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# Adaptive Software Engineering: Optimizing Deployment Strategies and Mitigating Risk Factors for Success from ERP and Game Development

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IUB, CSE

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**”Adaptive Software Engineering: Optimizing Deployment Strategies and Mitigating Risk Factors for Success from ERP and Game Development”**

By

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**AU**tumn, 2023

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Dissertation submitted in partial fulfillment for the degree of Master of  
Science in Software Engineering

Department of Computer Science & Engineering

**Independent University, Bangladesh**

# Attestation

I affirm that this graduate report is the result of my own independent work undertaken during my post-graduate study. I have acknowledged all materials and sources employed in this document. To the best of my knowledge, this report has not been previously submitted for assessment in any other academic unit, and I have not engaged in any form of plagiarism. I adhere to international academic standards, providing proper citations for the use of others' work within our University project.

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Signature

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Date

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Name

# Acknowledgement

Firstly, I express profound gratitude to Almighty Allah for guiding me in my academic journey at Independent University Bangladesh. The experienced faculty at IUB provided invaluable support. Dr. Mahady Hasan, my supervisor, played a crucial role in my Master's program. I extend our heartfelt gratitude to my supervisor Dr. Mahady Hasan for his invaluable guidance and feedback during our graduate project. Special thanks to my respected faculty member ,my co supervisor Ms. Farzana Sadia for her support and guidance. I also appreciate the collaborative efforts of co-authors and friends at IUB. Lastly, heartfelt thanks to my family, friends, and loved ones for their unwavering support and encouragement.

Sayedra Rahnuma Akthar

May, 2024

# Letter of Transmittal

Mahady Hasan, PhD, UNSW  
Associate Professor,  
Independent University of Bangladesh,  
Department of Computer Science and Engineering

Subject: Graduate Project Report Submission Letter, Autumn 2023

Dear Sir, I, Sayeda Rahnuma Akthar (ID: 2211849), enrolled in the Autumn 2023 Semester Graduate Project Course. Hereby submit my graduate project, reflective of our experiences during the Master of Science program at Independent University Bangladesh. The primary objectives of our project were to acquire practical insights into the software engineering sector, engage in research, and familiarize with various technology-related departments within the company, encompassing research and development, documentation, software development, and processes. Adapting to evolving technologies throughout our master's program equipped us to apply this knowledge to real-world scenarios. I sincerely hope for the acceptance of my report and appreciate your consideration.

Sincerely,  
Sayeda Rahnuma Akthar  
Email address:2211849@iub.edu.bd

# Evaluation Committee

## Supervision Panel

.....	.....
Supervisor	Co-supervisor

## External Examiners

.....	.....
External Examiner 1	External Examiner 2

## Office Use

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Program Coordinator	Head of the Department
.....	
Director Graduate Studies, Research and Industry Relations	

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# Chapter 1

## Introduction

### 1.1 Overview

For a firm to succeed in the ever-changing field of software engineering, managing the intricacies of project development phases, reducing software risk factors, and carrying out smooth ERP deployment procedures are critical. As companies work to improve their operational effectiveness and flexibility, managing these interdependent components well becomes essential. Phases of project development outline the methodical flow from ideation to execution, emphasizing the importance of careful planning and execution at every turn. To ensure the integrity and success of the project, software risk factors must be identified and mitigated proactively as they pose a potential threat during this trip. ERP deployment procedures, on the other hand, become essential activities that connect organizational workflows and technologies in order to maximize performance and promote long-term growth. Organizations have possibilities and problems in this complex mix of project development, software risk, and ERP deployment, which calls for a comprehensive approach to software engineering. This report consists of three research areas related to software engineering addressing project development phases, software risk factors, ERP deployment process.

Our study reveals that many businesses, however, are devoid of the resources and instruments required to implement effective project management, software development, and software deployment strategies. Due to these deficiencies, sometimes the software sector is nevertheless unable to reach its full potential, increasing the likelihood that projects will fail. Consequently, the goal of this research is to enhance the software industry through the identification of risk factors, development methodologies, and deployment issues. In order to provide an appropriate structure and pattern of potential answers to the current problems encountered by businesses in software project management, software development, and software deployment strategy, it integrates significant study topics.

## 1.2 Contribution of the thesis

Through meticulous research and analysis, this thesis makes several significant contributions to the fields of software implementation and game development. Firstly, it emphasizes the pivotal role of effective communication and responsibility sharing during ERP deployment. By synthesizing insights from interviews and discussions, it offers a thorough guidebook and methodology model diagram to assist businesses and clients in navigating the ERP deployment process successfully. This contribution underscores the importance of involving implementation partners to ensure a smooth transition and maximize the benefits of ERP systems. Secondly, the thesis explores the impact of project governance on software project performance, with a particular focus on Bangladeshi software companies. It illuminates the critical role of project governance in mitigating software risk factors and enhancing project performance, with project leadership identified as a favorable moderator. This analysis provides valuable insights into optimizing project governance structures to drive success in software development endeavors. Lastly, the thesis addresses the challenge of usability in game development, especially for smaller gaming firms and startups with limited resources. By synthesizing various research methodologies, including interviews, heuristic scoring studies, and polls, it formulates twelve usability heuristics tailored to game software development stages. Rooted in the Nielsen usability technique, these heuristics offer practical solutions to identify and rectify game-specific usability issues, ultimately enhancing the user experience and bolstering the success of gaming ventures. Overall, this thesis presents a holistic approach to software development and deployment, integrating the realms of ERP systems and game development. By offering practical insights and strategies, it equips stakeholders across diverse industries with the tools necessary to navigate the complexities of modern software implementation successfully.

## 1.3 Organization of the thesis

In Chapter 1, the introduction section describes the entire report by offering a concise overview of the various research projects undertaken. Moving on to Chapter 2, an analysis of relevant literature is presented. This comprehensive review serves to establish the theoretical framework and contextual background for the next chapters. Chapter 3 describes one of our published research works, providing insights into an empirical study on Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses. This chapter presents the detailed findings to modify usability inspections for games, allowing developers to assess both mock-ups and functioning prototypes. In Chapter 4, we describe our another published research work, Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation Through ERP Imple-

mentation. This section describes a guidebook that offers insightful advice to businesses and their clients throughout the whole ERP deployment process which leads to the creation of an implementation handbook that addressed important challenges and offered useful solutions . Chapter 5 explores various risk factors were taken into account, project leadership favorably moderated the relationship between project governance and project performance. It describes the Implementing project governance systems to reduce software risk factors in software projects is one of the findings' implications for enterprises.. Finally, Chapter 6 the conclusion section serves to summarize the collective knowledge presented throughout the report and provides a cohesive understanding of the research outcomes.

## 1.4 Thesis Project Management

### 1.4.1 WBS

WBS is an ideal tool for brainstorming and to visualize further scope of basic phases into much more detailed portions. As you can see from the diagram below, a top-down approach has been used to further give a breakdown of sub tasks necessary to complete the phases. The research papers in general have been developed using this structure. From Figure 1.1, we can understand the high-level research work and plan have been divided into 4 phases. The first phase; Initiation and definition focuses on identifying the research gap and extracting the necessary research areas that have not been addressed. As the research idea along with its contribution is evaluated, further hypotheses and research questions are developed using studies. This development allows the authors to formulate the contributions and value the research papers will bring to society in terms of knowledge. Provided that the research paper has significant contributions and importance, literature review is conducted to gain in-depth knowledge of the research areas. The research papers are collected from Google Scholar, Web of Science, Scopus, IEEE Xplore, ScienceDirect, and ACM Digital Library. The relevant papers were identified by searching in papers' metadata (title, abstract, keywords), using keyword search queries. In the second phase; Planning, The project management plan is developed regarding further scopes defining timelines and tasks. The knowledge development along with timeline definition helps us to formulate strategy for research processes such as data collection. Further, the research methodology is designed along with defining research tools and techniques required for necessary data analysis. and collection.

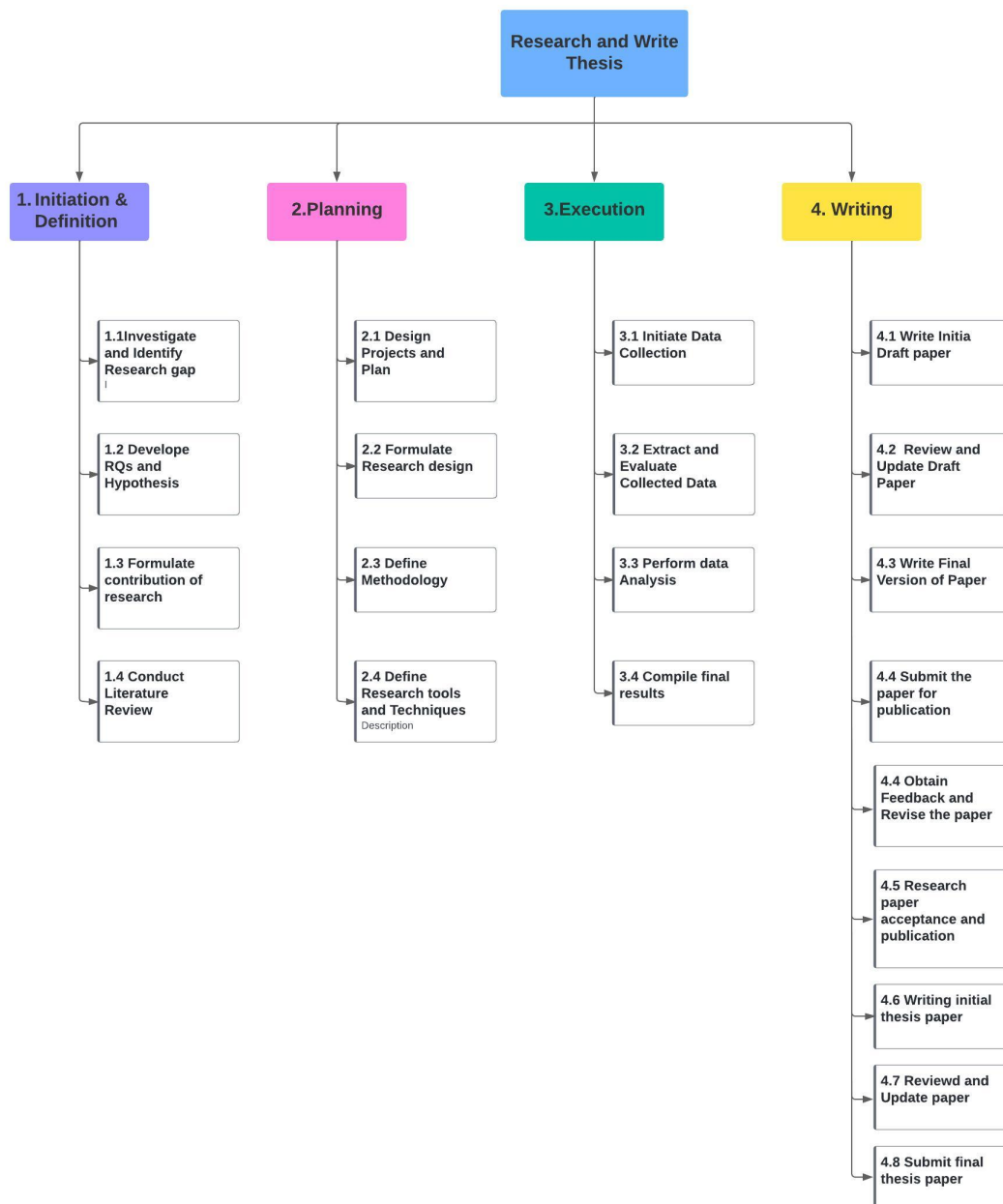


Figure 1.1: Work Breakdown Structure of Thesis

Now moving on to the third phase; Execution, after the methods are identified, we execute the research by initiating data collection and extraction using Python, scale sets and excel. This provides us the ability to visualize the extracted data for analysis and compile results into meaningful outcomes. Finally, in the fourth phase; Write-up, after the completion of this life cycle, the authors are able to organize their writings into an initial draft version which with further reviews and corrections from experienced researchers, develops into structured writings. As the final version is developed the research papers are submitted for publication process. Later following external reviews by publishers, more flaws are detected with which when corrections are done the paper becomes

publication-worthy. Given the process is followed properly eventually the research papers are published. The thesis write-up is then initiated and reviewed by department. After the review process is completed, the final thesis version is submitted to the department. To summarize, the WBS determines the process and sub-processes necessary for the completion of a thesis. In terms of chapters 3,4 and 5, we have followed these phases to complete the research work.

