# DAFFODIL INTERNATIONAL UNIVERSITY

**“WHY TO USE M-LEARNING?”**

**BY**

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This report was submitted to partially fulfill the requirements for the Master of Science degree in Management Information Systems.

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**JULY 2024**

## APPROVAL

This Thesis titled **"WHY TO USE M-LEARNING?"**, submitted by **Khadhija Akter Nowrin** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Master of Science in Management Information System and approved as to its style and contents. The presentation has been held on **06/07/2024**.

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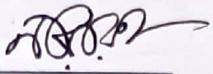

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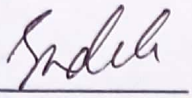

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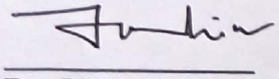

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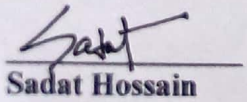

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# DECLARATION

I hereby declare that this project has been done by me under the supervision of **Dr. Arif Mahmud, Associate Professor & Program Director MIS, Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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# ACKNOWLEDGEMENT

Firstly, I thank the Almighty God my sincere gratitude and thanks for His heavenly favor, which enables me to successfully finish the final year project/internship. I would like to express my sincere gratitude and debt of gratitude to **Dr. Arif Mahmud**, **Associate Professor and Program Director** of the MIS at Daffodil International University, Dhaka's CSE Department. My supervisor has extensive knowledge and a strong interest in the topic of "**Information systems**," which makes him ideal for this research. This research could not have been successfully done without his unending patience, academic direction, continuous encouragement, steady and enthusiastic supervision, constructive criticism, insightful counsel, and reading numerous subpar versions and editing them at every turn.

I would like to extend my sincere gratitude to the CSE department head, **Professor Dr. Sheak Rashed Haider Noori**, as well as the other faculty and personnel of Daffodil International University, for their kind assistance in helping me to complete my research.

Lastly, I must respectfully thank my parents for their unwavering support and patience.

# ABSTRACT

The education sector has undergone a transformation due to the swift progress of mobile technologies, offering new avenues for learning through mobile learning (m-learning). This study explores the critical factors influencing the utilization and impact of mobile learning can be evaluated through the Information Systems (IS) Success Framework. The variables examined encompass System Quality (SYSQ), Service Quality (SERQ), Information Quality (INFQ), Self Efficacy (SE), Social Influence (SI), Attitude (ATT), Symbolic Adoption (SA). By employing SmartPLS for data analysis, we aim to understand the relationships between these variables and their impact on m-learning success. The findings suggest that high self-efficiency, superior system and information quality, reliable service quality, positive social influence, and favorable attitudes towards m-learning significantly contribute to its symbolic adoption. This research provides valuable insights for educators, policymakers, and technology developers to enhance m-learning systems, ultimately promoting a more effective and engaging learning experience. Anyone who wants to plan, organize, and execute a mobile learning initiative might find the paper helpful.

**Keywords:** M-learning, System Quality (SYSQ), Service Quality (SERQ), Information Quality (INFQ), Self Efficacy (SE), Social Influence (SI), Attitude (ATT), Symbolic Adoption (SA).

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# CHAPTER 1

# Introduction

## 1.1 Introduction

We find it difficult to put down our smartphones down. It is our standard tool for everything such as chatting with family and friends, ordering food, online shopping, playing games, and other such activities. Should we also use smartphones for gaining knowledge? The use of mobile devices, such as smartphones and tablets, to support learning anytime, anywhere is referred to as mobile learning, or m-learning. Mobile technology can be used to help students more effectively both within the classroom and when they are navigating the context of their study. This chapter provides an overview of the study's background, motivation, and rationale, setting the stage for a detailed examination of the factors influencing m-learning. The widespread use of mobile technology has transformed education and given access to information and learning materials. This thesis explores the transformative potential of mobile learning in modern education, focusing on its benefits, challenges, and future prospects. Technology is a vital part of our lives in the twenty-first century, and in order to use it to rethink or reengineer education and training systems, professionals, educators, and students must reevaluate their core values. Additionally, these electronic devices play an important role towards supporting anybody with huge advantages. Mobile learning is a modern approach to accessing diverse content through mobile devices. If we have an Internet-connected smart mobile device, we can learn at any time from any location.

This thesis uses SmartPLS as a powerful instrument to analyze the variables. I use the “Information systems (IS) success model”as a proposed model. The IS success model identifies and describes the relationships among the variables: System Quality (SYSQ), Service Quality (SERQ), Information Quality (INFQ), Self Efficacy (SE), Social Influence (SI), Attitude (ATT), Symbolic Adoption (SA) .

Due to its ability to facilitate communication, processes, and information access at any time and from any location, mobile technology opens up novel opportunities for people. The internet revolutionized e-learning, and now the strength of wireless technologies for mobility is redefining it (McGreal, 2009). By the close of 2011, there were 6 billion mobile subscriptions globally, with the majority of people in developing countries accessing the Internet via mobile devices (International Telecommunication Union, 2012).

The objective of this thesis report is to give valuable information to future research by offering extensive summary, practical perspectives, and a guideline for future research with the help of SmartPLS and IS Success Model.

### 1.2 Motivation

This study is motivated by the increasing acknowledgment of mobile learning as an essential element of contemporary education. Despite its potential, the adoption and effectiveness of m-learning are influenced by various factors that need to be understood comprehensively. This study aims to identify and analyze these factors to enhance m-learning experiences and outcomes. Mobile learning has gained significant traction due to its ability to address various educational challenges and enhance the learning experience. The motivation to use mobile learning can be understood from multiple perspectives, including students, educators, and educational institutions. Here are some important advantages of mobile learning:

1. **Accessibility:** We can access educational resources anywhere at any time through mobile devices, which make education more flexible. This is particularly beneficial for students.
2. **Engagement and Interactivity:** Mobile learning offers interactive and multimedia-rich content that can enhance student engagement. Features such as gamification, quizzes, and multimedia presentations cater to diverse learning styles and can make learning more enjoyable and effective.
3. **Personalized Learning:** Mobile learning facilitates personalized education by enabling students to learn at their own pace and according to their

unique needs and preferences. Mobile learning can provide customized content and feedback, helping to address different learning gaps and strengths.

4. **Collaboration and Communication:** Students and educators can communicate and work together more easily due to mobile devices. Tools such as discussion forums, social media, and instant messaging enable real-time interaction and support a community of learning.

5. **Cost-Effectiveness:** Mobile learning can minimize the cost needed for infrastructure and materials. Open educational resources (OER) and online courses available on mobile platforms can provide high-quality education at a lower cost.

6. **Future-Readiness:** As the world becomes increasingly digital, proficiency with mobile technology is essential. Mobile learning helps prepare students for the future by developing their digital literacy and technical expertise, which is essential for success in the current industry.

By understanding these motivations, educational institutions can plan and execute mobile learning initiatives to meet the needs of their students and educators. This thesis will further explore these motivations through empirical research, providing a comprehensive examination of the contributing elements driving the usage of mobile learning and its impact on educational outcomes.

### 1.3 Rationale of the Study

This study needs to bridge the gap between the theoretical understanding of m-learning and its practical implementation. By utilizing the Information Systems (IS) Success Framework, this research indicates the positive and negative impact of variables. The rationale for integrating mobile learning into educational systems is multifaceted, reflecting its potential to address existing educational challenges and its alignment with contemporary educational goals. Students can access educational resources at any time and from any location by utilizing mobile devices and the Internet through a kind of learning technique known as mobile learning, or m-learning. For mobile learning to be successful and its implementation to be effective, the components must be properly arranged, and the interactions between the different aspects must be combined in an efficient and optimal way. Billions of people are using mobile phones and it is increasing day by day. All generations can benefit from m-learning

because it has so many advantages. When mobile learning are adopted and used in educational settings, instructors and students may have more opportunities to learn by using these tools, which they are already used to, encouraged to use, and feel secure using (Arpaci 2019).

