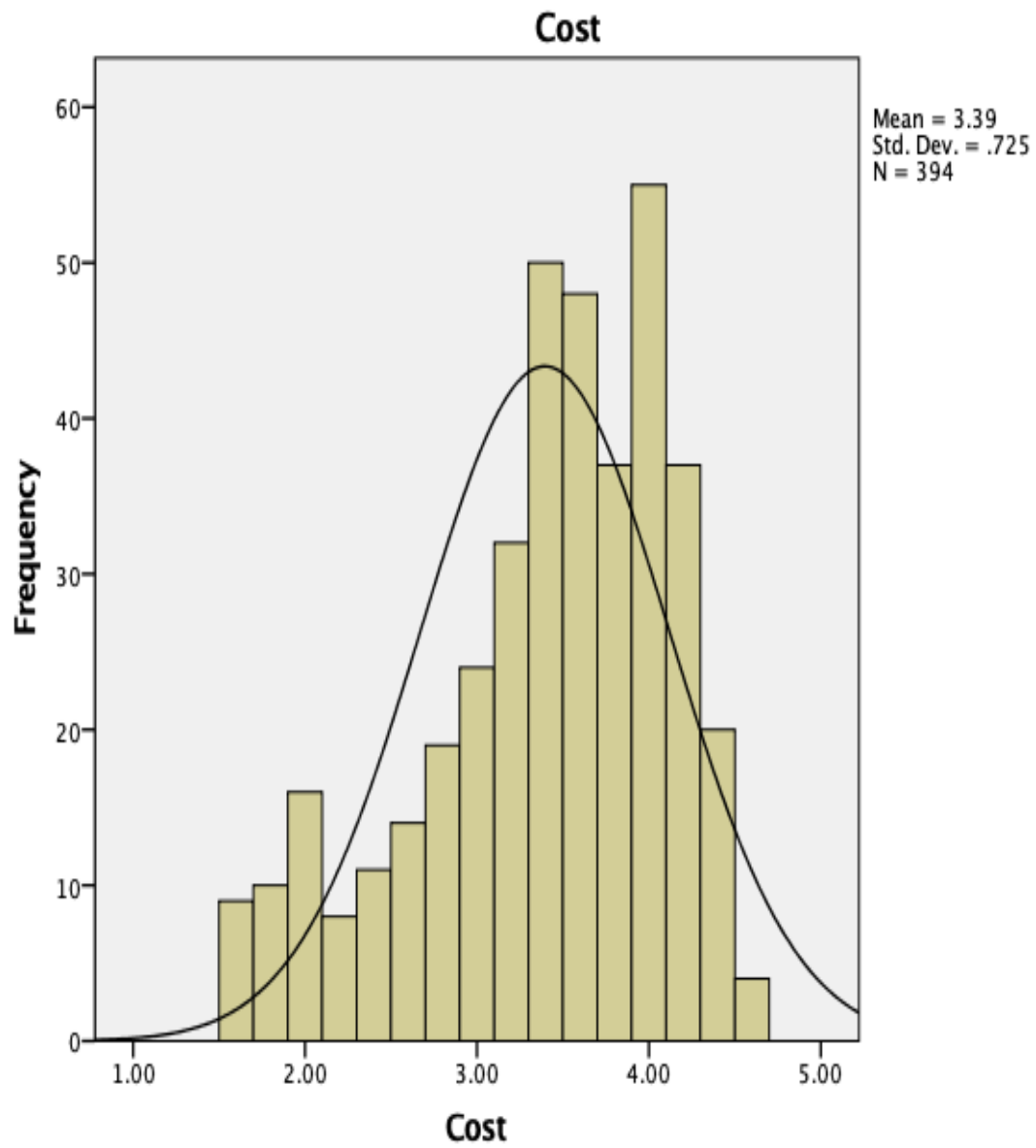


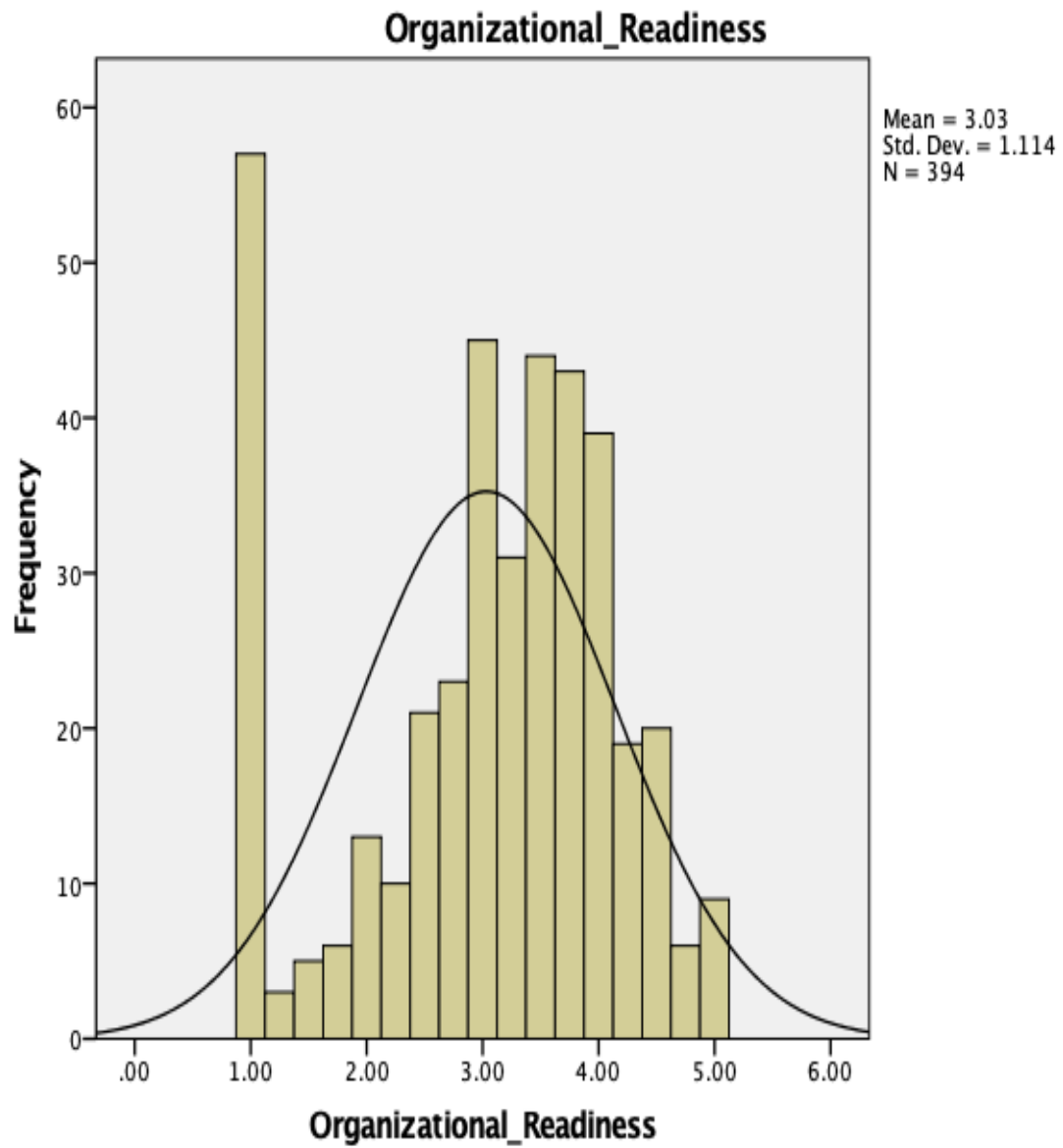


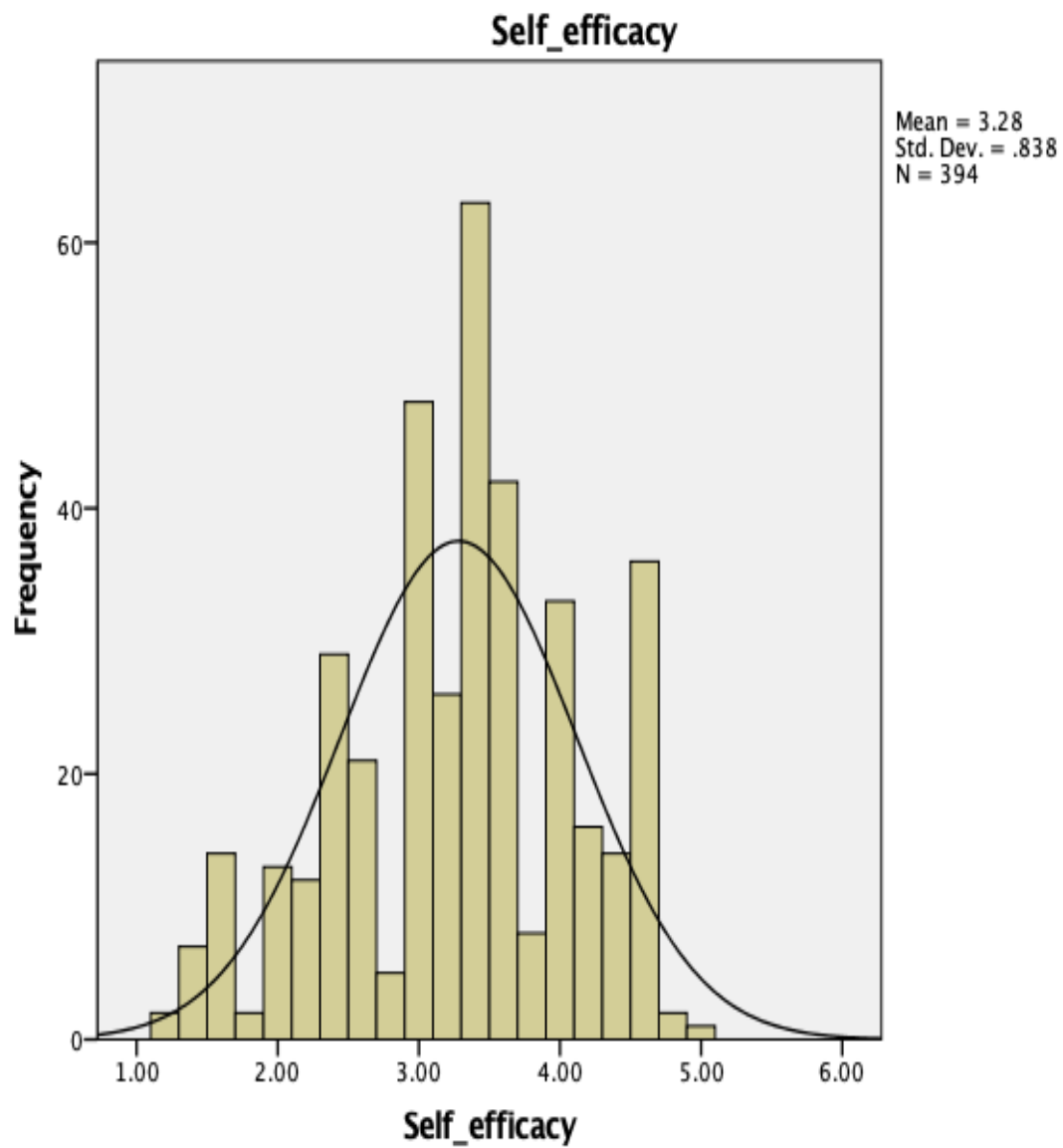


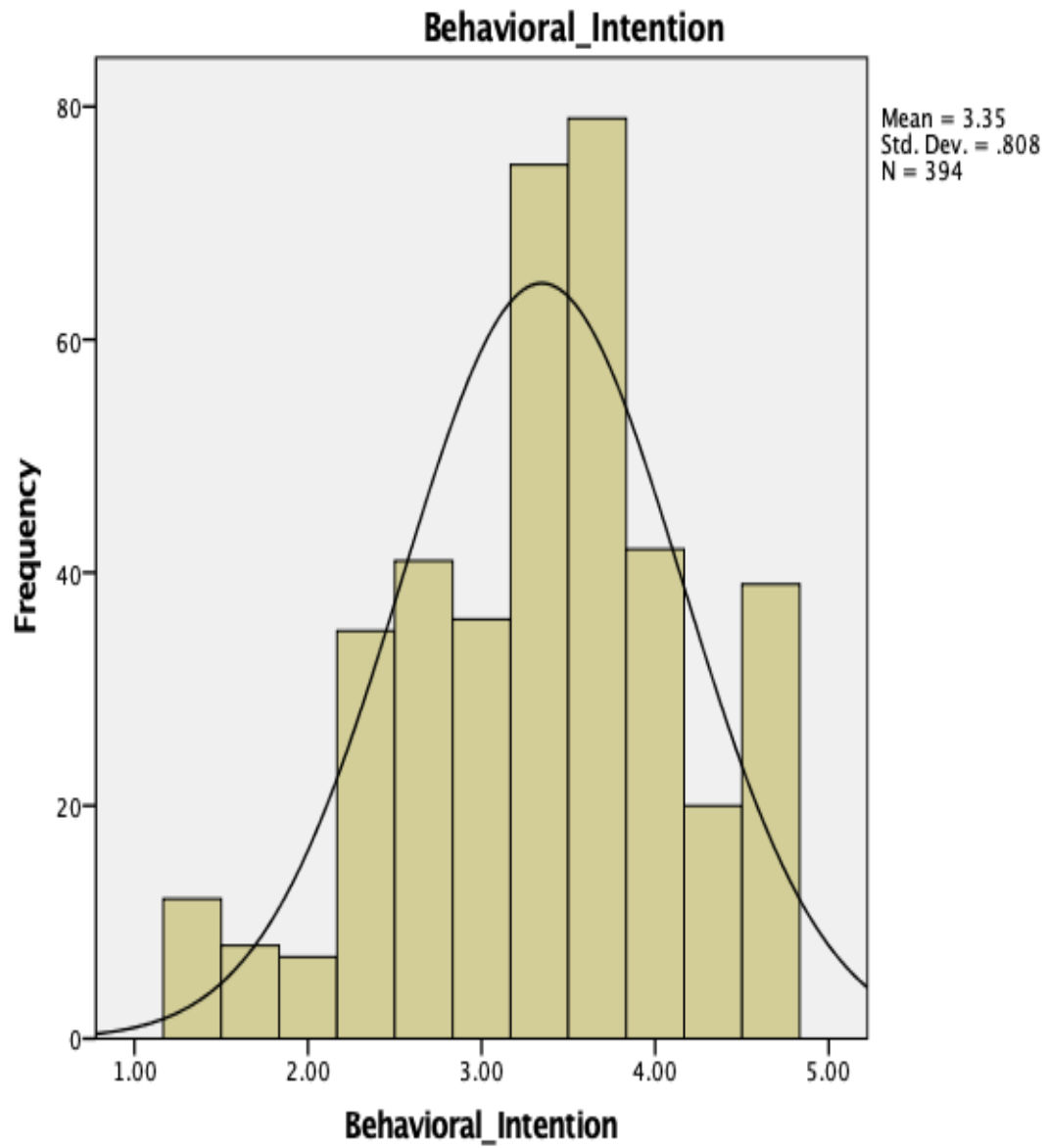












A.4 APPENDIX D: CROSS LOADING

	BI	CO	EE	EN	OR	PE	PL	SE	SI	Satisfaction	TMS	UB
BI1	0.90	-0.15	0.37	0.23	0.45	0.47	0.22	-0.02	0.43	0.46	0.32	0.39
BI2	0.89	-0.08	0.48	0.23	0.46	0.42	0.25	0.07	0.42	0.44	0.39	0.42
BI3	0.92	-0.08	0.45	0.24	0.46	0.46	0.24	0.01	0.45	0.49	0.37	0.40
CO2	-0.10	0.75	0.00	0.05	-0.02	-0.05	0.07	0.07	0.02	-0.03	0.19	0.43
CO3	-0.07	0.86	0.02	0.09	-0.02	0.01	0.05	0.17	0.04	-0.07	0.07	0.05
CO4	-0.08	0.85	-0.02	0.09	-0.01	0.01	0.04	0.22	0.06	-0.01	0.08	0.04