### 1.4.2 Gantt Chart

Gantt charts are tools that is used to schedule projects and research tasks and plan accordingly. It is a representation of the activities and days it takes to complete them. As you can see below, we have a compiled overview of the total days, each event needs to be completed in a sequential manner. The tasks are dependent on each other as one defines the next task's outcome.

The Gantt chart defines the necessary tasks required to complete research papers within a certain timeline. The chart consists of elements such as Task list, Timeline and bars. These elements are being used to schedule research timeline. In the given chart. We can find the activities related to research work and WBS are defined. Initially starting from identifying research gap, developing theories, selecting methodologies to later on, executing collection and extraction of data to validate results. These results are reviewed with proper references and research paper is made eligible for publication. In most cases, a research paper is hardly accepted at first submission, there are always scope for flaws and revisions which are not detected initially. As the papers are reviewed, certain flaws are modified which eventually result to acceptance and publication of a research paper. As the research work is completed, overall thesis write-up is is compiled and submitted. This Gantt chart, exactly represents the activities it took over a certain period to develop the 3 research papers to be upto the standards of publishing.

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# 1.4. THESIS PROJECT MANAGEMENT

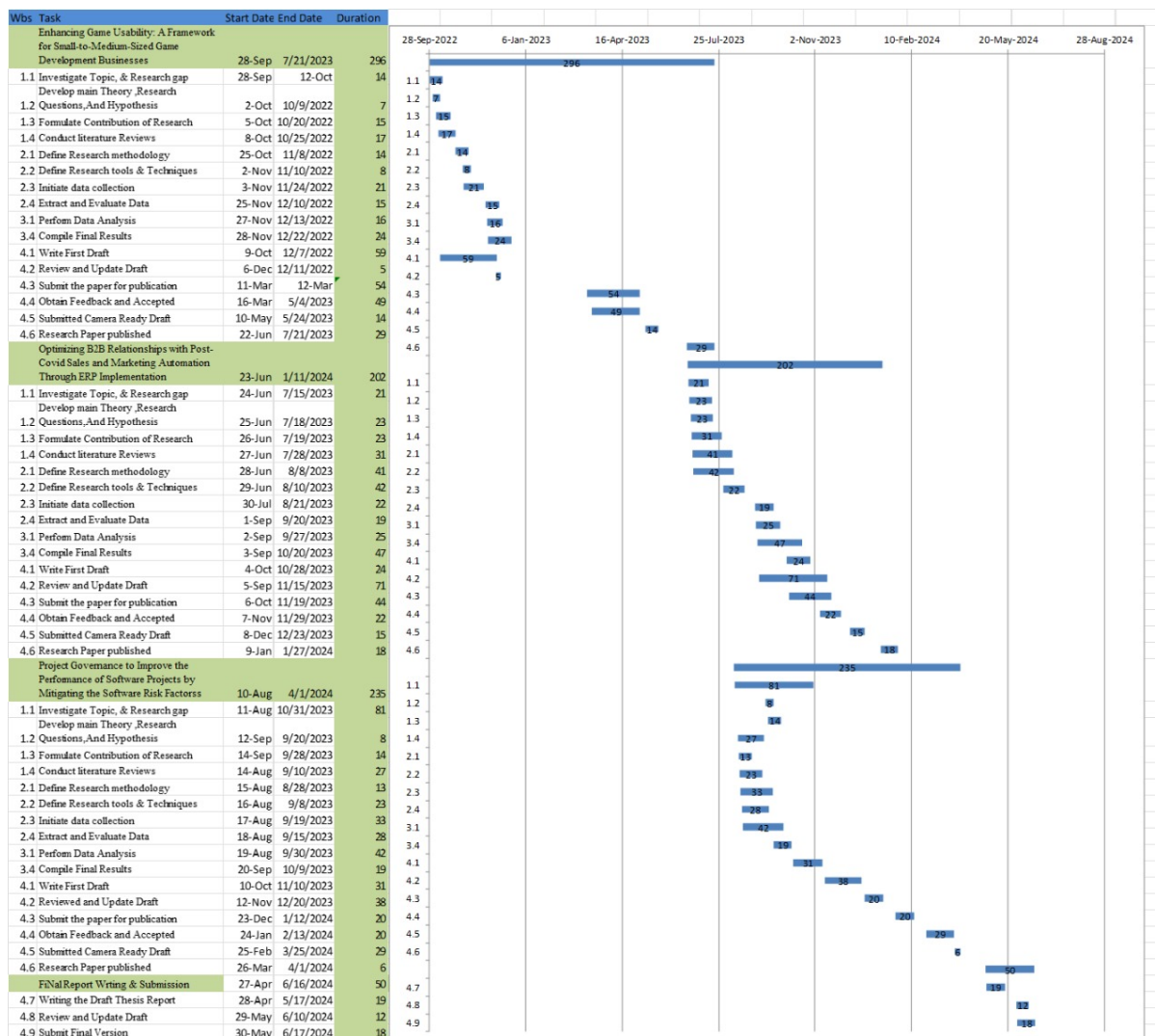


Figure 1.2: Gantt Chart

# Chapter 2

## Literature Review

### 2.1 Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses

An extensive literature review was conducted on related publications in the field, and an analysis of the most relevant papers have been included below: Mylly et al., designed a new set of usable usability heuristics that can be used as a practical, developer-oriented tool during the game development process based on user satisfaction and convenience (Mylly, & Rajanen, Iivari, 2020). Politowski et al., presented insights and considerations gathered from developers and literature studies, which may serve as a source of knowledge as well as characterization of the Brazilian game developer's main contributions (Politowski, Vargas, Fontoura, & Foletto, 2016). Zaidi et al., designed a usability framework for VR casual game development for non-gamers that would help developers get important game elements in the pre-production phase, which was tested for user-experience, with positive results suggesting that the framework proposed was successful in producing an immersive VR game prototype for the target users (Zaidi, Duthie, Carr & Maksoud, 2018). Simor et al., proposed usability evaluation methods for gesture-based games, with a focus on devices with motion-sensing capability such as Kinect and Wii. The study concludes that there is a need for a standardized evaluation protocol for gesture-based serious games, particularly for older adults, to enhance user comfort, welfare, and confidence (Simor, Brum, Schmidt & Rieder, 2016). Fatta et al., discusses the development of a model for measuring usability evaluation specifically for Mobile Game-Based Learning (m-GBL) applications and highlights the need for a specific model to evaluate m-GBL usability and identifies potential areas for further research (Fatta, Maksom & Zakaria, 2018). Soomro et al., highlights the need to improve the efficiency of conducting heuristic evaluations for application software and games by automating

the process and designed a playability heuristic evaluation system (PHES) and tested to identify playability problems in games. The results suggest that using PHES can improve the identification of playability problems within a shorter timeframe compared to manual evaluations (Soomro, Ahmad & Sulaiman, 2014). Desurvire et al., discussed how adapting efficacious heuristics from productivity software to games, based on popular game review website ratings by gamers, can help improve game quality through design evaluation and self-report surveys. (Desurvire & Wiberg, 2009). Fernandez et al. propose a usability inspection method for model-driven video game development, based on ISO/IEC 25010, to identify and improve usability issues early in development for higher quality, more enjoyable games. (Fernandez, Insfran, Abrahão, Carsi & Montero, 2012). Smith et al. propose VR PLAY, a domain-specific heuristic list for virtual-reality game development, by evaluating Elder Scrolls: Skyrim VR and identifying missing usability principles, highlighting the importance of domain-specific heuristics for evaluating game usability (Smith, Granados & Suss, 2019). Parker et al. explore how indie game developers perceive the benefits and risks of game streaming, and how it impacts game-making practices, based on interviews with small commercial indie game developers in Toronto and Montreal, finding that streaming offers organic playtesting but has a normative effect on game design (Parker & Perks, 2021). Xenos et al. found that the perceived usability of a game, using Civilization IV as a paradigm, significantly impacts learning during gameplay, suggesting that improving game usability can enhance their educational potential (Xenos, Papaloukas & Kostaras, 2019). Hussain et al. conducted a systematic review of 21 studies on mobile game usability evaluations, finding that a combination of expert review and playtesting methods after completion of the application's implementation was the most popular and effective approach (Hussain, Abbas, Abdulwaheed, Mohammed & Abdulhusein, 2015). Muhanna et al. developed a list of adapted usability heuristics based on Nielsen's list and game usability principles for evaluating Arabic mobile games, concluding that these heuristics provide an effective and efficient evaluation method for improving the user experience of Arabic-speaking players (Muhanna, Masoud & Qusef, 2022). Şener et al. reviewed research papers and analysed Steam user numbers and stock prices of major game companies to investigate the impact of the Covid-19 pandemic on the game industry, finding that the surge in demand for video games during the pandemic led to increased stock prices of game companies (Şener & Yalçın). Senap et al., proposed a set of evaluation components for assessing the usability of mobile educational games, based on a literature review of heuristics for evaluating the usability of mobile games and educational games, aiming to help developers ensure effective delivery of educational content and a positive user experience (Senap & Ibrahim, 2019). Vieira et al. proposed a methodology to identify heuristics applicable for evaluating the usability of educational games and found GUESS as a useful heuristic, contributing to the research on usability of educational games (Vieira, Silveira & Martins, 2019). Halonen et al. propose a set of

heuristics to evaluate the usability of games that employ speech recognition, aiming to promote effective and successful implementation of speech recognition in gaming (Halonen, Hyrunsalmi, Kimppa, Knuutila, Smed & Hakonen, 2012). Pyae et al., evaluated the usability and user-friendliness of a Finnish skiing video game among 24 elderly Japanese participants, and found that the game was well-received and met the objective of serving as an exercise tool. (Pyae, Liukkonen, Saarenpää, Luimula, Granholm & Smed, 2016).

## 2.2 Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation Through ERP Implementation

ERP is difficult to install due of its complexity. In recent years, there have been a number of studies on ERP deployment, among those there were numerous count of failed implementation of the ERP. (Barker, T., & Frolick, M.N,2003) ERP implementation should be considered as a new company venture and a team effort, not simply a software installation. (Chen, C. C., Law, C. C., & Yang, S. C., 2009) For ERP to be a success, companies must involve all employees and sell the notion of ERP to them absolutely and completely.(King, W. R. ,2005)Involving, supervising, recognizing, and retaining those who have worked or will work closely with the system is critical to a successful implementation. (Chakravorty, S. S., Dulaney, R. E., & Franza, R. M. 2016)The findings suggest a roadmap for firms adopting ERP to follow in order to avoid making significant, yet often overlooked, project management blunders. Despite the widespread use of ERP systems, there remains substantial worry about ERP installation failure. (Grabski, S. V., & Leech, S. A. ,2007) Escalation of commitment could be one reason for many ERP implementation failures. The tendency of decision makers to continue investing in a poor course of action is referred to as escalation of commitment. Two main kinds of factors influence ERP implementation: national/environmental and organizational/internal, each of which has five variables. (Dezdar, S., & Ainin, S. ,2011) This study compares the AISs and ERPs that are currently most widely utilized in the United Arab Emirates while also examining the market and the size of local firms. The study emphasized the benefits and drawbacks of the present information systems as well as the traits of the businesses that influenced how widely the programs were used. (Faccia, A., Mosteanu, N. R., Fahed, M., & Capitano, F. ,2019) It demonstrates that basic physical, economic, cultural, and cultural difficulties present extra challenges for ERP systems in emerging nations. By contrasting developed and developing nations, this essay identifies a variety of problems with ERP deployment.(Huang, Z., & Palvia, P,2001) Daniela Corsaro, Isabella Maggioni, Mirko Olivieri examine how S&MA generates value for companies in the post-Covid-19 scenario. They propose a conceptual model that considers various value drivers, including

customer-centric, operational, and integration-based factors. (Corsaro et al., 2021)

## 2.3 Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factors

Literature review explains the four constructs (Project governance, software risk factors, project leadership and project performance) used in this study.