This section outlines the key reasons why mobile learning is a compelling and necessary component of modern education.

- **Access to Education:** Mobile learning can provide educational opportunities to students in remote, rural, and underprivileged regions. This can help bridge the educational divide and promote equity.
- **Affordable Learning Solutions:** Mobile learning can reduce costs associated with physical textbooks, transportation, and other expenses related to traditional education. This makes education more affordable and accessible to a broader population.
- **Enhancing Educational Quality:** The integration of videos, animations, interactive activities can increase the effectiveness and engagement of learning.
- **Facilitating Continuous and Lifelong Learning:** Students can access educational resources on a flexible schedule, at anytime, anywhere, via mobile learning.

According to Sánchez-Prieto et al. (2016), m-learning is a type of instruction that is closely related to e-learning and falls under the independent typology, which allows for the teaching and learning process to take place in a digital setting. The rationale for mobile learning is grounded in its ability to enhance educational accessibility, quality, and relevance in today's digital age. By addressing educational inequities, providing engaging and personalized learning experiences, supporting continuous and lifelong learning, promoting collaboration, and leveraging technological advancements, mobile learning represents a vital innovation in the pursuit of effective and inclusive education.

### 1.4 Research Questions

- RQ1: Which type of thesis is this?
- RQ2: How is the dataset created?
- RQ4: How can m-learning impact the education sector?
- RQ5: Why should people use m-learning for study purposes?

### 1.5 Expected Output

This thesis is survey-based. I am using SmartPLS tools for mobile learning for academic purposes and creating two superior SmartPLS models which will detect mobile learning usage for academic objectives. This chapter includes:

1. Complete knowledge of the key factors influencing m-learning adoption and success.
2. Empirical evidence on the relationships between the variables.
3. Practical recommendations for educators, policymakers, and technology developers to improve m-learning systems and strategies

### 1.6 Project Management and Finance

Gathered authentic data from the students, who are studying in the university. This research is in the form of a survey. To obtain the data, I utilized a Google Form. Actually, I've granted the academics access to the Google Form. My intention was to apply the model for business purposes.

### 1.7 Report Description

The report is organized as bellow:

| Chapter | Description |
|---|---|
| Chapter 1 | Introduction - Provides an overview summary of the study. |
| Chapter 2 | This chapter reviews research background, existing literature on m-learning and the IS Success Framework. |
| Chapter 3 | This chapter shows research methodology and proposed research model. |
| Chapter 4 | Experiment, results, models and analysis |
| Chapter 5 | Shows impact on Society, Environment and Sustainability |
| Chapter 6 | Overall summary, conclusion, recommendation and guidance for future research. |

This layout ensures that the research is given in an orderly and understandable manner, making it easier for readers to understand the goals, procedures, and outcomes of the study.

# CHAPTER 2

## Background

### 2.1 Preliminaries

Mobile learning is rooted in constructivist learning theories, which emphasize active, contextual, and social learning. Early research by Vygotsky (1978) highlighted the importance of social interaction in learning, a principle that is central to mobile learning. Recent studies have shown that mobile learning can enhance student engagement, motivation, and achievement (Kukulska-Hulme, 2010). We employ mobile learning through wireless communication devices, including PDAs, PCs, and smartphones. If students are aware that their learning resources are portable, they may be more inclined to learn a new skill or enroll in online training. The primary ideas of mobile learning encompass its definition, historical development, theoretical foundations, and the key characteristics. This section provides an overview of these preliminaries, setting the stage for a deeper exploration of m-learning in subsequent sections.

In this section, we define key terminologies essential for understanding the study:

- **Mobile Learning/M-learning:** M-learning is one of the instructional services created to speed up the process of learning. The portability, connectivity, and multimedia capabilities ensure a unique mobile learning experience.
- **IS Success (Information Systems) Framework:** The IS Success theoretical framework evaluates success focusing on variables. The IS Success Framework is proposed by DeLone and McLean. The system quality, information quality, service quality, use, user satisfaction, and net benefits are the six dimensions of success that are identified. This model will be modified for this research environment of m-learning.
- **Self-Efficiency:** The belief in the capacity to carry out duties and accomplish

objectives in a particular field.

- **System Quality:** The performance and functionality of an information system, including its usability, reliability, and efficiency.
- **Information Quality:** The accuracy, quality, and validity of the data that an information system offers.
- **Service Quality:** The total amount of user support, which includes user instruction and technical help.
- **Social Influence:** The impact of social factors, such as peer pressure and cultural norms, on an individual's behavior and attitudes.
- **Attitude:** The overall feeling or disposition towards a particular object or concept, in this case, m-learning.
- **Symbolic Adoption:** The acceptance and internalization of a new technology or practice, beyond mere usage.

### 2.2 Related Work

The use of mobile learning in academic settings has been thoroughly studied in earlier studies. This section reviews existing literature and studies related to mobile learning and the IS Success Framework. Key findings and insights from previous research are summarized to provide a foundation for this study. Topics covered include:

- Success Factor Affecting M-Learning Implementation: Perspective of Students.
- An empirical examination of continuous intention to use m-learning: An integrated model.
- Basic elements and characteristics of mobile learning.

### 2.3 Comparative Analysis and Summary

Thisresearch work is conducted to identify common themes, gaps, and areas of divergence. This analysis highlights: Similarities and differences in the factors

influencing m-learning adoption across various studies, Research methodology employed in earlier studies, as well as significant discoveries that either confirm or refute the study's hypotheses. This section outlines the advantages of adopting mobile learning in academic settings and contrasts the conclusions from the SmartPLS analysis in order to give a comprehensive summary of the research findings. The SmartPLS study identified a number of key factors that affect mobile learning's benefits in educational environments. Comparison analysis demonstrates the relative significance and impact of these factors and makes plain the hierarchical influence they have on adoption choices. The conclusions of the SmartPLS analysis are compared to well-known theoretical frameworks such as the IS Success Framework to see if they agree or disagree with them. This comparative analysis contributes to the validation of the current theories explaining the interest in mobile learning for educational reasons.

The comparative study provides recommendations for ways to minimize obstacles and grab opportunities in educational institutions by summarizing the key challenges and opportunities associated with mobile learning. The shortened findings are positioned within the broader scholarly context, underscoring the importance for educators, legislators, and other interested parties. This summary focuses on the recommendations that can be put into practice in light of the research findings. The summary synthesizes the comparative analysis, providing a clear understanding of this research on nd the IS Success Framework.

### 2.4 Scope of the Problem

Research concerns include opportunities and problems related to m-learning use and success. This study focuses on:

1. Understanding the multifaceted nature of m-learning adoption, considering technological, personal, and social factors.
2. Evaluating the effective use of m-learning through IS Success Framework.
3. Identifying practical implications for enhancing m-learning experiences and outcomes.

The scope of the issue with regard to using mobile learning for educational purposes establishes the limitations, scope, and complexity of the opportunities, issues, and effects that are specific to this research. The scope takes into consideration how mobile learning might impact teaching and learning, collaborative research, administrative procedures, resource optimization, and the entire educational ecosystem. It acknowledges the fundamental limitations

of the research, such as sample size restrictions, temporal limitations, geographical limitations, and the focus of the study on a specific academic setting or region, all of which may have an impact on how widely the findings may be applied. With an emphasis on using it as a methodological tool, this work focuses on the usefulness of SmartPLS for structural equation modeling in the analysis of mobile learning. This section establishes the boundaries and parameters within which the research on mobile learning for academic purposes will operate by outlining the dimensions, opportunities, issues, consequences, and methodological considerations important to the problem scope. Expand and alter this section to reflect every aspect of the problem's reach inside our study environment.