CO5	-0.10	0.86	-0.05	0.10	-0.06	-0.05	0.06	0.19	0.01	-0.04	0.03	0.02
EE1	0.44	0.02	0.92	0.20	0.29	0.56	0.12	-0.03	0.51	0.40	0.39	0.32
EE2	0.41	-0.07	0.90	0.17	0.28	0.57	0.14	-0.06	0.55	0.39	0.34	0.35
EE3	0.44	-0.01	0.92	0.16	0.29	0.56	0.11	0.00	0.53	0.37	0.40	0.31
EE4	0.48	-0.01	0.93	0.20	0.31	0.57	0.11	-0.03	0.51	0.39	0.37	0.33
EN1	0.23	0.07	0.19	0.90	0.14	0.06	0.40	0.06	0.27	0.21	0.14	0.15
EN2	0.23	0.10	0.16	0.88	0.10	0.09	0.43	0.02	0.22	0.22	0.13	0.17
EN3	0.20	0.05	0.16	0.88	0.10	0.04	0.44	0.02	0.23	0.20	0.15	0.14
EN4	0.25	0.15	0.20	0.89	0.10	0.08	0.44	0.04	0.24	0.22	0.11	0.18
EN5	0.23	0.05	0.19	0.90	0.13	0.05	0.47	0.07	0.27	0.20	0.15	0.13