### 2.3.1 Project Governance

Project governance, as defined by the Project Management Institute (PMI®), is an oversight function aligned with the organization's governance model. It encompasses the project life cycle and provides a consistent method for controlling and ensuring project success through reliable and repeatable practices [11]. Project governance establishes structured roles, responsibilities, and decision-making models, defining and documenting the project's objectives and governing the effectiveness of the project manager [5]. It aids in managing deviations in scope, budget, time, resources, and risks that may arise during the project [14].

Dimensions of Project Governance: Project governance was divided into four dimensions initially [14] consisting of: 1) portfolio direction, 2) project sponsorship, 3) project management effectiveness and efficiency, and 4) disclosure and reporting. The third dimension was renamed from project management effectiveness and efficiency to project management capability [15]. In this research, only the first three dimensions are discussed.

Portfolio Direction: This dimension authorizes the direction and evaluation of the projects for their alignment with the critical business objectives as well as constraints of various organizations [15]. The significance of project portfolio management has been studied by many researchers [17]. For example, the relationship between the development of new product and portfolio management was investigated in prior literature [18]. "The project portfolio management aims at maximizing the financial worth of a portfolio, linking the portfolio with the strategy of the firm, and balancing the projects in the portfolio keeping in view the capacity of the firm" [19].

Project Sponsorship: This dimension has often been discussed in standard documents of project management [11] [16]. Generally a project sponsor is held accountable for development plus maintenance of the project business case document [17]. This dimension maintains an essential link between top-level management and project management decision making, directing and representational accountabilities [16]. Governance of all

kinds maintains the substantial role of top management along with project sponsors and ensures effective project governance.

**Project Management Effectiveness and Efficiency:** This dimension ensures that the project teams can attain the project objectives depending on factors, i.e., available resources, skills, experience, approach for tools, and processes [16]. Efficiency of project-based organizations is measured by the rigorous process of planning, structured coordination, and communication that stimulates the leadership skills of front-line managers [17] [22]. “To ensure project management’s success, the human factor plays an equally important role in addition to adequate instruments and resources” [17] [21].

### **2.3.2 Project Leadership**

Project leadership involves a variety of viewpoints, including organizational management, strategic goal development, HR planning, and the creation and implementation of project objectives [24] [25]. There isn’t much empirical research on project leadership, despite its significance [23]. Effective leadership is essential for successful project management, especially while managing change and working in a dynamic environment [22] [26]. In order to motivate, organize, and influence team members to accomplish project goals, project leaders are essential [28]. Planning, organization, networking, and information have been recognized as key managerial activities that influence project leadership behavior in earlier research [22].

### **2.3.3 Software Risk Factors**

Risks are a natural part of software initiatives [30]. In order to prevent disasters, rework, project cancellations, and to ensure project success, risk management is essential [29]. Software engineers and practitioners have been polled in prior research to identify and rate software risk factors [10]. Twenty indicators were taken from [31], [32], and an additional six components were taken from [33], for a total of 26 software risk factors that were found and ranked. This study focuses on inappropriate feasibility, decisions made by higher levels of management, poor planning, the project manager’s lack of expertise, and a lack of motivation [10].

### **2.3.4 Project Performance**

The time, cost, and scope criteria, also known as the “iron triangle,” are frequently used to judge a project’s success [34]. Prior research [37] recognized user interaction, specific requirements, and executive management support as crucial success elements. Project performance has been proven to be improved by elements like leadership, organizational support, and project management expertise [36]. Another study looked at how

### *2.3. PROJECT GOVERNANCE TO IMPROVE THE PERFORMANCE OF SOFTWARE PROJECTS BY MITIGATING THE SOFTWARE RISK FACTORS*

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well projects performed in terms of their scope, money, efficiency, and reporting quality [38]. These studies [37, 38] emphasize the value of teamwork, individuals, and a variety of other elements in achieving project success and enhancing project performance.

## Chapter 3

# Enhancing Game Usability: A Framework for Small-to-Medium Sized Game Development Businesses

Akthar, S. R., Islam, M. R., Islam, N., Sadia, F. (2023). Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses. ICSOFT 2024 Rome, Italy

The video game industry has experienced significant growth in recent years, with revenues projected to reach \$197 billion in 2022. The global video game market was estimated to be worth \$195.65 billion in 2021 and is predicted to rise to \$220.79 billion in 2022. Bangladesh's gaming market was valued at \$0.37 billion in 2021, but it is expected to grow four-fold by 2026. India currently leads the South Asian region with a gaming industry value of almost \$4.46 billion. Despite the potential for growth in the video game development sector, Bangladesh has yet to fully capitalize on the industry's potential. There are no official statistics on the number of game development companies in Bangladesh. Moreover, game development processes, including software engineering, have been neglected by researchers. Additionally, game developers and large gaming companies tend to keep their processes and methodologies secret, and studies and professional reports have exposed some of the negative aspects of the industry (Islam, 2020). During the COVID-19 pandemic, many games released were criticized for having bugs or being unoriginal. However, despite these issues, major gaming companies saw an increase in their stock values. The popular gaming platform Steam experienced a surge in its active user base, with an increase of over 20%. (Şener, Yalcin and Gulseven, 2021).

This study aims to investigate whether game developers in Bangladesh utilize the usability evaluation heuristics proposed in various research papers. Video game design focuses on entertaining and engaging the player, which involves various design elements



such as storyline, pacing, level of difficulty, and gameplay mechanics. However, since most games require frequent interaction from the player, game designers need to consider usability issues carefully. If game interfaces are poorly designed, they can impede the primary objective of providing an engaging experience to players, resulting in reduced success and quality of the game (Fabricatore, 2007).

The goal of this study is to review the concept of game usability and provide practical, developer-centric solutions to ensure high usability in game development, particularly for small-to-medium-sized businesses and start-ups in the slowly expanding game development sector in Bangladesh. This study also aims to review current research on usability techniques for game production, create usability heuristics based on the Nielsen usability technique and the stages of game software development, and evaluate their effectiveness in identifying game specific usability problems.

The primary contributions of this paper are:

1. Identify real world usability problems that provide breadth and depth coverage of the game design space.
2. To make the heuristics simple enough for individuals with familiarity with usability principles and some game development experience to implement.
3. Game developers to be able to use the heuristics to identify real problems that will affect the usability of games.

## 3.1 Research Methodology

This paper aims to examine the state of development in usability and related issues in the context of game development in Bangladesh. Three research questions were raised to further specify the research.

- 1.RQ1. What is the nature of specific usability recommendations for Game Development?
- 2.RQ2.What Heuristic Method developers follow to develop a game?
- 3.RQ3. What are the most common problems faced by game developers in each process type?

The above questions influenced the key literature search criteria. The literature search was carried out between September 2022 and December 2023 in five databases: Web of Science, Scopus, IEEE Xplore, ScienceDirect, and ACM Digital Library. The relevant papers were identified by searching in papers' metadata (title, abstract, keywords), using keyword search queries. The keywords identified from the research questions were as follows: Video games, gaming industry, Bangladesh, small-to-medium-sized businesses, startups, developer centric solutions, usability specialists, game production, game developers, usability heuristics, Nielsen usability technique, stages of game software development, typical usability problems, game specific usability problems. Renowned works related to game development and video game heuristic evaluations were prioritised from researchers of various countries. Research works related to the same topic from Bangladesh were also searched but nothing remarkable was found. There is not enough research done in Bangladesh about game development. Many other countries have done intense research on this topic. As an alternative measure, articles released by local news media and interviews or data provided by Bangladesh ICT Ministry were studied.

This research is done based on the heuristics provided by Sami Mylly et al. In their research paper *The Quest for Usable Usability Heuristics for Game Developers* in 2020. Also, theoretical concept was drawn from Kristina Magyłaite et al's "Towards High Usability in Gamified Systems: A Systematic" in 2022 which is based on Nielsen's 10 heuristics. Review of Key Concepts and Approaches. The most frequently used method for usability inspection is heuristic evaluation. However, recent research has demonstrated that heuristic evaluation is not commonly employed as a usability evaluation technique in the video game industry. Game developers prefer to devise their own usability heuristic lists tailored to each game rather than using pre-existing lists since they consider them to be too intricate to use (Mylly, Rajanen, and Iivari, 2020). The authors recognized the need for heuristics evaluation methods specifically tailored to game development. While Nielsen's usability evaluation heuristics are widely used for assessing software systems, they are not always suitable for video games. Therefore, the authors aimed to develop a set of heuristics that could be applied throughout all stages of video game development.

Questionnaires were designed based on the heuristics proposed by Mylly et al. The game development process was divided into eight stages, including Concept, Pre-production, Prototype, Production, Alpha, Beta, Gold, and Post-release, and a total of 30 questions were asked across all stages. The participants were selected randomly from game developers in Bangladesh, including both employees and freelancers. Participation in the survey was voluntary, and anonymity was maintained. The survey questions were distributed among the participants through a Google survey form link. Additionally, interviews were conducted with the participants to gain further understanding of the game developing sit-

uation of Bangladesh. In this interview participants were asked to explain their struggles and hardships in the various stages of game development and as game developers.

#### 3.1.1 Data Collection

In October 2022, a small-scale survey was conducted among game creators, testers, consumers, and freelancers in Bangladesh to gauge their views on game usability, the use of heuristic evaluation in businesses, and the usefulness of usability heuristics described in the literature. The survey received responses from 19 individuals. In addition, interviews were conducted with a few game testers and developers who were both employees and independent contractors. Despite the relatively small number of game firms in Bangladesh, only 36 developers responded to the survey. The research on game development in Bangladesh is inadequate compared to numerous other countries that have conducted extensive research on the subject. Nonetheless, with the assistance of publications from other countries, the researchers were able to conduct their study. Six papers were selected as qualified for analysis, and the years and categories of the publications were examined. The results indicate that the chosen papers were published within the past five years, but the number of papers was small. Most of the articles were conference proceedings.

#### 3.1.2 Usability testing Method employed

The papers that were chosen used a variety of usability assessment techniques. The Quantitative and Qualitative approaches used in this paper are (1) Questionnaires (n=20); (2) "Think Aloud procedure"; (3) Interviews (n=10); and (4) Heuristic Testing (n=8). The response from the respondents to an inquiry about what usability meant to them is quite like how people think of (game) usability: "Usability is one of the design goals that should be pursued during development to make the product as accessible, intuitive, and transparent as necessary to its core audience." This encourages the inclusion of usability activities in the development cycle.

To discover more about the input that consumers have gotten by speaking with various gamers and non-gamers. Another response highlights providing players with space to comprehend the game and the option to modify that. How easily a player can use and interact with a team is referred to as its usability. Poor usability is typically a result of poor user experience (UX) design, a lack of customization options for players to tailor the game to how they want to enjoy it (for instance, relocating controllers to suit left- and right-handedness), and a lack of instructional areas for new players.

There are several ways for the game development process to resemble the traditional software development process. the basic game development process can be divided into following phases:

Phases	Description of the Development Phases
Concept	The main idea of the game is decided and described
Preproduction	To define what the game is, how long it will take how many people are needed and how much it will cost to make it
Prototype	To test the non-functional requirements of the game which is difficult to evaluate ( gameplay).
Production	It's when the most action happens, most people work at the same time and most time is consumed.
Alpha	To define when the game is mostly playable from start to finish and where a particular build of the game is the first playable version.
Beta	In this phase, the goal is to have the game stabilized and remove most of the errors and problems
Gold	24.9The climax of the process where the game is ready and waiting to be delivered for the distributors
Post Release	Patching the bugs and issues that were not found or fixed before the initial release, without forgetting the upgrades,.