## 2.5 Challenges

This section provides a thorough overview and analysis of some difficulties. Several challenges are associated with the adoption and implementation of m-learning, including:

- **Technological Barriers:** Issues related to device compatibility, internet connectivity, and software usability.
- **User Acceptance:** Resistance to change, lack of familiarity with mobile technologies, and varying levels of self-efficiency.
- **Content Quality:** Ensuring that educational content is relevant, accurate, and engaging.
- **Support Services:** Providing adequate technical support and training for users.
- **Social and Cultural Factors:** Addressing social influence's effects and cultural norms for adoption of m-learning.

Understanding these challenges is crucial for developing effective strategies to encourage m-learning's use and wide acceptance.

# Chapter 3

## Research methodology

### 3.1.1 Introduction

This is a survey based quantitative research which examined the variables. This section outlines the research approach applied in this study to investigate these factors using the Information Systems (IS) Success Framework. The methodology contains 10 parts. The initial 5 topics are: research process, research paradigm, research methodologies, research subject, instrumentation, and data collection technique, and dataset used. The chapter summary, statistical analysis, implementation requirements, and proposed methodology/applied mechanism are covered in the final five sections.

### 3.1.2 Research Process

This is quantitative research. The process of gathering and evaluating numerical data is known as quantitative research. The natural and social sciences—biology, chemistry, psychology, economics, sociology, marketing, etc.—both heavily rely on quantitative research. Interpretivism, critical theory, or positivism are the three approaches that any study paradigm should select (Rehman & Alharthi, 2016). To start with, positivism is applied in quantitative methods, where positivists do empirical research and assess individual behavior (Creswell, 2014).

### 3.1.3 Research Methods

Quantitative analysis is associated with numerical data, statistics, and verified facts (Daniel, 2016). Furthermore, the ultimate objective of this quantitative method is to test the hypothesis. After the final survey is finished, these hypotheses are examined using the SmartPLS to determine the correlations between the variables. Another advantage of the quantitative approach is the utilization of statistical evidence to minimize energy and resource consumption. Nonetheless, when statistical methods are employed for both data collection and analysis, the outcomes may find widespread application (Daniel, 2016).

### 3.1.4 Research subject and Instrumentation

Students, educators, and administrators involved in mobile learning (m-learning) environments. The study targets a diverse demographic to ensure a comprehensive understanding of m-learning adoption and success factors across different user groups. Participants are selected from various educational institutions that have implemented m-learning systems, including universities, colleges, and online learning platforms. Researchers can create models that examine the factors influencing mobile learning in educational settings using SmartPLS. SmartPLS can help to know learning outcomes and mobile-based instructional resources are related. Investigating how online learning environments, online resources, and collaborative platforms affect student performance and satisfaction falls under this category.

I have created two SmartPLS models for better understanding of this research.

Table: 3.1.4 Data Collection Questionnaire

| Variables | Code | Items |
|---|---|---|
| System Quality | SYSQ 1 | M-learning is easy to use. |
| | SYSQ 2 | Interacting with m-learning is flexible. |
| | SYSQ 3 | My interaction with mobile learning is simple and understandable. |
| Service Quality | SERQ 1 | I could access the m-learning resources from anywhere at any time. |
| | SERQ 2 | Multimedia course materials including text, video, and audio are available through m-learning. |

| | | |
|---|---|---|
| | SERQ 3 | M-learning makes conversation interactive.. |
| Information Quality | INFQ 1 | M-learning delivers current information. |
| | INFQ 2 | Accurate knowledge is provided via M-learning.. |
| | INFQ 3 | M-learning offers useful data. |
| | INFQ 4 | Comprehensive knowledge is provided by m-learning. |
| | INFQ 5 | M-learning offers knowledge that is organized. |

| | | |
|---|---|---|
| Attitude | ATT 1 | Using mobile learning would be a smart move.. |
| | ATT 2 | Using mobile learning would be an excellent decision. |
| | ATT 3 | I think the concept of m-learning is interesting. |
| | ATT 4 | It would be enjoyable to utilize m-learning. |
| Social influence | SI1 | I would use m-learning because people who have importance in my life want me to use m-learning |
| | SI2 | I would use m-learning because my friends encourage me to use m-learning. |
| | SI3 | I would use m-learning because those who are important to me advise me to use it. |

| | | |
|---|---|---|
| | SI4 | I would use m-learning because it's being used by those who inspire me. |
| | SI5 | I would use m-learning because my family members desire that I make use of it. |
| | SI6 | I would use m-learning because I'm encouraged to use it by other people in my social group. |
| Self efficacy | SE1 | The use of m-learning would be entirely under my control. |
| | SE2 | In order to apply m-learning, I would have the necessary tools and knowledge. |
| | SE3 | It would be simple to use m-learning. |
| | SE4 | I could utilize m-learning on my own. |

| | | |
|---|---|---|
| Symbolic adoption | SA | I am excited to use mobile learning |
| | SA | I am delighted about using m-learning |
| | SA | My hope is to see that m-learning will be fully adopted. |

### 3.2 Data Collection Procedure

Outline our objectives by describing the process of gathering data in clear terms. Determine the research questions or hypotheses that our data will try to address. Select the best methods for gathering data. This may involve questionnaires, interviews, experiments, observations, secondary data analysis,

and so on. Adapt observation techniques, interview guides, or questionnaires to your research objectives. Make sure they align with our study objectives and are unbiased and clear. Address ethical issues around data collection, such as confidentiality, informed consent, anonymity, and preservation of participant rights.To identify and address any wording, clarity, or comprehensibility issues, pre-test our data collection tools on a small sample. Execute the data collection process using the chosen strategies. Ensure that the techniques employed to collect data are the same for each respondent or instance.To ensure accuracy and dependability, monitor the data collection process. By closely supervising and educating data collectors, biases and errors can be reduced.Arrange the information in a methodical manner. Verify or double-check data while inputting it using software to ensure that its quality and integrity are preserved.

### 3.3 Statical Analysis:

Using SmartPLS for statistical analysis in mobile learning for educational goals could be instructive. SmartPLS is a widely used tool that can be used to look at the interactions between latent variables is structural equation modeling, or SEM. In the context of mobile learning, we might use SmartPLS to look into the relationships between various elements.

SmartPLS is employed for the primary statistical analysis.

- **Measurement Model Assessment:** Determines whether the constructions are valid and reliable using composite reliability, and Average Variance Extracted (AVE).
- **Structural Model Assessment:** Examines the hypothesized relationships between constructs, assessing path coefficients, t-values, and R-squared values.

### 3.4 Proposed Methodology

This section integrates the IS Success Framework with SmartPLS analysis to explore the factors influencing m-learning adoption and success. The steps include:

1. **Literature Review:** Identify and define the constructs based on the existing research.
2. **Questionnaire Development:** Design and validate the survey instrument.
3. **Data Collection:** Implement the data collection procedure as outlined.
4. **Data Analysis:** Use SmartPLS to assess the measurement and structural models.
5. **Interpretation:** Interpret the results to draw conclusions about the relationships between constructs.

Two SmartPLS models used to analyze and evaluate adoption of mobile learning.

### 3.4.1 Factor Loading

"Indicator loading," another name for factor loading, is a measurement of how much the construct influences the indicators. Additionally, Urbach and Ahlemann (2010) evaluate the percentage of indicator variance that may be attributed to the associated latent variable. To achieve satisfactory results, the loading value must be at least 0.7. Above all, the item must be eliminated from the measurement model if the loading value is less than 0.5 (Sarstedt et al., 2017). However, if the composite reliability and AVE are increased, several items with a factor loading of 0.4 to 0.7 can also be eliminated, as stated by Domínguez Quintero et al. (2018) and Suprihartini et al. (2021).

### 3.4.2 Multicollinearity

The interaction between two or more external variables inside the regression model is referred to as multicollinearity. Even a tiny degree of multicollinearity could cause major issues for the study (Daoud, 2018). As a result, multicollinearity refers to the disturbance of data that may be discovered using the values of the variance inflation factor (VIF). If VIF = 1, this variable is not correlated; if 1< VIF <= 5, it is moderately correlated; and if VIF >5, it is significantly correlated. Consequently, any VIF number more than five needs to be ignored (Daoud, 2018). Alternatively, 10 is the VIF cutoff value according to Urbach and Ahlemann (2010).