OR1	0.23	-0.06	0.16	0.04	0.82	0.19	0.11	-0.05	0.25	0.17	0.27	0.14
OR2	0.24	-0.04	0.21	0.04	0.83	0.22	0.11	-0.05	0.24	0.15	0.29	0.12
OR3	0.64	-0.02	0.36	0.20	0.88	0.34	0.25	-0.03	0.37	0.30	0.34	0.33
OR4	0.20	-0.01	0.20	-0.01	0.80	0.21	0.09	-0.03	0.21	0.16	0.25	0.12
PE1	0.50	-0.03	0.53	0.10	0.30	0.91	0.14	0.09	0.51	0.44	0.38	0.28
PE2	0.42	0.00	0.56	0.02	0.27	0.89	0.03	0.05	0.49	0.34	0.30	0.26
PE3	0.43	-0.02	0.52	0.04	0.24	0.89	0.04	0.05	0.50	0.40	0.28	0.24
PE4	0.44	-0.05	0.63	0.09	0.34	0.91	0.09	-0.01	0.57	0.40	0.36	0.27
PL1	0.16	0.10	0.07	0.40	0.11	0.07	0.81	0.10	0.13	0.28	0.14	0.15
PL2	0.24	0.05	0.12	0.43	0.22	0.08	0.88	0.00	0.24	0.28	0.15	0.20