Table 3.1: Description of Game Development Phases .

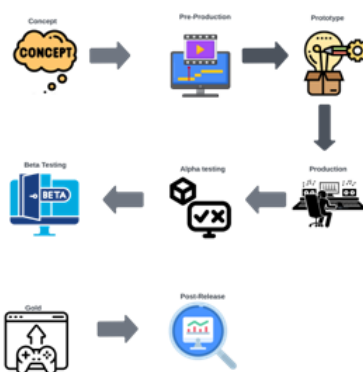


Figure 3.1: Development Phases. It shows Phases list & Details about the development phases. (Mylly, Rajanen, & Iivari, 2020)

This study goal was to prepare a new set of heuristics in some phases to understand the process more smoothly.

### 3.1.3 Design OF Questionnaires

Based on Eight development phases which are discussed above, the study is designed with some Questionnaires to proceed in this research. In Table: 2 some of the most important questions are given below:

- During the concept development stage do you gather all the necessary information and set them on board?
- When designing the game, do you consider the target audience?
- Rate the complexity and difficulty of the AI you use in the game?
- For casual online or offline games do you allow players to exit/quit anytime without harsh penalty or losing in-game progress?
- Do you make the basic controls and tutorials easy to learn for new players?
- Do you provide both simple and complex control options in your game to cater to the needs of both inexperienced and experienced players?
- At beta phase of the development do you ensure the players receive enough feedback from their surroundings while progressing through the
- Do you ensure the game interface/HUD (skill bar, health indicator, mini-map, compasses, currency) is informative?
- Do the players have to wait to download a massive update package and install to play the game?
- Do you provide manuals, tutorials so the player doesn't have to rely on outside sources for information?
- Does the new content remain consistent with the old content/base game?

#### 3.1.4 Participants in the usability testing

Most of the studies (64) of user as a participant in usability evaluations, e.g., Freelancer or Game Developer (30) only. By categorising the data according to the number of participants according to type of usability evaluation method.

### 3.1.5 Data Extraction and Categorization

Data extracted from each article were recorded on a computer worksheet (Excel) to categorise and compare characteristics.

## 3.2 Result Analysis

### 3.2.1 Data Analysis

The dataset was calculated using Excel Sheets and performed quantitative analysis and calculated descriptive statistics, consisting mostly of frequency tables for the categorical variables. The study summarised the findings from the selected articles to answer the research questions that guided this study. Cross tabulations were used to make filter results from the survey questionnaires. In Figure 2, Visual mapping is shown for this online survey.

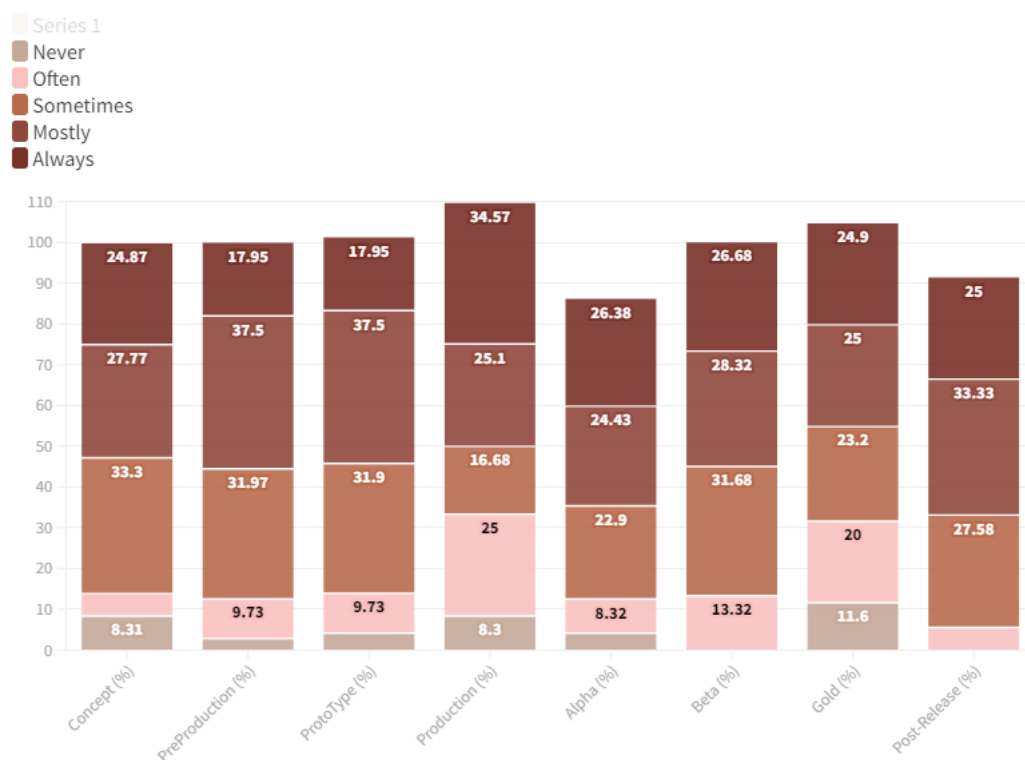


Figure 3.2: Survey Result Based on Questionnaires

In the above figure, this graph shows the mapping of data collected from game developers based on their experience using different parameters of their development phases.

Here, the result is longitudinal. The actual results can be increased or decreased in a sequential manner depending on the variable (No of Participants)

Development Phases	Never	Often	Sometimes	Mostly	Always
Concept	8.31	5.53	33.30	27.77	24.27
Preproduction	2.77	9.73	31.97	37.5	17.95
Prototype	4.15	9.73	31.97	37.5	17.95
Production	8.3	25	16.68	25.1	34.574
Alpha	4.15	8.32	22.9	24.43	26.38
Beta	0	13.32	31.68	28.32	26.68
Gold	11.6	22	23.2	25	24.9
Post Release	0	5.53	27.58	33.33	25

Table 3.2: This Crossed tabulation shows calculations of survey questionnaires using development phases maintaining heuristics.

The research is to ensure if any of the answers depends on or correlated with each other because of the usability testing, as the correlation approach is cited as an important component of game development. To have a clearer understanding of this study, if a developer failed to build a clear concept or prototype of the game, the game development can be stuck and further failed to proceed.

### 3.2.2 Comparison of Two Heuristic Models

In 2022 Magylaitè et al., introduced another set of Heuristics for game development. To gain a better understanding of the nature of the recommendations proposed in the selected papers, the generalised recommendations namely: Nielsen's heuristics for user interface design. Heuristics serve as the most general usability principles available. There are several similarities between in this reviewed heuristics and Nielsen's heuristics; N1, N4, N5, and N9 are kind of similar with the concepts so far. The discussions were with the developers but there are some variations with their version of heuristic methods.

For instance, Nielsen's consistency and the standard 'heuristic' is that 'users don't have to Do different words mean situations and actions. The platform rules. Heuristics dealing with consistency, "provide consistently Reacting to User Actions", and basic Mechanics such as hit detection, game physics, and characters Movement and hostilities should be appropriate about the user's situation. Games should provide consistent input mappings to match user actions. These situations are also defined by the phases Concept, Pre-Production, prototyping. Each recommendation had to be assigned to one or more of the following heuristics:

- • N1. Visibility of system status.
- • N2. Match between system and the real world.

- • N3. User control and freedom.
- • N4. Consistency and standards.
- • N5. Error prevention.
- • N6. Recognition rather than recall.
- • N7. Flexibility and efficiency of use.
- • N8. Aesthetic and minimalist design.
- • N9. Help users recognize, diagnose, and recover from errors.
- • N10. Help and documentation

Nielsen’s error detection (N9) (N5) is like alpha and beta phase as Alpha and Beta testing is the user end’s acceptance testing. This can help to detect bug from the final product and fix it if needed. The data is shown here Table 2, here the similarities between two methods are denoted by ”Yes”

Number	Concept	Preproduction	Prototype	Production	Alpha	Beta	Gold	PostRelease
N1	Yes	Yes	Yes	Yes		Yes		yes
N2								
N3								
N4	Yes	Yes	Yes	Yes				
N5					Yes	Yes	Yes	Yes
N6								
N7								
N8								
N9		Yes		Yes	Yes		Yes	Yes
N10								

Table 3.3: Similarities between Two Methods

This also addresses control design, artificial intelligence, and information on game status. However, the content and focus of the heuristics are significantly different. Their heuristics focus on engagement issues, but ours are strongly oriented around usability and are augmented by detailed information on common usability problems.

### 3.2.3 Proposed Heuristics

To fulfil two key functions in the game design process, this study put together a set of game heuristics. First, heuristics can be utilised as a set of design guidelines early in the game design and development process. They can also be used to conduct usability



inspections, where evaluators utilise them to iteratively critique the design. This paper's approach is more closely aligned with that described by Sami Mylly et al., who suggest that heuristics can be developed using specific software development phases, as well as by developing principles that describe the usability problems that seem to be present in games. Nielsen's method for defining a new set of general-purpose heuristics served as the initial motivation for this method for defining game usability heuristics. After studying both methods, a set of heuristics was designed to help game developers in Bangladesh. Here are the key findings of the analysis; –



Figure 3.3: Twelve Proposed Heuristics

Here each heuristic is listed above described and explained how common problems can be avoided. (1) prior to reaching them, long-term goals should be visible, whereas short-term goals should be obvious from the start. (2) There are several types of players; for example, some are right-handed while others are left-handed, and some might only have one hand or be subject to other limitations. The player should have the option to change the controls to play the game as effectively as feasible. (3) Ensuring that the system-wide use of the same coloration provides high quality (such as a raised rectangle), word, command, etc. (4) it is to make sure there are no unwelcome lags or delays in the system's response to user input. (5) The visual representations that are frequently used to convey information about the game's current condition include radar views, maps, symbols, and avatars and use of jargon that pertains to a specific topic and ought to be familiar to regular users.(6) Adding a fictional plot to a tale will boost user interest and concerns the user's subjective emotional enjoyment, which is often assessed through user testing, and is greatly influenced by the way the game creation process is structured.(7) Gamers must be aware of their progress toward the game's objective. Feedback on their development

will encourage them to keep playing (progressive feedback), and input on their present and future circumstances will make it much apparent how to move forward (informative feedback). (8) It is worthwhile to overcome the challenges since doing so makes you feel good. Even though the trials could be challenging, if the players succeed, they will keep trying. It fosters a thorough user ranking and incentive system in a gaming solution. (9) Ensuring that the activities that system users can do at any given time are in line with the usual steps of the activity that is being performed and that no distracting, deceptive, or irrelevant options are shown, or that they are easily identifiable. (10) Users receive badges, which can be physical or digital, for a variety of honourable deeds or accomplishments. (11) Giving system users the ability to control the system's speed and not imposing arbitrary, fixed time limits on user operations. (12) The complexity and learning curves of many games make it difficult for players to become proficient in the fundamentals of the game. Users should have access to comprehensive game documentation that explains how to interact with game features and understand visual cues.

## 3.3 Key Observation

The results of the review presented above served as the input answering the research question RQ1-RQ3. The key observation is presented below:

RQ1. What is the nature of specific usability recommendations for Game Development? The authors of the chosen papers presented their findings not just as advice for usability but also as suggestions for enhancing user experience, increasing motivation, and improving compliance with humans. Many of the suggestions fell under the category of being widely accepted, such as using common jargon, giving helpful comments, preventing errors, segmenting information, assuring quick response times, etc. As an alternative, the writers frequently suggested employing modality and signalling principles, making sure that all necessary information was provided prior to the activity, and including features for managing fatigue (adaptable time limitations and speed of work). While not all software systems fall within these standards, it is obvious that they should be considered when creating games. (Magylaitė, Kapočius, Butleris & Čėponienė, 2022).