### 3.4.3 Internal Consistency Reliability

When the indication changes according to the underlying variable, this is

referred to as the internal consistency phenomenon. Composite reliability is an additional method for evaluating it. Interestingly, the composite dependability rating must be at least 0.7 to be accepted. (2010) Urbach and Ahlemann.

### 3.4.4 Discriminating Validity

The degree of variation in the measurements of the many variables is one aspect of discriminating validity, according to Urbach and Ahlemann (2010). It should be noted that, per Hair et al. (2014) recommendations, this study established discriminant validity by using the procedures of Fornell and Larcker (1981). A concealed variable can share more variation than any other variable with its assigned indicators when using this strategy. Each variable's AVE must be greater than the maximum squared correlation of every other variable, according to Hair et al. (2014), in order to assess this constraint. Table 3.3 is a summary of the validity requirements that are used to assess a measurement model.

Table 3.2 Summarization of the Measurement Model's Validity Standards

| Authenticity and Reliability | Procedures | Guideline and Threshold Value |
|---|---|---|
| Indicator reliability | Factor loadings (FL) | FL > = 0.5 |
| Indicator validity | Variance inflation factor (VIF) | VIF < = 5 or, VIF < = 10 |
| Internal consistency reliability | Composite reliability (CR) | CR > = 0.7 |
| Convergent validity | Average variance extracted (AVE) | AVE > = 0.5 |
| Discriminant validity | Fornell and Larcker (1981) | Every variable must have an AVE greater than the maximum squared correlation of every other variable. |

### 3.4.5 Coefficient of Determination

The link between the total variances of a latent variable and the variation it explains is measured by the coefficient of determination, or R2. According to Chin (1998), an explanatory power of around 0.19, 0.333, and 0.67, respectively, is considered low, moderate, and significant. On the other hand, 0.25, 0.5, and 0.75, respectively, are the weak, moderate, and significant levels of explanatory power, as reported by Hair et al. (2014).

### 3.4.6 Cross Validated Redundancy

The cross-validated redundancy (Q2) method can be used to determine the inner model's predictive importance. Based on the sample reuse technique, the metric forecasts the deleted section of the data matrix by first removing a portion of it, calculating the parameters of the model (Rigdon, 2014; Sarstedt et al., 2017). In particular, Q2 > 0 is the recommended threshold value (Urbach & Ahlemann, 2010; Hair et al., 2014).

### 3.4.7 Path Coefficient

Path coefficient, also referred to as a weighted beta or standardized beta coefficient (Komalasari et al., 2015), is the theoretical link between the variables. In addition, Hair et al. (2014) state that this coefficient has a range of +1 to -1, with both values potentially being statistically significant. It is significant to remember that the minimum route coefficient value must be more than 0.1 (Lohmöller, 1989) or 0.2 (Chin, 1998).

### 3.4.8 Effect Size

According to Urbach and Ahlemann (2010), the effect size guarantees that an independent variable has a significant impact on a dependent variable. Additionally, by confirming Cohen's f2, the researcher can determine the effect size of each path in the structural equation model. The effect magnitude can be classified as minimal (when 0.02 <= f2 <0.15), medium (when 0.15 <= f2 <0.35), or big (when f2 >= 0.35), depending on the value of f2. Hair (2014), among others. Moreover, Sawilowsky (2009) notes that 0.01 <= f2 < 0.02 might be regarded as a relatively tiny influence size.

### 3.4.9 Data Analysis Techniques and Tools

Two complementing types of SEM approaches are partial least square (PLS-SEM) and covariance-based methodology (CB-SEM) (Mohamad et al., 2019). However, SPSS version 23 and SmartPLS 3.3.3 are used in this work.

### 3.4.10 Structural Equation Modeling

Structural Equation Modeling (SEM) is a statistical technique that allows researchers to examine complex relationships among observed and latent variables. It integrates multiple regression, factor analysis, and path analysis into a single framework, enabling the analysis of direct and indirect effects, measurement errors, and the interplay between multiple variables simultaneously. SEM is widely used in social sciences, psychology, and other fields to test theoretical models and hypotheses about the relationships among variables.

### 3.4.11 SmartPLS

SmartPLS is a software application used for Partial Least Squares Structural Equation Modeling (PLS-SEM). It is designed to analyze complex relationships between observed and latent variables, even with small sample sizes and non-normally distributed data. SmartPLS offers user-friendly tools for model visualization, estimation, and validation, making it popular in fields such as business, marketing, and social sciences for its ability to handle both reflective and formative measurement models.

### 3.4.12 Summary of the Chapter

The study approach and implementation are described in this chapter. This structured approach ensures a rigorous examination of the factors influencing m-learning adoption and success, providing valuable insights for educators, policymakers, and technology developers. Additionally, pre-tests and pilot tests are conducted; the findings of the pilot test indicate that the survey questions have sufficient validity and reliability.

### 3.4.13 Proposed Model

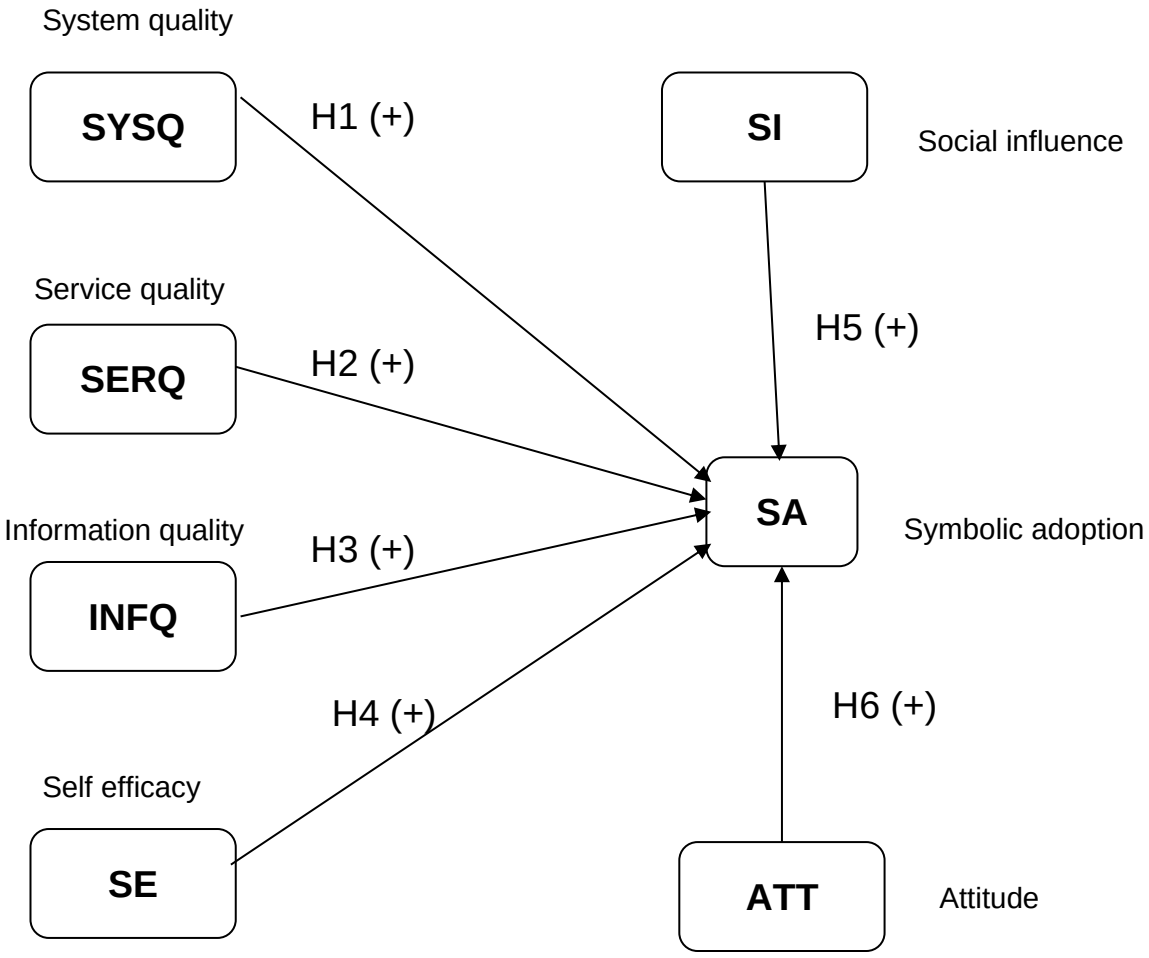


**Figure: 3.4.13 Proposed Research Model**

Hypothesis 1: System quality has a positive influence on symbolic adoption..