PL3	0.20	0.06	0.09	0.39	0.14	0.04	0.85	0.05	0.16	0.28	0.15	0.17
PL4	0.27	0.05	0.15	0.46	0.20	0.11	0.89	0.07	0.22	0.33	0.19	0.19
SA1	0.47	-0.04	0.39	0.20	0.24	0.37	0.31	-0.07	0.40	0.91	0.41	0.39
SA2	0.47	-0.01	0.39	0.20	0.24	0.45	0.30	-0.05	0.44	0.89	0.46	0.41
SA3	0.46	-0.07	0.36	0.24	0.25	0.38	0.32	-0.07	0.38	0.92	0.37	0.37
SE1	0.08	0.22	0.06	0.09	-0.01	0.03	0.05	0.69	0.06	0.01	0.07	0.03
SE2	0.05	0.21	-0.01	0.04	-0.03	0.04	0.06	0.94	0.04	-0.07	-0.01	-0.05
SE3	0.03	0.16	-0.02	0.06	-0.05	0.04	0.02	0.84	0.03	-0.05	-0.02	-0.03
SE4	0.05	0.19	0.01	0.13	-0.03	0.05	0.12	0.81	0.07	-0.02	0.05	-0.01
SE5	0.02	0.20	0.01	0.06	-0.03	0.05	0.06	0.84	0.05	-0.02	0.01	-0.02