RQ2. What Heuristic Method developers follow to develop a game? Most game developers attempt to create games using Nielsen's heuristics method. The survey asked if it would be simple or difficult to implement a particular heuristic in a current project. However, some recent studies have alarmingly shown that heuristic evaluation is not a typical usability evaluation method in the video game industry and that game developers would prefer to create their own usability heuristic lists for each of their games rather than use existing lists, which they believe to be too cumbersome to use. So, there is

a need to better comprehend the developer's perspective on game usability. Developers attempt to follow a sound model before implementing it, but for complex use cases of AI (Artificial Intelligence), they construct their own strategies to proceed. Together with "Greater knowledge," it is believed there is a need for a broader set of heuristics that covers the entire spectrum of game creation, from concept to live operations and serving the user base, as well as a set that explains what and why the heuristics are. These questions are being addressed by the heuristics suggested in this study, which also serves as a foundation for a more in-depth and comprehensive treatment of game creation. (Mylly, Rajanen, & Iivari, 2020)

RQ3. What are the most common problems faced by game developers in each process type? Age is a crucial consideration when deciding how to create or enhance games, as shown by most of the papers that were chosen, which (30 respectively), discussed the usability of games especially geared at either children or adults. Half of the six publications that offered suggestions for adults were targeted exclusively at gamers over the age of sixty. The authors of the remaining 40 publications didn't mention any details about the target population that their recommendations were intended for. Other user qualities, such as user goals, degree of motivation, education, or IT abilities, were also cited as factors that frequently have an impact on usability-related system development decisions (Magylaitė, Kapočius, Butleris & Čeponienė, 2022).

This strategy is more in line with the idea that heuristics may be created for software categories by analysing current products and creating rules that define the usability issues that are discovered. Yet, it was impractical to conduct the evaluations ourselves due to the vast range in game usability issues that anticipated. This research anticipated that both within games and between game genres, there would be a large variety in usability issues. The study has consequences for both theory and practice. It was found that the recommendation lists offered by the various authors largely overlapped after assessing the pertinent guidelines and recommendations for gamified systems discussed in the chosen articles. The only thing that varied between the many authors' mentions of the same idea or advice was the wording. Hence, an initial categorization was done to make the study of the recommendations easier. To go forward, game developers set their own usability assessments rather than always using the standard heuristic approach. Instead of always using heuristics, game creators create their own usability tests to move the process along. Through speaking with or surveying game creators, this study concluded that each one upholds the industry standard for game production in their own unique style.

This paper first reveals the degree of success of the heuristics in achieving these objectives. With only a handful of the heuristics, people were able to track down countless

problems and discover numerous problems. The evaluation does not include a thorough analysis of the heuristics because it is not expected for any game to necessarily have problems in every area of coverage. But it does show that the evaluators were able to understand the heuristics, and a check at the problem descriptions shows that they did match the range of coverage specified by the selected heuristic. This shows that people could apply the heuristics to recognize real problems, and that they weren't too challenging to utilise. For a full evaluation of the heuristics, more testing with multiple evaluators and where the heuristics are applied to games from different genres will be necessary. However, it is assumed that the results give us enough proof to say that heuristics are effective in spotting important usability problems in the context of games.

## 3.4 Limitations

The data collected for this paper ran into a few bumps. Secondly, Bangladesh has done significantly less research and work on game development than other countries. Because there are so few game production companies, there are incredibly few game developers. On this subject, neither formal education nor research exist. Most developers are self-taught independent contractors who pick this line of work out of curiosity and passion. Young pupils receive no assistance from the government. Most of them begin their careers as independent game creators. Independent contractors make up the bulk of participants. Most company developers are reluctant to share information because of corporate policies. Most game creators do not want to take part in the interview because they are so private. This is a pattern that was also observed in other papers (Mylly, Rajanen, & Iivari, 2020). They were reluctant to disclose the information.

## Chapter 4

# Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation Through ERP Implementation

Akthar, S. R., Khan, M. S., Sadia, F., & Hasan, M. (2023). Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation through ERP Implementation: A Value-Driven Approach in Bangladesh. *Collections*, 77.ICSBT 2023

The Enterprise Resource Planning (ERP) has become an indispensable tool for managing critical aspects of organizational operations. With the support of comprehensive multi-module software, manufacturers and service providers can efficiently handle a wide range of tasks (Maguire, S., Ojiako, & Said, 2010). ERP systems have evolved over the years, replacing outdated Material Requirements Planning (MRP) systems and emerging as a fundamental component of IT infrastructure. Large corporations with diverse business units often face challenges in managing their databases and generating timely reports on their operations. Previously, organizations relied on in-house databases and software solutions to handle data, with the accounting system being linked to the overall database (Barker, T., & Frolick, M. N., 2003). However, the process of gathering information from various factories and generating reports for higher authorities was time-consuming. Implementing ERP requires a comprehensive understanding of the fundamental steps and technical intricacies involved, which can be challenging for marketers to grasp (Khan, M. R., & K., 2012). Although implementation partners are available to provide support, effective communication and responsibility sharing can sometimes be difficult, necessitating additional assistance. To enhance understanding and discuss ERP practices worldwide, a framework is proposed that examines ERP installations in both industrialized

and developing nations. This framework provides valuable insights for practitioners and researchers, highlighting the implications and considerations associated with ERP implementations (Achard, F., 2005; Maxwell, James Clerk). It is important to note that the abundance of ERP solutions in the market does not necessarily correlate with the availability of up-to-date content. Technological advancements and evolving practices render literature older than ten years obsolete, and the most recent information is predominantly accessible through online articles.

## **4.1 Factor OF THE ERP**

Based on the publication (Huang, Z., & Palvia, P., 2001)) the factors of the ERP given down below

### **4.1.1 Infrastructure**

Infrastructure, which comprises both fundamental and IT infrastructure, is a crucial requirement for ERP deployment. The company's internal operations, as well as those of its suppliers, clients, and banks, are all impacted by ERP. The entire infrastructure must be reliable to implement complete value chain management made possible by ERP.

### **4.1.2 IT Maturity**

How a firm chooses to purchase and implement IT/IS can be significantly influenced by the level of IT maturity. Because they have a better understanding of IS implementation, can successfully communicate with ERP vendors, and have a better understanding of IS implementation, IT mature organizations are more likely to succeed in ERP adoption. (I. S. Jacobs, 1963).

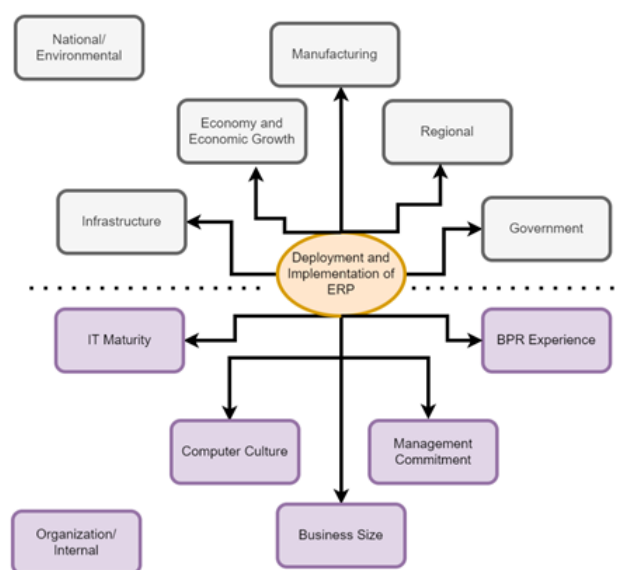


Figure 4.1: ERP Implementation Factors and Frameworks

### 4.1.3 Computer Culture

This relates to the organization’s computing history, employee attitudes toward computers, and organizational computer dependency even though it is related to IT maturity. A company with a solid culture will have more understanding of ERP system acceptance, data management, and application functionality.

### 4.1.4 Business size

The size of a company has a big impact on how much money it spends on IT and how often it uses it. Many major systems began in huge corporations, and ERP systems were pioneered by large corporations. Smaller businesses are starting to embrace ERP as a result of two considerations. First, ERP companies are focusing more on small and medium businesses, and second, small businesses are feeling the push to use ERP to gain a competitive advantage.

### 4.1.5 BPR Experience

How much a company spends on IT and how frequently it uses it are significantly influenced by its size. Large enterprises were the forerunners of many important systems, including ERP systems. Due to two factors, smaller companies are beginning to use ERP. First, small and medium-sized firms are receiving increasing attention from ERP

providers, and second, small businesses are sensing pressure to embrace ERP to gain a competitive edge.

### 4.1.6 Manufacturing Strengths

Although this is changing, historically, ERP solutions have been more functional in the manufacturing areas. Despite the fact that service providers have started to enter this sector, manufacturers are more likely to use ERP.

### 4.1.7 Government Regulations

Regulations can either help or impede the use of IT, and governments can encourage it. For instance, in order to be audited, several government departments in China are compelled to replace manual accounting processes with accounting software. Software for accounting and finance has therefore been widely used.

### 4.1.8 Management Commitment

Given the complexity and resource demands, this management commitment is essential to the implementation of ERP in both developed and developing countries. Given the fundamental status of ERP in undeveloped countries, it might even be more crucial in these nations.

### 4.1.9 Regional Environment

The use of IT and ERP in a country may be influenced by its geographical surroundings and culture. Bangladesh is a great case in point. Bangladesh should have a sizable future ERP market because it is a developing nation, but its presence is still quite young. The bulk of big Bangladeshi firms have moved their manufacturing activities to other Asian countries, which is one of the factors. In these Asian countries, ERP usage is not very common. Because collaborating nations do not use ERP, which is not a stand-alone system. The geographical setting and cultural traditions of a nation may affect how it uses IT and ERP. Bangladesh is a great case in point. Bangladesh should have a sizable future ERP market because it is a developing nation, but its presence is still quite young. One aspect is that.

## 4.2 Research Design

This paper proposes a framework for driving value creation through ERP implementation in B2B relationships, focusing on the perspective of Bangladesh. The research



addresses two main questions: (RQ1) What is the proper methodology for ERP implementation? and (RQ2) How does data driven value creation occur through SMA in B2B relationships? Interviews were conducted to gather relevant insights, and the following interview questions were considered:

- - Does the vendor possess the necessary skills to set up the modules?
- - Are all business heads aware of the implementation and providing timely support?
- - Do team members responsible for ERP have adequate knowledge and experience?
- - Are decisions made by the team leader timely and effective?
- - Can the company afford the cost of ERP implementation?
- - Is the vendor providing proper training and support to the end user?
- - Is the funding for implementation being utilized effectively?
- - Are the data being migrated from legacy systems to ERP transparent and accurately reported?
- - Do end users exhibit a tendency to use ERP in the same way as their legacy systems?
- - Is the UAT session conducted appropriately before going live with ERP?

#### 4.2.1 Data Collection Method

Google Forms was used to gather the data for this article during the qualitative phase. The authors chose to directly interview people involved in the relevant subject, nonetheless, as the initial responses looked unrelated. Four project managers from various firms, one managing director, and an Oracle representative involved in the rollout of the Oracle Fusion ERP system were all interviewed via Skype by the team. The aforementioned questions were asked to the interviewees, and the answers were used to develop the solutions.

### 4.3 Limitations

For a business to avoid ERP deployment failure, which could be financially draining, it is essential to analyze the process. Typically, when establishing an ERP system, businesses must follow a particular framework and process. Companies can guarantee more efficient execution by adhering to this structure and organizing the implementation process. Accessing larger businesses or enough resources, however, can be difficult because there may not be enough communication and teamwork among employees.