.Hypothesis 2: Service quality has a positive influence on symbolic adoption.

Hypothesis 3: Information quality has a positive influence on symbolic adoption.

Hypothesis 4: Social influence has a positive influence on symbolic adoption.

Hypothesis 4: Self-efficacy has a positive influence on symbolic adoption.

.Hypothesis 6: Attitude has a positive influence on symbolic adoption.

### 3.5 Implementation Requirements

The system requirements are:

- Windows 10 or above OS
- SSD/HDD of minimum space of 100GB
- Minimum 8 GB RAM

Developing Tools requirements:

- Smart pls
- Browser

# Chapter 4

## Experimental Findings and Analysis

### 4.1 Experimental Setup

#### 4.1.1 Data collection

Students who may use mobile devices in school, college, or university are the target audience for information collected through the snowball sampling technique. Most participants said that using Google Forms to collect data online was preferable. As a result, 348 students participated and finished the survey. The questionnaire, for instance, is broken down into three sections. The parameters listed in section 3.6.4 are utilized in the first part to identify the intended responders. Most of these respondents did not meet the selection criteria. Nonetheless, a tiny percentage of contradictory responses are discovered; these are known as outliers.

#### 4.1.3 Common Method Variance

In this book, statistical and procedural solutions are the main focus, both prior to (see Chapter 3) and after data collection. Nonetheless, a variety of approaches are available to mitigate the effects of common technique variation, starting with the data collecting and research design phases. Podsakoff et al. (2003) divided these methods into multiple categories, including the partial correlation procedures, the direct product model, the correlated uniqueness model, separate method factor designs, and Harman's single factor test.

#### 4.1.4 Demographic Statistics

In this case, all of the data is gathered by school, college and university students. Table 4.1 displays the respondents that are man (261) and woman (87) out of the 348 respondents. The age range of the students is 15 to 20 and 21-26.

Table: 4.1.4 Demographic Data

| Variables | Classification | Occurrence |
|---|---|---|
| Use mobile -learning | Yes | 323 |
| | No | 25 |
| Gender | Man | 261 |
| | Woman | 87 |
| Age | 15-20 years | 164 |
| | 21-26 years | 184 |
| Highest academic qualification | No recognized academic degree | 0 |
| | SSC or equivalent | 7 |
| | HSC or equivalent | 125 |
| | Diploma or equivalent | 0 |
| | Honors or equivalent | 216 |
| | Masters or equivalent | 0 |
| | PhD or equivalent | 0 |
| | Others | |

## 4.2 Analysis and Outcomes of the Experiments

### 4.2.1 Data Analysis

The assessment of the measuring model is based on several factors, as covered in chapter 3. Notably, section 4.4 (parts 4.4.1 to 4.4.10) evaluates the direct effect of variables.

### .4.2.2 Indicator Reliability:

The factor loading values for the other items are appropriate, as seen most notably in Table 4.2, suggesting that these items have a good association with the related structures.

Table: 4.2.2 Indicator Reliability (Outer Loading)

| | ATT | INFQ | SA | SE | SERQ | SI | SYSQ |
|---|---|---|---|---|---|---|---|
| **ATT1** | **0.917** | | | | | | |
| **ATT2** | **0.884** | | | | | | |
| **ATT3** | **0.920** | | | | | | |
| **ATT4** | **0.888** | | | | | | |
| **INFQ1** | | **0.779** | | | | | |
| **INFQ2** | | **0.840** | | | | | |
| **INFQ3** | | **0.876** | | | | | |
| **INFQ4** | | **0.875** | | | | | |
| **INFQ5** | | **0.838** | | | | | |
| **SA1** | | | **0.881** | | | | |
| **SA2** | | | **0.909** | | | | |
| **SA3** | | | **0.866** | | | | |
| **SE1** | | | | **0.808** | | | |
| **SE2** | | | | **0.890** | | | |
| **SE3** | | | | **0.855** | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **SE4** | | | | **0.910** | | | |
| **SERQ1** | | | | | **0.879** | | |
| **SERQ2** | | | | | **0.918** | | |
| **SERQ3** | | | | | **0.862** | | |
| **SI1** | | | | | | **0.858** | |
| **SI2** | | | | | | **0.894** | |
| **SI3** | | | | | | **0.889** | |
| **SI4** | | | | | | **0.870** | |
| **SI5** | | | | | | **0.877** | |
| **SYSQ1** | | | | | | | **0.891** |
| **SYSQ2** | | | | | | | **0.834** |
| **SYSQ3** | | | | | | | **0.877** |

### 4.2.3 Indicator Validity

The variance inflation factor (VIF) is used to assess the validity of the indicator. The inquiry indicates that every element in the measurement model, with values ranging from 1.099 to 3.831, has a value less than 10. Multicollinearity is deemed to be unproblematic based on the results.

Table: 4.2.3 Variance Inflation Factor

| | VIF |
|---|---|
| **ATT1** | 3.847 |
| **ATT2** | **2.782** |
| **ATT3** | 3.941 |
| **ATT4** | **2.784** |
| **INFQ1** | **1.821** |
| **INFQ2** | **2.356** |
| **INFQ3** | **2.877** |
| **INFQ4** | **2.823** |
| **INFQ5** | **2.239** |
| **SA1** | **2.230** |
| **SA2** | **2.565** |
| **SA3** | **2.011** |
| **SE1** | **2.029** |
| **SE2** | **2.901** |
| **SE3** | **2.371** |
| **SE4** | 3.244 |
| **SERQ1** | **2.341** |
| **SERQ2** | **2.707** |
| **SERQ3** | **1.964** |
| **SI1** | **2.715** |

| | |
|---|---|
| **SI2** | 3.420 |
| **SI3** | 3.245 |
| **SI4** | **2.816** |
| **SI5** | **2.937** |
| **SYSQ1** | **2.265** |
| **SYSQ2** | **1.740** |
| **SYSQ3** | **2.050** |

### 4.2.4 Internal Consistency Reliability & Convergent Validity

A composite reliability (CR) study evaluates the dependability and internal consistency of the measurement model. Table 4.4 illustrates that each construct has a CR that is more than the threshold value, ranging from 0.899 to 0.992. This suggests that one can regard the internal consistency of the model as reasonably reliable.

In this work, the measurement model's convergent validity is evaluated using the average variance extracted (AVE) value. As can be shown in Table 4.2.4, the AVEs for all the variables range from 27 0.679 to 0.898. These results show that the model's convergent validity is above the 0.5 threshold and is sufficient.

Table: 4.2.4 Internal Consistency Reliability & Convergent Validity

| | **Composite Reliability** | **Average Variance Extracted (AVE)** |
|---|---|---|
| **ATT** | 0.946 | 0.814 |
| **INFQ** | 0.924 | 0.710 |
| **SA** | 0.916 | 0.784 |

| | | |
|---|---|---|
| **SE** | 0.923 | 0.751 |
| **SERQ** | 0.917 | 0.786 |
| **SI** | 0.944 | 0.770 |
| **SYSQ** | 0.901 | 0.753 |

### 4.2.5 Discriminant Validity

Discriminant validity is a measure used in statistics and research to assess the extent to which a concept or construct is truly distinct from other similar constructs. It ensures that the variables or factors intended to measure different concepts do not highly correlate with each other, thus confirming that each construct is unique and captures phenomena that other constructs do not. Establishing discriminant validity is essential for validating the uniqueness and specificity of constructs within a model.