SI2	0.37	0.02	0.45	0.22	0.24	0.49	0.19	0.02	0.85	0.41	0.32	0.29
SI3	0.43	0.03	0.54	0.20	0.31	0.52	0.17	0.08	0.86	0.38	0.29	0.31

SI4	0.45	0.04	0.50	0.29	0.36	0.49	0.24	0.01	0.91	0.38	0.40	0.36
TMS1	0.36	0.03	0.35	0.12	0.34	0.36	0.20	-0.02	0.33	0.42	0.89	0.28
TMS2	0.32	0.04	0.34	0.14	0.27	0.32	0.14	-0.07	0.35	0.41	0.89	0.32
TMS3	0.33	0.23	0.34	0.13	0.30	0.25	0.13	0.02	0.31	0.32	0.75	0.67
UB1	0.43	0.13	0.38	0.14	0.29	0.28	0.18	-0.06	0.35	0.35	0.48	0.88
UB2	0.36	0.27	0.31	0.13	0.22	0.22	0.18	0.00	0.27	0.34	0.46	0.87
UB3	0.39	0.14	0.28	0.18	0.21	0.25	0.19	-0.06	0.34	0.41	0.39	0.89
UB4	0.40	0.10	0.29	0.17	0.22	0.27	0.20	-0.10	0.34	0.42	0.43	0.91