## 4.4 Problem and Solution

Some problems and existed solutions are discussed in this paper

### 4.4.1 Insufficient Software Fit

Understanding the requirements is essential for an ERP deployment to be successful. Meet with stakeholders from many disciplines, discuss existing problems, and foresee upcoming difficulties. Make a thorough list of the requirements and features that are necessary. Put functionality before superfluous embellishments. Continue looking for an ERP system that satisfies all needs if a potential candidate falls short.

### 4.4.2 The Implementation is not dedicated by Business Leadership

For an ERP project to be successful, organizational leadership commitment is essential. To ensure proper resource allocation, consider postponing the project if they are not totally committed. Resources like money and people should be taken into account. Important people involved in the deployment should finish off their previous tasks, and if necessary, plans should be prepared for interim replacements. The entire organization must be involved in the ERP adoption.

### 4.4.3 Limited Team Resources

Building the ideal ERP team is essential for a successful implementation. It's crucial to allot enough time and resources. Think about hiring freelancers, contract workers, or existing staff who have time set aside for the project. If employing internal resources, give the ERP implementation more importance than other activities. For particular purposes, such as data conversion programming, seek outside assistance. The project will be managed by a committed team manager who will report to high management and a steering team.

### 4.4.4 Failure to Hold People Accountable for Making Timely, High-Quality Decisions

Early on in the ERP installation process, establish defined decision-making roles. Failure may be caused by indecisive, bad decisions. Instead of relying primarily on top management, promote group decision-making that involves team members knowledgeable with processes and changes.

##### **4.4.5 Lack of investment in change management**

Prioritizing excellent communication and careful planning is crucial for a successful ERP installation. To keep everyone informed and involved, over communicate the arguments and anticipated benefits of the ERP rollout. You shouldn't take it for granted that people will accept the change right away because opposition can result in failure. Specialists in change management can be useful additions to the implementation team since they can help people accept and embrace the future by recognizing their unique personalities and resolving their worries.

##### **4.4.6 Inadequate coaching/support**

User education is necessary for ERP installation. Users who haven't had any prior training are using up the resources of the implementation support team. When there aren't enough support resources to handle go-live issues, the implementation fails.

##### **4.4.7 Minimal Resources**

An ERP system budget must account for both the initial cost and recurring costs. Increase your expected budget by 25 charges. Be prepared to spend more money on top of the cost of the ERP system itself for payroll expenses, consultancy fees, infrastructure upgrades, continuing support, and maintenance. Although long-term savings may be feasible, it's important to set aside cash to make sure the implementation works well.

##### **4.4.8 Inadequate cleaning of information**

Preparing and cleaning data are two essential but challenging steps in deploying ERP. System development and data cleansing should happen simultaneously to avoid implementation problems. Sort data into categories that are static (transactional) and dynamic (once-entered). In the new ERP system, tables with columns of static data will be present. Data from previous sources is duplicated and mapped to the new ERP while accounting for mandatory and optional fields. Send only the most recent and essential information to avoid unnecessary clutter. Keep legacy systems running in read-only mode so that historical data can be accessed. Double-check the data and make any necessary corrections before entering it into the new ERP. Paying close attention to every last detail throughout the data preparation stage is essential for a successful deployment.

##### **4.4.9 ERP's insistence on appearing outdated**

Excessive ERP system customization can be harmful, limiting functionality, making upgrades and testing more challenging, increasing costs and risks, and other negative

effects. Users may be accustomed to old systems, but because the new ERP incorporates best practices, they will quickly become accustomed to it. Priority should be given to meeting specific business requirements over aesthetic considerations. Customization should only be done when absolutely necessary due to its high cost. Most ERP systems offer setup options with little to no customization.

#### 4.4.10 Failure During Testing

An ERP implementation must undergo comprehensive testing on a regular basis to be successful. Test each important business process individually before moving on to volume tests and simulated go-live scenarios. Testing helps identify and address issues, such as problems with data migration. Just one data element with the wrong format can cause a test to fail. Data migration is an essential part of testing. Make the necessary adjustments based on testing results and go through numerous iterations to achieve a smooth transition. Document the migration procedure and locate techniques that permit speedy loading of all required data to ensure effective data migration during go live. Automated robotics testing can find and fix a variety of potential problems, lowering the possibility of implementation failures. While there may be other dangers, avoiding these ten major ones greatly raises the likelihood that an ERP crisis won't occur and enables your company to quickly restart operations.

### 4.5 Results/Findings

The research was consists of few interviews from different organizations in Bangladesh. Table 1 provides a detailed overview of the sample profile of the employees who participated in the study, which can be useful for understanding the demographics of the participants and analyzing the results of the study.

Category	Characteristics	Sample Amount	Percentage(%)	Valid Percent
Gender	Male	6	100	92
	Female	0	0	0
Age (Years)	31-35	1	16.67	10
	36-40	4	66.67	60
	41-45	1	16.67	16.67
Designation	Project Manager	4	66.67	66.67
	Managing Director	1	16.67	30.10
	Brand Ambassador	1	16.67	50.55
Year of Designation	3-5	1	16.67	31.51
	6-10	4	66.67	70.21
	>10	1	16.67	30.66

Table 4.1: Details of Sample Profile

In this paper, there is a proposed model diagram framework for ERP system. To help to visualize the system there is a sample scenario given down below:

Here is detailed discussion of the proposed model Framework:

### 4.5.1 Sign off Agreement

Sign off agreements are formal declarations between the client and the implementation team, certifying the successful implementation of the ERP system and meeting all client requirements.

- Vendors present system solution and discuss rules and support.

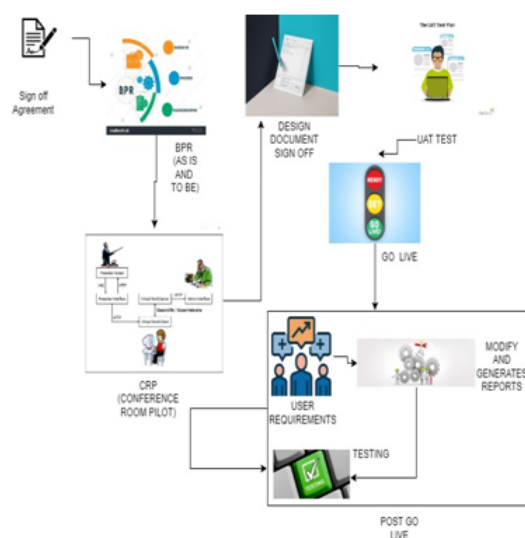


Figure 4.2: Proposed Model Framework to Implement ERP System

### 4.5.2 BPR

BPR involves redesigning processes to improve key performance indicators and align with the new ERP system.

- Map current processes, identify gaps, and design future state blueprint.
- Implement changes and consider dependencies.

### 4.5.3 CRP

A select group tests system functionality in a simulated environment before full implementation.

- Scope, design, and build.

#### 4.5.4 Design Documents Sign Off

When Formal acceptance and approval of design documents by stakeholders to ensure their needs are addressed.

- Approve CRP build.

#### 4.5.5 Sign off UAT

Obtain official clearance from users or stakeholders after thorough testing.

- Provide test server and module testing.

#### 4.5.6 Go Live

Stage when the ERP system is fully operational and used for regular business operations.

- Go live after successful UAT.

#### 4.5.7 Post Go Live

Continuously optimize and address requirements for ongoing improvements.

- Address user requirements, fix issues, and test. user.

Previously, organizations relied on in-house software Legacy, which was easy to use but lacked proper record-keeping. Shifting to Oracle Fusion ERP provided a convenient solution, as it stores and tracks all user input, ensuring data integrity. The COVID-19 pandemic accelerated the adoption of cloud ERP, offering significant benefits for remote work. As more companies in Bangladesh transition from legacy systems to ERP, the demand has increased. However, professionals limited experienced and computer literacy among employees pose challenges in implementation.

# Chapter 5

## Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factors

Lesum.L., Akthar, S. R., Sadia, F., & Hasan, M. (2023). Strategies to Overcome Slow Growth in Software Firms: Project Diversity Perspective (No. 10736). Proj MAN 2023., Porto, Portugal .

The relationship between project governance and project performance in the field of project management has been highlighted by recent study [1]. Through the use of project governance approaches, which guarantee effective resource allocation and coordination, software development projects seek to improve performance [2] [3]. The use of systems, authority structures, and processes to allocate resources and manage project activities is referred to as project governance [4]. Alignment with organizational governance has been highlighted as a key predictor of increased project performance [3]. The efficiency of project governance systems in enhancing the performance of software development projects in the presence of software risk factors, however, has received very little research. Prior project governance literature has mainly concentrated on building while ignoring risk issues unique to software projects. Software projects are inherently accompanied by risks, and perceiving these risks helps prevent project failure [6]. Software risk factors pose a threat to the successful completion of such projects [6] [7]. Various types of risk factors, including dependent, independent, certain, and uncertain, can lead to project failure [8] [9]. Project governance, which aligns organizational strategy with project objectives, is believed to effectively manage software risk factors and improve project performance [2] [11]. Project leadership also plays a crucial role in project performance [12]. This study aims to investigate the influence of project governance on project performance in the presence of software risk factors and examine the moderating effect of project leadership on

this relationship. By collecting data from 100 respondents in Bangladeshi software firms, the study provides empirical evidence supporting the hypotheses that project governance reduces software risk factors and project leadership positively moderates the relationship between project governance and project performance in the presence of software risk factors. This research contributes to the literature on software development projects' choice of governance methodologies to achieve organizational objectives in the presence of software risk factors [7].

## 5.1 Hypotehsis Development and Conceptual Model

### 5.1.1 Project Governance and Risk Factors

Risks in project development can impact project performance, and effective project governance can identify and mitigate software risk factors. Proper governance can address improper feasibility studies and higher management decisions, reducing associated risks. Project governance mechanisms can be adapted based on the project's ongoing situation, influencing risk events throughout the project life cycle. The first hypothesis is that project governance reduces the impact of software risk factors. Additionally, the dimensions of project governance lead to the following sub-hypotheses:

- H1a: Project direction moderates the relationship between software risk factors and project performance.
- H1b: Project sponsorship moderates the relationship between software risk factors and project performance.
- H1c: Project management effectiveness and efficiency moderates the relationship between software risk factors and project performance.

### 5.1.2 Project Governance, Risk Factors and Project Performance

Software risk concerns can be accurately identified via a project governance model [2]. Project governance can help participants collaborate and coordinate so that responsibilities are aligned and these risk variables are better managed, improving project outcomes [35]. Project managers improve their comprehension of risks and their capacity to anticipate and manage them by adding software-specific hazards into the project governance framework [2]. The effects of these risks on project performance are mitigated by these risks, which also play a crucial role in managerial decision-making processes [2]. As a result, it is believed that software risk variables significantly mediate the relationship between project governance and project performance [2].