Table: 4.2.5 Discriminant Validity

| | **ATT** | **INFQ** | **SA** | **SE** | **SERQ** | **SI** | **SYSQ** |
|---|---|---|---|---|---|---|---|
| **ATT** | 0.902 | | | | | | |
| **INFQ** | 0.712 | 0.843 | | | | | |
| **SA** | 0.753 | 0.649 | 0.886 | | | | |
| **SE** | 0.738 | 0.656 | 0.716 | 0.867 | | | |
| **SERQ** | 0.724 | 0.685 | 0.641 | 0.712 | 0.887 | | |
| **SI** | 0.700 | 0.606 | 0.750 | 0.660 | 0.572 | 0.878 | |
| **SYSQ** | 0.768 | 0.630 | 0.765 | 0.714 | 0.646 | 0.735 | 0.868 |

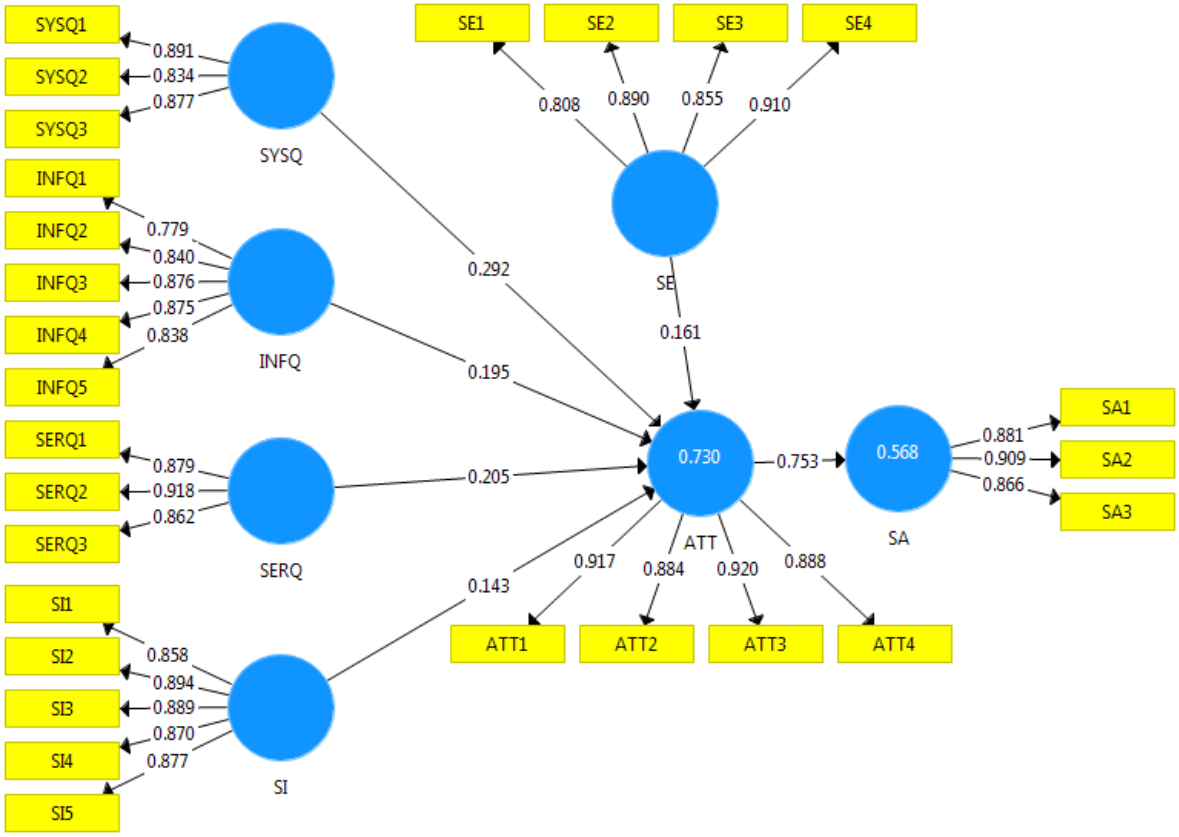


Figure 4.1 Research Measurement Model Outcomes using SmartPLS Tool

### 4.2.6 Coefficient of Determination

The R2 in this study is computed using the SmartPLS tool.

Table: 4.2.6 R-squared ($R^2$)

| | R Square | R Square Adjusted |
|---|---|---|
| **ATT** | 0.730 | 0.727 |
| **SA** | 0.568 | 0.566 |

### 4.2.7 Effect Size

Figures display the findings from the structural model analysis using the SmartPLS tool, as well as the outcomes of the hypothesis testing.

Table: 4.2.7 F-squared ($F^2$)

| | ATT | INFQ | SA | SE | SERQ | SI | SYSQ |
|---|---|---|---|---|---|---|---|
| **ATT** | | | **1.312** | | | | |
| **INFQ** | 0.061 | | | | | | |
| **SA** | | | | | | | |
| **SE** | 0.034 | | | | | | |
| **SERQ** | 0.062 | | | | | | |
| **SI** | 0.031 | | | | | | |
| **SYSQ** | 0.109 | | | | | | |

### 4.2.7 Cross Validated Redundancy

In statistical modeling and validation, cross-validated redundancy is a metric used to assess a model's predictive significance. To determine how effectively the model can predict or duplicate observed outcomes, it first divides the data into different subgroups, trains the model on some of those subsets, and then tests the model on the remaining subsets. By determining the model's capacity to generalize to new, untested data, this technique contributes to the assurance of the predictive power of the model's robustness and dependability.

Table: 4.2.7 Q-squared ($Q^2$)

| | SSO | SSE | $Q^2$ (=1-SSE/SSO) |
|---|---|---|---|
| **ATT** | 1388.000 | 574.289 | 0.586 |
| **INFQ** | 1735.000 | 1735.000 | |
| **SA** | 1041.000 | 580.968 | 0.442 |
| **SE** | 1388.000 | 1388.000 | |
| **SERQ** | 1041.000 | 1041.000 | |
| **SI** | 1735.000 | 1735.000 | |
| **SYSQ** | 1041.000 | 1041.000 | |

### 4.2.8 Path Coefficient

For every relationship, t-statistics are produced in order to establish the significance threshold. The path coefficient, sample mean, standard deviation, t-values, and p-values are also shown in Table 4.2.8. Additionally, a red indicator is displayed for each link whose p-value is higher than 0.05.

.

Table: 4.2.9 Path Coefficient (P)

| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P Values |
|---|---|---|---|---|---|
| **ATT -> SA** | 0.753 | 0.752 | 0.033 | 22.686 | **0.000** |
| **INFQ -> ATT** | 0.195 | 0.198 | 0.057 | 3.398 | **0.001** |

| | | | | | |
|---|---|---|---|---|---|
| **SE -> ATT** | 0.161 | 0.161 | 0.061 | 2.623 | **0.009** |
| **SERQ -> ATT** | 0.205 | 0.201 | 0.056 | 3.692 | **0.000** |
| **SI -> ATT** | 0.143 | 0.142 | 0.048 | 2.992 | **0.003** |
| **SYSQ -> ATT** | 0.292 | 0.293 | 0.058 | 5.061 | **0.000** |

**Discussion**

### 4.3.1 Hypothesis

A precise, verifiable prediction or assertion regarding the expected outcome of a study is known as a hypothesis in research. In smartPLS, hypotheses are specific statements or assertions about impacts of variables. These theories are tested by data analysis within the SEM framework. They are established based on prior research or theoretical predictions. Within smartPLS, theories generally focus on the relationships between the model's defined hidden constructs, or variables. These connections are typically depicted in the SEM diagram as arrows or roads connecting the structures. Each path illustrates a potential connection or result between two ideas.

Table 4.3.1: Hypothesis

| | **Original Sample (O)** | **Sample Mean (M)** | **Standard Deviation (STDEV)** | **T Statistics (\|O/STDEV\|)** | **P Values** |
|---|---|---|---|---|---|
| **ATT -> SA** | 0.753 | 0.752 | 0.033 | 22.686 | **0.000** |
| **INFQ -> ATT** | 0.195 | 0.198 | 0.057 | 3.398 | **0.001** |
| **SE -> ATT** | 0.161 | 0.161 | 0.061 | 2.623 | **0.009** |
| **SERQ -> ATT** | 0.205 | 0.201 | 0.056 | 3.692 | **0.000** |
| **SI -> ATT** | 0.143 | 0.142 | 0.048 | 2.992 | **0.003** |
| **SYSQ -> ATT** | 0.292 | 0.293 | 0.058 | 5.061 | **0.000** |

**Table 4.3.2 Hypothesis Testing Results**

| No | Hypotheses | Results |
|---|---|---|
| H1 | System quality has a positive influence on symbolic adoption. | Supported |
| H2 | Service quality has a positive influence on symbolic adoption. | Supported |
| H3 | Information quality has a positive influence on symbolic adoption. | Supported |

| | | |
|---|---|---|
| H4 | Social influence has a positive influence on symbolic adoption. | Supported |
| H5 | Attitude has a positive influence on symbolic adoption. | Supported |

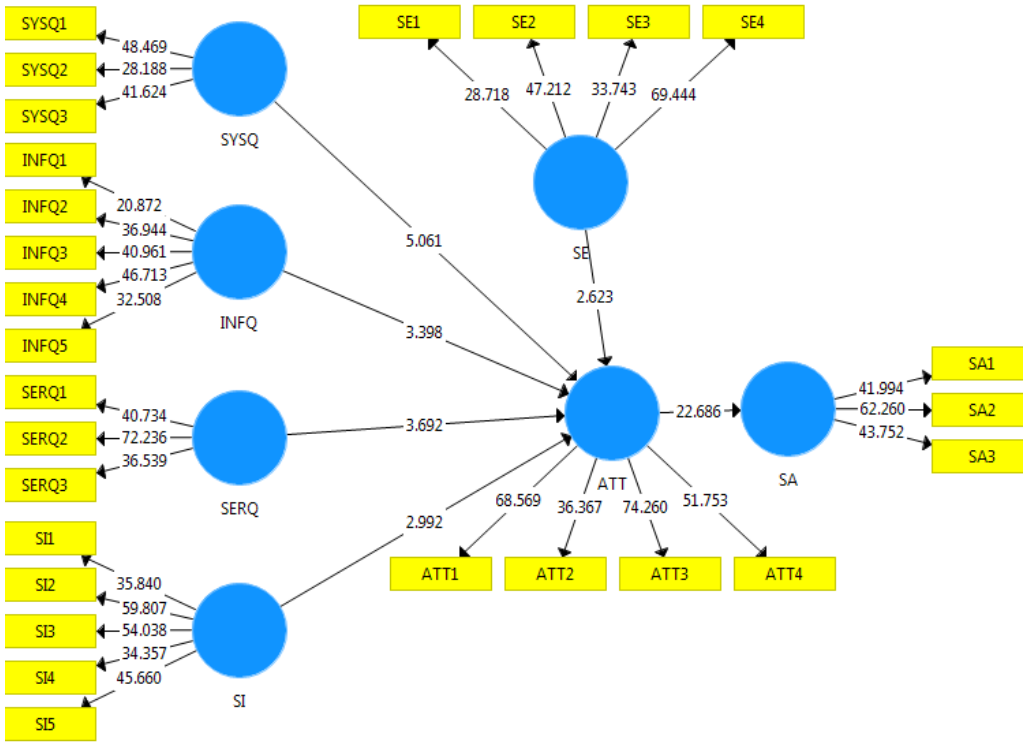


Figure 4.2 Results of the Structural Model Using the SmartPLS Tool

# CHAPTER 5

## Impact on Society, Environment and Sustainability

### 5.1 Impact towards Society

The way education is accessed and provided is changing due to mobile learning, or m-learning, which has significant societal effects. With no time or space restrictions, m-learning facilitates numerous contacts between teachers and students, offering great support for meaningful learning and m-learning achievement based on the evaluation.

Important effects on society include:

- **Increased Accessibility:** M-learning breaks down geographical barriers, providing educational opportunities to individuals in remote and underserved areas. This democratizes education, enabling lifelong learning for all segments of the population.
- **Enhanced Learning Engagement:** The interactive and flexible nature of m-learning platforms enhances student engagement and motivation, leading to improved learning outcomes.
- **Skill Development:** M-learning fosters digital literacy and technical skills, preparing individuals for the modern workforce. It also supports continuous professional development through on-the-go access to training and educational resources.
- **Social Inclusion:** By catering to diverse learning needs and styles, m-learning promotes social inclusion, accommodating students with disabilities and those who require personalized learning paths.
- **Community Building:** M-learning platforms facilitate collaborative learning and knowledge sharing, building online communities that support peer learning and networking.

### 5.2 Impact towards Environment

Environmental effect of m-learning is multifaceted, offering both positive and negative effects:

**Reduced Carbon Footprint:** M-learning reduces the need for physical infrastructure, such as classrooms and educational materials, thereby lowering carbon emissions associated with commuting and the production of paper-based resources.

**Energy Consumption:** While m-learning reduces some environmental burdens, it also increases energy consumption. Efforts needed to optimize energy efficiency in these areas are essential to mitigate negative impacts.

**Electronic Waste:** The widespread mobile learning utilization contributes to electronic waste (e-waste). Proper recycling and disposal of devices, as well as promoting the use of sustainable and durable technology, are critical to addressing this issue.

### 5.3 Ethical Aspects

There are some ethical concerns with using mobile learning in educational settings that should be carefully explored. This section discusses the moral implications of adopting mobile learning in educational settings. The ethical considerations surrounding m-learning are crucial to ensure its responsible implementation and use:

- **Data Privacy and Security:** Protecting the personal information of learners is paramount. M-learning platforms must adhere to stringent data privacy and security standards to prevent unauthorized access and misuse of data.
- **Equity and Fairness:** Ensuring equitable access to m-learning resources is essential to prevent widening the digital divide. Policies and initiatives should focus on providing affordable and inclusive access to technology and internet connectivity.
- **Content Clear and Accuracy:** Authentic educational materials delivered through m-learning platforms must be maintained. Ethical standards should govern the creation, and dissemination of content to ensure it is reliable and beneficial to learners.
- **Digital Well-being:** Promoting a balanced use of technology is necessary to avoid issues related to screen time, digital addiction, and the potential negative impact on mental health. Encouraging healthy digital habits and providing support for digital well-being are critical.

### 5.4 Sustainability Plan

It ensures its long-term viability and positive impact plan for m-learning :

- **Integration with Traditional Learning:** Combining m-learning with traditional classroom-based education creates a combination approach that capitalizes on the advantages of both approaches. This integration enhances the overall learning experience and ensures sustainability.
- **Continuous Improvement:** Regularly updating and improving m-learning platforms and content is essential to keep pace with technological advancements and evolving educational needs. Feedback from users should drive these enhancements.
- **Environmental Responsibility:** Implementing green practices, such as using energy-efficient devices and renewable energy sources, can minimize the environmental impact of m-learning. Encouraging the recycling and proper disposal of electronic devices is also important.
- **Inclusive Access:** It is essential to guarantee that all students, irrespective of their financial situation, have access to m-learning materials.. Partnerships with governments, NGOs, and private sector organizations can help bridge the digital divide and promote inclusive education.
- **Monitoring and Evaluation:** Establishing mechanisms to monitor and evaluate the effect of m-learning on the environment and society; and learners is essential. This includes assessing educational outcomes, environmental footprint, and user satisfaction to inform future strategies and policies.