### 5.1.3 Project Leadership, Project Governance and Risk Factors

Effective project risk management depends heavily on project leadership. It is closely related to several project governance frameworks. However, past study has mainly ignored the effect of leadership style on project governance. Project management has the capacity to improve the project governance framework and significantly lower risk factors. In light of this, it is proposed that project leadership enhances the effect of project governance in lowering software risk factors

### 5.1.4 Project Leadership, Project Governance and Project Performance

The success of a project is greatly influenced by the project manager's leadership style. Relationships between project leaders, such as the project manager, project sponsor, and other stakeholders, are influenced by project governance [2]. Project failure can be caused by a project leader's lack of skills, but effective leadership can strengthen the impacts of the project governance model on project performance [2] [3]. Therefore, project leaders' abilities and skills are vital. As a result, it is assumed that project leadership strengthens the influence of project governance on project performance. Based on these hypotheses, a conceptual model was created that illustrates the connection between project governance, project leadership, and project performance [2]

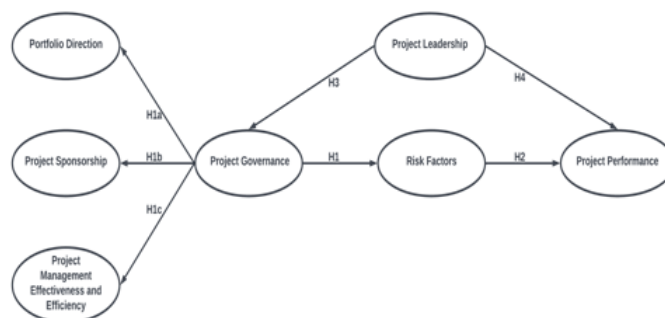


Figure 5.1: Conceptual Model of Research

## 5.2 Research Methodology

This study focuses on the moderating effects of project leadership to examine how project governance might improve project performance in the presence of software risk factors. Project governance, project leadership, software risk factors, and project performance are the four primary constructs that the study looks at. Three factors—portfolio

Variables	Frequency Experience	Percentage
Employees	500 or more	68
Project Owner	5 Years	3
Project Manager	6 Years	6
Senior Developer	5 Years	23
Developer	4 Years	58
UX Designer	3 Years	7
Designer	3 Years	3

Table 5.1: Sample Profile Table

direction, project sponsorship, and the efficacy and efficiency of project management—are used to assess project governance. We have taken current literature’s discussion of software risk factors and applied it to software development initiatives. Project outcomes are used to gauge project performance. Data is gathered via a survey approach in order to test the hypotheses. Each concept is represented by a section on the questionnaire, and the questionnaire’s validity and reliability are ensured using a variety of techniques. These techniques typically include methods such as expert reviews, pilot testing, factor analysis, and Cronbach’s alpha for reliability, among others. A Likert scale with five points is used to rate each item. Project performance and software risk factors are rated on a scale from Never (1) to Always (5), while project governance and leadership are rated on a range from Strongly Disagree (1) to Strongly Agree (5).

### 5.2.1 Sample Profile of Respondents

the following Table displays the demographic profile of the respondents.

### 5.2.2 Data Collection

Over the course of a month, data for this study were gathered through an online survey. There were 92 respondents in total, and 85 were judged useful for analysis based on their experience and hypothesis question. The poll requested respondents to read the definitions of project governance and project performance in order to confirm that they were familiar with them before asking survey questions. The analysis took into account the respondents’ position within the organization as well as their work history (minimum of a year).

### 5.2.3 Data Analysis

In Table 2, Testing for validity and dependability was done with SPSS. Confirmatory factor analysis (CFA) was used to evaluate the measurement scale validity, with factor loadings  $\geq 0.40$  indicating a good match for the model. When the measurement scale’s

Variable	Item	Factors Loading	Cronbach's alpha
Project Governness	PG1	.556	.88
	PG2	.651	.88
	PG3	.826	.88
Project Performance	PP1	.489	.83
	PP2	.489	.83
	PP3	.626	.83
	PP4	.464	.83
	PP5	.471	.83
	PP6	.532	.83
Software Risk Factors	RF1	.489	.86
	RF2	.463	.86
	RF3	.441	.86
	RF4	.364	.86
	RF5	.671	.86
Project Leadership	PL1	.381	.85
	PL2	.675	.85
	PL3	.464	.85
	PL4	.581	.85
	PL5	.467	.85

Table 5.2: Hypothesis Decision Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.449	2	5.225	7.405	0.001
Residual	67.773	96	0.706		
Total	78.182	98			

Table 5.3: Anova

reliability was tested using Cronbach's alpha scores, the results were acceptable, ranging from 0.80 to 0.88. A value of 2.215 for the chi-square when divided by the degree of freedom denotes a good model fit. Additionally, the AGFI, GFI, RMSEA, and CFI fitness markers were evaluated. The CFI number was just below the 0.90 level, while the GFI and AGFI values were both above the 0.80 threshold. The appropriate dependability was indicated by the composite reliability (CR) values, which varied from 0.795 to 0.907. Overall, the dataset met the requirements of validity.

#### 5.2.4 Sample Data Tables

Sample Data tables below show the moderation effect of project direction in the relation between software risk factors and project performance.

Regression The relevance of the moderating relationship is demonstrated by a test of project direction, software risk factor, and project performance (Table 5.3). The moderating value's importance is further demonstrated by the coefficient table. Here,

	B	Std. Error	Beta	t	Sig
Constant	2.429	.397		6.125	0.01
PG1	.306	1.113	1.369	3.189	0.02
Moderator	-0.001	0.016	-0.006	-0.050	0.960

Table 5.4: Co-efficients

R	R Square	Adjusted R square	Std. Error
0.366	0.134	0.116	0.840

Table 5.5: Model Summary

the moderator's t and values are both within the acceptable range (Table 5.4). The relationship between the software risk factor and project direction is significant, as shown descriptive statistics by the R value and modified R square value (Table 5.5) (Table 5.6).

## 5.3 Result

### 5.3.1 Hypothesis Testing

85 sample data were used to determine the path coefficient of the hypotheses. The study's findings show the importance and trajectory of the links that were looked at. A stronger impact of project governance on project performance is suggested by higher path coefficients. The significance of the correlations is shown by the p-values, which are less than 0.05, and T-values, which are larger than 1.96. With p-values less than 0.05 and T-values greater than 1.96, all of the study's tested hypotheses were judged to be significant. The moderating impacts of project leadership and software risk variables were also looked at in the study. The findings showed that the association between project governance and project performance was negatively moderated by software risk variables. On the other side, it was discovered that the relationship between project governance and project performance was positively moderated by project leadership.

### 5.3.2 One sample test Data

One sample test data tables of a software risk factor, project leadership and project performance. These table 5.8 and 5.9 shows One Sample test examines the moderating effect of project leadership on the relation between project governance and project performance. Result found align with the hypothesized value. In Table 5.7, P-value for each

	N	Minimum	Maximum	Mean	Std. Deviation
PP1	92	2	5	3.91	0.893

Table 5.6: Descriptive Statistics

Sr. No	Hypothesis	Path Coefficient	F Statistics	P Values	Effect Size f <sup>2</sup>	Comment
1	PG1*RF1 - PP1	-0.763	1.981	0.048	0.027	Supported
2	PG2*RF2 - PP2	-0.209	2.083	0.023	0.037	Supported
3	PG3*RF3 - PP3	-0.508	2.785	0.028	0.029	Supported
4	RF1*PG1 - PP1	-0.508	4.412	0.002	0.041	Supported
5	RF2*PG2 - PP2	-0.508-0.508	2.005	0.00	0.269	Supported
6	RF3*PG3 - PP3	-0.508	2.054	0.004	0.289	Supported
7	RF4*PG4 - PP4	-0.508	1.978	0.003	0.292	Supported
8	RF5*PG5 - PP5	-0.508	1.995	0.001	0.069	Supported
9	PL*RF - PP	-0.508	3.785	0.000	0.059	Supported
10	RF*PG - PP	0.566	2.806	0.000	0.068	Supported

Table 5.7: Hypothesis Decision Table

	t	df	Mean Difference	Lower	Upper
RF1	26415	98	3.242	3.00	3.49
PL	33.533	98	3.667	3.45	3.88

Table 5.8: One Sample Data

of the hypotheses is well below 0.05 which means they are strongly supported by the data. In conclusion, out of the total ten hypotheses tested, all ten were supported by the data. These findings provide insight into the relationships between the variables under investigation and offer implications for the overall result.

	N	Mean	Stf. Deviation	Std. Error Mean
RF1	92	3.24	1.221	.0123
PL	92	3.67	1.008	0.109

Table 5.9: One Sample Statistics

# Chapter 6

## Conclusion

The study “Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses” investigates the concept of game usability and provide practical, developer centric solutions to ensure high usability in game development, particularly for small-to-medium-sized businesses and start-ups in the slowly expanding game development sector. The study showcases the resilience and adaptability of gaming usability, revealing how big companies managed to deliver their projects despite numerous obstacles and review the current research on usability techniques for game production, create usability heuristics based on the Nielsen usability technique and the stages of game software development, and evaluate their effectiveness in identifying game-specific usability problems.. The second research study “Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation Through ERP Implementation: A Value-Driven Approach in Bangladesh” focuses on the importance of Enterprise Resource Planning (ERP) systems and their associated issues in managing organizational operations. It talks about how ERP, which consists of extensive software with multiple modules, has become necessary for effectively managing different duties. It explores how ERP implementation requires a comprehensive understanding of fundamental steps and technical intricacies, which can be challenging for marketers to grasp. By studying these domains, a framework for analyzing ERP installations worldwide is proposed, offering insights into the ramifications and factors to be taken into account when implementing ERP in both developed and developing countries. The third research study “Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factors: The Moderating Role of Project Leadership”, In the context of software development projects, it looks into the connection between project governance, project performance, and software risk factors. In order to ensure efficient resource allocation and coordination and enhance project performance, it highlights the significance of project governance systems. The alignment of project governance with organizational governance is also emphasized in the study as a significant predictor of improved project performance. The research supports the hypotheses that project governance lowers software risk factors and

that project leadership positively moderates the relationship between project governance and project performance in the presence of software risk factors by gathering empirical data from software firms. Together, these three research papers examine methods for improving effectiveness and performance in several fields. They look into the impact of project governance on software project performance, optimizing B2B connections through ERP deployment, and usability in game development. Every study provides useful information and suggestions suited to the unique problems and circumstances of the industry in question. evolving project handling based on scenarios.

## 6.1 Sustainability

**Sustainability in Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses** This research would explore several approaches to enhance player pleasure, engagement, and accessibility in games. It would investigate how well-suited controls, dependable visual signals, and quick system performance are to guarantee a smooth gaming experience. Furthermore, the research would examine how narrative components, feedback mechanisms, and incentive schemes facilitate user engagement and emotional satisfaction. The increasing influence in the gaming sector offers a chance for long-term expansion and improvement. There is potential for long-term profitability and industry expansion as the nation progressively enters this market. This sustainability is further supported by the anticipated expansion of the global gaming sector, which emphasizes the large market opportunity for developers. Developers in Bangladesh can make a name for them in the game industry and support its further growth and development by taking advantage of this growth trajectory. The research proposed a comprehensive approach concentrating on improving player enjoyment, engagement, and accessibility in games while taking the long-term sustainability impact of the gaming sector into consideration The study would also investigate how well narrative elements, feedback systems, and reward programs promote user engagement and emotional fulfillment, which in turn supports the long-term viability of the gaming industry.

**Sustainability in Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation Through ERP Implementation** The sustain ability of this study is evident in its capacity to address the challenges posed by the growing complexity of software systems. As outlined in our study, Implementing ERP requires a comprehensive understanding of the fundamental steps and technical intricacies involved, which can be challenging for marketers to grasp. Although implementation partners are available to provide support, effective communication and responsibility sharing can sometimes be difficult, necessitating additional assistance. The positive trend in the adoption of AI-driven techniques further shows its sustainability. It reflects the industry's

recognition of AI as a valuable tool for enhancing efficiency.

**Sustainability in Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factor** This study uses a quantitative methodology for its investigation. Information on software risk factors, project performance metrics, project governance procedures, and project leadership traits is gathered using a structured survey instrument. Regression analysis and moderation analysis are two statistical analytic approaches used to investigate the correlations between various variables and evaluate the hypotheses put forth. The study's findings highlight how crucial it is for software development projects to have strong project governance procedures that promote proactive risk management. Project governance can assist reduce software risk factors and improve project sustainability by coordinating organizational tactics with project objectives and encouraging responsibility and openness. Additionally, the results emphasize how important project leadership is to maximizing the benefits of project governance and stress the importance of having strong leadership traits—like vision, communication, and adaptability—when navigating challenging software development environments. In an increasingly dynamic and risk-prone software development landscape, businesses can boost project performance and assure long-term sustainability by implementing effective methods that acknowledge the significance of these aspects and their synergistic impacts.

## 6.2 Feasibility

### Feasibility of Game Usability

The feasibility of the study “Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses” is perceivable in its focused objective, systematic methodology, and insightful findings. The study's ability to capture and analyze shifting dynamics within the software development landscape is highlighted by the identification of Cognitive Concentration Market study, Team Being stable, Communication, as well as Team Maturity, and User Involvement, Customer Feedbacks, as crucial factors during developing, as opposed to not following any approach. The software development process will become more possible if software organizations are ready to accept and incorporate the highlighted variables into their project management methods. Teams must receive additional training and assistance in order to adopt new heuristics and methods for the successful implementation of practices. If heuristics are upheld, the game development process ought to discover it simpler to adhere to recognized software development practices. This study identified software usability issues and provided a set of design guidelines for creating games. The results support the feasibility by providing practical advice for project managers and software development teams dealing with shifting obstacles in the dynamic world of software engineering.



#### **Feasibility of B2B Relationships with Post-Covid Sales and Marketing Automation through ERP Implementation**

The study is doable since it provides efficiency through a suitable methodology that expedites time to market. Businesses used internal software Legacy, which was user-friendly but didn't maintain accurate records. Conveniently, switching to Oracle Fusion ERP ensures data integrity by tracking and storing every user input. Cloud ERP has been increasingly popular due of the COVID-19 epidemic, which has tremendous advantages for remote work. The need has grown as more Bangladeshi businesses switch from outdated to ERP systems. This study skillfully traverses the problems, solutions, and development of ERP systems, firmly establishing its claims in the context of both the past and the present. In the context of ERP practices, it provides useful insights that improve the feasibility of its talks by addressing implementation issues and suggesting an analytical framework.

#### **Feasibility of Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factor**

This study's methodological clarity and quantitative methodology, which gathers data on software risk factors, project performance measures, governance practices, and leadership attributes through a standardized survey instrument, make it feasible. By assessing hypotheses and looking at correlations between variables, statistical analyses like regression and moderation help to confirm the study's validity. The results highlight the critical role that strong project governance plays in reducing software risks and advancing sustainability, as well as the importance of successful leadership qualities like vision and flexibility. The study's practical implications are noteworthy as they align with the ever-changing software development ecosystem, providing valuable insights to improve project performance and Feasibility in the long run. The study guarantees its relevance and application by addressing relevant topics within a particular industry environment, so making a valuable contribution to the discourse on software project management.

## **6.3 Social and Environmental Impact**

**Social and Environmental Impact of Game Usability** The suggested study on improving accessibility, player involvement, and enjoyment in games in Bangladesh has important social and environmental ramifications. The project intends to increase gaming inclusively for people with disabilities by emphasizing accessibility, which will promote social inclusion and community building within gaming communities. Furthermore, the study encourages cultural representation in the gaming business by pushing local developers to provide material that reflects Bangladeshi culture, which strengthens players' sense of identification and pride. Furthermore, as the gaming industry grows, players may have the opportunity to gain new skills that will help them with problem-solving and team-

work. Environmentally speaking, the move to digital distribution platforms lessens the carbon footprint associated with the physical production and distribution of games; however, the increased energy consumption from gaming hardware must be addressed by paying attention to energy-efficient gaming practices. Moreover, suggestions for the ethical disposal and recycling of gaming equipment help solve e-waste management-related environmental issues. The overall goal of the research is to favorably impact environmental sustainability and socioeconomic inclusion in Bangladesh's rapidly growing gaming industry, in addition to making gaming experiences better.

**Social and Environmental Impact of B2B Relationships with Post-Covid Sales and Marketing Automation through ERP Implementation: A Value-Driven Approach in Bangladesh** The study has important social and environmental consequences as it examines the migration of Bangladeshi firms from antiquated software to Oracle Fusion ERP systems. The implementation of Oracle Fusion ERP empowers the workforce by optimizing processes and enhancing data integrity, which promotes job satisfaction and chances for professional growth. Additionally, the move to cloud-based ERP systems, particularly in light of the COVID-19 epidemic, makes remote work possible, encouraging work-life balance and possibly lowering stress levels associated with commuting. Furthermore, as companies move to more sophisticated ERP systems, workers must be retrained or up skilled in order to improve the workforce's general skill set and support the development of human capital. In terms of the environment, the shift decreases energy use through cloud infrastructure, cuts down on paper consumption by digitizing operations, and improves resource usage and inventory control, all of which lower waste production. In Bangladesh's business scene, the study promotes social empowerment, environmental sustainability, and improved operational efficiency.

**Social and Environmental Impact of Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factor**

The study's viability is established by its quantitative approach, which uses standardized survey instruments to collect data on project performance metrics, governance procedures, leadership qualities, and software risk factors. The study validates its validity by evaluating hypotheses and investigating correlations between variables through statistical techniques like regression and moderation. The findings highlight the critical importance of excellent project governance in reducing software risks and promoting sustainability, as well as the value of adaptability and vision in effective leadership. The study's practical implications are particularly noteworthy as they align with the changing software development ecosystem and provide insightful information that might improve project performance and feasibility over the long term. The study adds significantly to the conversation on software project management by tackling relevant issues in particular industry contexts, which affects social dynamics like stakeholder engagement, teamwork, and professional growth. Furthermore, through increasing resource efficiency, lowering

environmental footprints, and stimulating technical innovation targeted at resolving environmental concerns, it indirectly improves the health of the environment.

## 6.4 Ethics

### **Ethical Considerations in Enhancing Game Usability:**

We secured participant privacy and permission while conducting this research, keeping ethical implications for data collecting in mind. We collected data in an open manner, disclosing none of the survey respondents' personal information. With regard to ethical concerns, we meticulously presented the data in the study's results section. In order to protect the company's confidentiality, we did not even reveal its name. No participant or corporate data was disclosed in order to maintain the study's research ethics.

### **Ethical Considerations in Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation through ERP Implementation**

The methodology of this study, namely direct interviews with the relevant stakeholders, project managers and a managing director, an Oracle representative, and data collection via Google Forms conducted during the qualitative phase, does not pose any considerable ethical challenges. It is an indicator of the transparency of the research and suggests the effort to consider several perspectives to ensure the effectiveness of the findings. From this perspective, it is possible to conclude that the research compensated for authority by paying attention to certain ethical criteria, including beneficence, informed consent, confidentiality, participant respect, and validity. In this way, the study safeguarded the integrity of its findings and minimized the probability of participant harmlessness.

### **Ethical Considerations of Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factor**

In this study, we considered ethical issues. Thus we ensured the privacy of survey participants and maintained transparency in data analysis. Over the course of a month, data for this study were gathered through an online survey. The poll requested respondents to read the definitions of project governance and project performance in order to confirm that they were familiar with them before asking survey questions. The analysis took into account the respondents' position within the organization as well as their work history. We did not disclose any participant's data nor a company's data which make sure the research ethics for this study. We did not disclose any personal data even if it contains significant information. We made sure of the privacy of data throughout the study.

## 6.5 Project Summary

The graduate project report looks at three main areas: software development project analysis, ERP implementation optimization for B2B interactions, and gaming experience enhancement. Enhancing user engagement in games, utilizing ERP systems to boost corporate productivity in the face of COVID-19, and stressing strong project governance in software development are some of the insights. . In the context of software engineering, the research on enhancing player enjoyment, engagement, and accessibility in gaming aims to comprehend how different influential factors affect the dynamics of user experience within the gaming industry. This involves simple heuristics for instance player knowing their goals, as long-term objectives ought to be apparent while short-term objectives ought to be clear from the outset. Players come in different varieties; some are left-handed, others are right-handed, some may only have one hand, and some may have additional restrictions. A fictional plot will pique readers' interest and address their subjective emotional enjoyment, which is evaluated through user testing and is heavily impacted by the framework of the game development process. .This aims to increase user engagement and emotional pleasure by analyzing narrative elements, feedback mechanisms, and incentive schemes. This will promote long-term sustainability in the gaming industry. The results of this study shed light on how to tailor gaming experiences to players' requirements and interests, which will ultimately advance gaming practices and technology. Concurrently, Moving on to the business domain, the emphasis is on ERP adoption as a means of improving B2B partnerships. Businesses in Bangladesh are adopting Oracle Fusion ERP solutions, especially in light of the challenges presented by the COVID-19 pandemic, in order to increase productivity, enable remote work, and reduce environmental impact. These initiatives not only promote technical innovation but also highlight how important ethical issues are when conducting research. This study contributes to sustainable development in Bangladesh's ever-changing terrain by navigating the complex convergence of technology, society, and ethics while upholding the values of informed consent, confidentiality, and participant respect. Another study uses a quantitative methodology to examine software development projects, carefully gathering information via a structured survey instrument on software risk factors, project performance measures, governance practices, and leadership qualities. The results highlight how important it is for software development projects to have strong project governance processes in place because they promote proactive risk management and increase project sustainability. Businesses may improve project performance and guarantee long-term sustainability in an environment that is becoming more dynamic and risky by putting plans into place that acknowledge the importance of these factors and their combined effect. The main goal of this graduate project report is to examine important areas of modern technological environments. Additionally, the report delves into software devel-

opment projects, emphasizing the significance of robust project governance procedures and effective project leadership in mitigating software risks and ensuring long-term sustainability. The integrated approach of these studies provides comprehensive insights into evolving technological landscapes and their impacts on society. It offers valuable resources for practitioners, policymakers, and researchers navigating the dynamic intersection of technology and societal challenges, facilitating informed decision-making and fostering sustainable development.

## 6.6 Future Work

Future work of our first work titled “Enhancing Game Usability: A Framework for Small-to-Medium-Sized Game Development Businesses”, take initiatives in this domain may tackle the obstacles faced in the process of gathering data, as well as the shortage of studies and instruction concerning game production in Bangladesh. To promote improved participation and data quality, efforts might first be taken during data collecting by establishing alternative data gathering methods or improving current approaches. Second, funding for formal education and research projects centered on game development is desperately needed. This can entail developing specific curricula or courses in academic institutions and technical colleges, in addition to provide funds for studies intended to comprehend and encourage the expansion of Bangladesh’s game development sector.

Future research for the second study titled “Optimizing B2B Relationships with Post-Covid Sales and Marketing Automation through ERP Implementation: A Value-Driven Approach in Bangladesh” could investigate ethical issues , ERP Adoption in SMEs: doing more thorough investigations to investigate the difficulties SMEs in Bangladesh have implementing ERP systems. This might entail examining elements like price, technical proficiency, and change management tactics to offer insightful information to practitioners and policymakers. Impact Assessment of ERP Implementation: Examining the ERP testing. implementation’s long-term effects on Bangladeshi SMEs. To evaluate the concrete benefits and outcomes of ERP deployment, this may entail measuring variables such as productivity, efficiency, cost savings, customer satisfaction, and overall business performance.

Future work for the third research article titled “Project Governance to Improve the Performance of Software Projects by Mitigating the Software Risk Factors: The Moderating Role of Project Leadership” may be going for a longitudinal study to track the evolving business risk factors, .future work in this area should aim to enhance the predictive power of software risk assessment models and provide actionable insights for project managers to optimize project outcomes. By incorporating a broader range of risk variables and considering stakeholder management as a crucial success element, researchers can contribute to the advancement of project management practices and improve the

overall success rate of software projects.

Overall, our first study suggests that future research should concentrate on filling in the gaps and addressing the issues that currently exist in Bangladeshi game development education, industry practices, and research, with the aim of fostering innovation and growth in the field. Moreover, in the second, an impact assessment of ERP installation in Bangladeshi SMEs study may yield important details regarding the long-term consequences of ERP deployment. The assessment of tangible benefits and results from ERP adoption would be aided by measuring variables like productivity, efficiency, cost savings, customer happiness, and overall business performance. This information would then be used to influence future strategy creation and decision-making in this field. Furthermore, acknowledging the significance of stakeholders in influencing project outcomes would be achieved by incorporating stakeholder management into our third research. Project managers may improve stakeholder satisfaction, forge better bonds with stakeholders, and proactively handle issues by having a thorough understanding of stakeholders' expectations, concerns, and preferences.

# Bibliography