This chapter highlights the significant impact of m-learning on sustainability, the environment, and society. By addressing accessibility, environmental concerns, ethical aspects, and sustainability planning, we can maximize the benefits of m-learning while mitigating potential drawbacks, ensuring a positive and lasting impact on education and beyond.

# CHAPTER 6

## Summary, Conclusion, Recommendation and Implication for Future

### Research 6.1 Summary of the Study

Using the IS Success Model and SmartPLS instead of mobile learning for academic purposes was the focus of a study that thoroughly examined the frameworks, implications, and factors that affect educational institutions. This study's main goals were to identify the factors influencing mobile learning in educational settings and evaluate the reasons behind the adoption of mobile learning. Research on mobile learning highlights its potential to revolutionize education. While there are challenges to be addressed, such as the digital divide and content quality, the future of mobile learning is promising. Emerging technologies and innovative pedagogical approaches offer exciting opportunities to further enhance the effectiveness and accessibility of mobile learning. As the field continues to evolve, ongoing research will be crucial in guiding the development and implementation of effective methods for mobile learning that satisfy the various demands of students around the globe. Variables were carefully examined, and their effects for academic institutions were made clear, so the research successfully achieved its objectives. Through the integration of data from SmartPLS analysis and established theoretical frameworks, The research adds to the corpus of current knowledge and offers an alternative viewpoint on the usage of mobile learning in institutions. Because the research findings have real-world applications for academics, decision-makers in government, and industry experts, they offer practical suggestions for resolving obstacles and optimizing the potential of mobile learning.

### 6.2 Conclusion

A thorough examination of how mobile learning is being used in educational institutions using SmartPLS research produces a number of conclusive results and implications for education. This study focuses on the factors that influence learner acceptance and discusses the mobile learning applications that have been required by higher education institutions. The study contributes to our understanding of M-learning elements that influence it on institutions. It is intended that this study inspires more investigation into higher education institutions' learners' acceptance of M-learning applications. It's critical to remember that this study is still a theoretical discussion of research aimed at enhancing higher education institutions' understanding of M-learning apps to

provide insight into how well-liked mobile learning providers are by users.

### 6.3 Implementation for Future Study

The implementation of mobile learning (m-learning) for future studies involves a strategic approach that addresses the key components of effective m-learning integration. This chapter outlines a comprehensive plan for implementing m-learning initiatives. The study which employs SmartPLS analysis to examine how mobile learning is used in academic settings opens the way for further research and provides a number of fresh opportunities for advancing our understanding of the difficulties that come with using mobile devices in the classroom. By using continuous studies to track the evolution and long-term impacts of mobile learning in institutions, looking long-term adoption for teaching methods, student learning outcomes, and institutional policies to find benefits and long-term effects. Applying qualitative research methods to improve quantitative analysis and get a better understanding of users' perspectives and experiences, such as focus groups, interviews, and surveys. I used two SmartPLS models in my study. To get better results in the future, I employed additional models. The goal is to provide a roadmap for educational institutions, policymakers, and researchers to successfully incorporate m-learning into their educational frameworks. Our work on this subject has shown that the majority of learning methods come from constructive learning.

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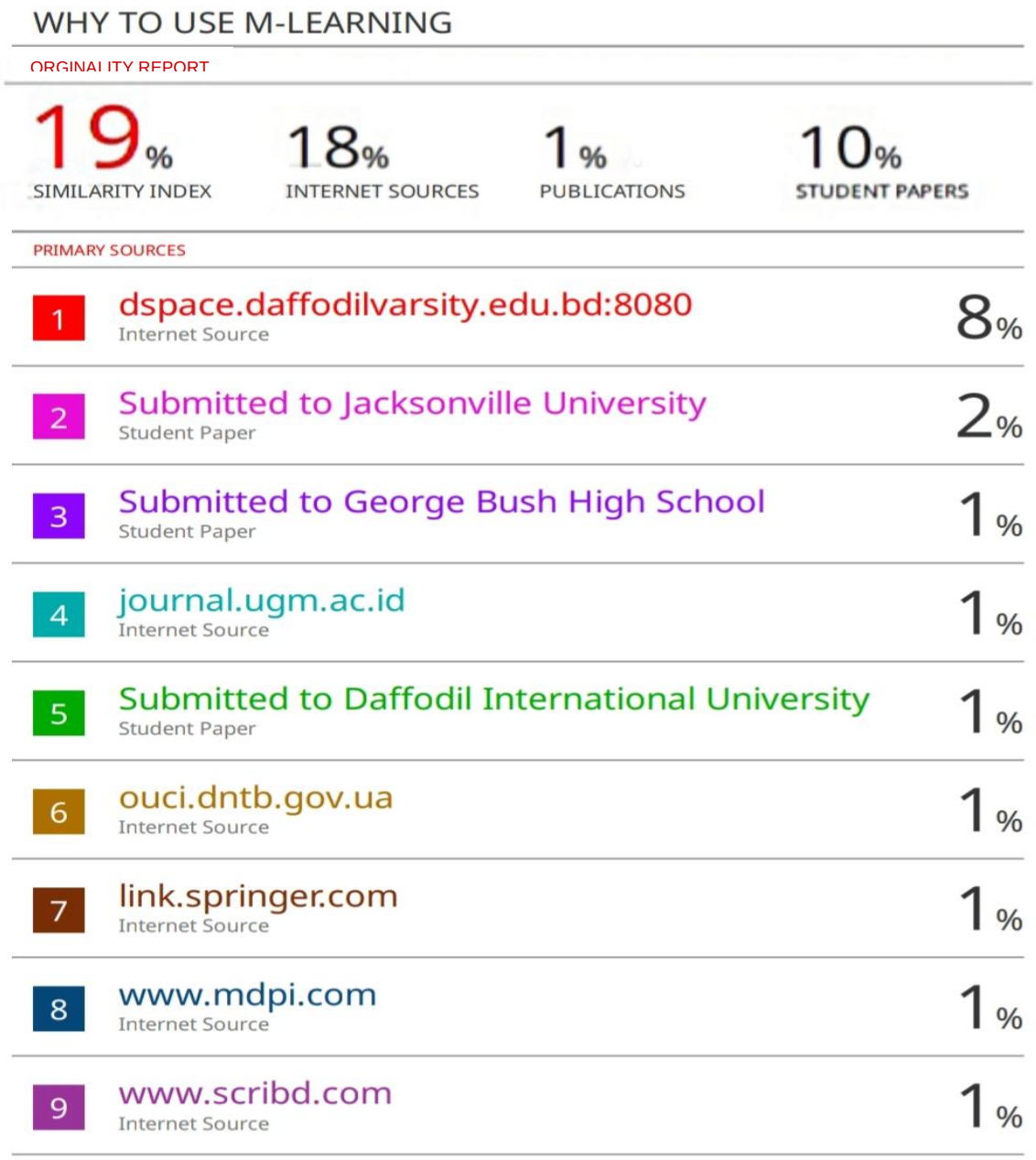
# APPENDIX:

## Plagiarism Report



WHY TO USE M-LEARNING

ORGINALITY REPORT

| 19% | 18% | 1% | 10% |
|---|---|---|---|
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

PRIMARY SOURCES

| | | |
|---|---|---|
| 1 | dspace.daffodilvarsity.edu.bd:8080<br>Internet Source | 8% |
| 2 | Submitted to Jacksonville University<br>Student Paper | 2% |
| 3 | Submitted to George Bush High School<br>Student Paper | 1% |
| 4 | journal.ugm.ac.id<br>Internet Source | 1% |
| 5 | Submitted to Daffodil International University<br>Student Paper | 1% |
| 6 | ouci.dntb.gov.ua<br>Internet Source | 1% |
| 7 | link.springer.com<br>Internet Source | 1% |
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