# Embracing Agile: Evaluating the Adoption and Effectiveness of Agile Methodologies in the Software Industry of Bangladesh

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## APPROVAL

This thesis titled on "**Embracing Agile: Evaluating the Adoption and Effectiveness of Agile Methodologies in the Software Industry of Bangladesh**", submitted by **Ali Hasnain Moula Chowdhury (ID: 213-35-765)** to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Software Engineering and approval as to its style and contents.

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## SUPERVISOR DECLARATION

I hereby declare that this thesis report is done by me under the supervision of **Ms. Nusrat Jahan**, Assistant Professor & Head, ITM Department, Assistant Professor in the Department of Software Engineering, Daffodil International University, in fulfillment of my original work. I am also declaring that according to the best of my knowledge, neither this thesis nor any part therefore has been submitted else here for the award of B.Sc. or any degree.

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## STUDENT DECLARATION

I, **Ali Hasnain Moula Chowdhury**, declare that I have a good understanding about the requirement for the research paper provided by Daffodil International university department of software engineering. I will comply with all the terms set out in the policy, the full rules, and regulations. During my research I have looked through all relevant sources and made sure to cite them and mention each. Neither this document nor any of its components has ever been submitted for consideration for a scholarship, degree, publication, or other such honors. I assure you that I worked hard on writing this essay. The authenticity of this work is solely my own.

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## DEDICATION

This research paper is dedicated to my parents for their unwavering support and encouragement; they are my foundation throughout this journey. I owe great gratitude to my professors and mentors, whose knowledge and wisdom have inspired me. Finally, I am thankful to all the pioneers of Agile software development and methodology, for their valuable contributions, which I put into practice in my work. It's proof of the power of perseverance, curiosity and knowledge-seeking.

## ABSTRACT

In this paper we explore the new trend of Agile methodologies in Bangladeshi software industry, to get an insight on (1) how much these methodologies are being adopted here, (2) where practitioners satisfaction regarding with current practices and adoption is attending, (3) the key barriers to adopting agile by providing reasonable recommendations. These analyses were performed on descriptive statistics, ANOVA, t-tests and by using correlation methods to 263 software professionals through a survey.

The results illustrate that Agile is perceived as effective by many and therefore recognized but arguably implemented mostly in hybrid or partial ways since they are restricted due to competency rifts, opposition to change, and power distance culture. Core Agile roles and generally those with experience, appear more satisfied with Agile practices, suggesting perseverance pays off in the end. Results from the correlation analysis inadequate training negatively affects satisfaction the most.

The findings validate the initial hypotheses and contribute with specific empirical data with respect to Agile introduction in Bangladesh. The results can provide guidance on how to support organizations in promoting adoption consistency, fostering collaboration, and improving software quality.



**Keywords:** Agile methodology, Agile adoption, practitioner satisfaction, organizational barriers, Bangladesh software industry, hybrid Agile

## TABLE OF CONTENT

## List of Figures:



## List of Tables:

# Chapter - 1

# Introduction

## 1.1 Background and Motivation

The software industry is growing and evolving, with modern manual tools supporting Agile strategies in the project management and software development paradigm. Agile manifesto-based approaches Agile software development also encourages adaptability, collaboration with stakeholders, iterative development and responding to dynamic requirements [1]. In the world of software development practices, modern times are marked by Agile frameworks like Scrum, Kanban and Extreme Programming (XP), among others to aid organizations in delivering products more quickly and efficiently [1]. The move to Agile is motivated by the rising complexity of software projects, faster time-to-market requirements, and customer satisfaction. At the wake of the progressively globalized software market [2], it is imperative for Software Development Organizations (SDOs), especially in developing economies like Bangladesh, to have a comprehensive knowledge about the acceptance and integration of Agile practice. Advent of Lean-Agile Software Development. As the world has started going through a swift change in the way corporates have been forced to adapt quickly to changes in technology and market demand, Agile adoption is gaining significance among corporates worldwide, especially with software companies.

The introduction of agile methodologies has profoundly transformed the software development paradigm, delivering discernible benefits in productivity, collaboration, and adaptive capacity to changing requirements [3]. By leveraging iterative development cycles, continuous feedback mechanisms, and close stakeholder involvement, Agile enables high-quality product delivery that is responsive to the changing market landscape [3]. It is less likely to deliver a final product that doesn't meet current customer expectations because it is regularly putting out something to get feedback on. Agile is adaptable and allows organizations to respond to ever-changing market conditions to stay ahead of the curve. Moreover, the foundation based on self-organizing teams and empowered people creates a co-generative setting and enhances the feeling of ownership to development staff [5].

With the maturation of the software industry there has been increasing awareness of the need for modern development methods in order to remain competitive globally. The advantages of Agile methodologies, such as Project visibility, increased communication among development teams and cost effectiveness, have captured attention from a number of software companies in Bangladesh. However, the concept of Agile in Bangladesh is relatively new where many organizations are struggling to adopt its key principles and practices comprehensively [3]. In addition, these challenges may depict a lack of thorough understanding of Agile literature, resistance to change of organizations, such as the effect of some socio-economic and cultural elements of Bangladesh.

Although Agile tools have shown significant promise for improving organizations [6], appropriate application of these tools is critical for Bangladeshi software companies to gain and sustain competitive advantage in the worldwide market. The Agile methodology can help organizations deliver software more effectively and with better alignment with customer expectations, while also helping to improve team morale and teamwork dynamics, leading to improved business value [6]. This paper studies the current state of Agile adoption in the Bangladesh software industry, the challenges faced, current best practices, and the opportunities for more Agile adoption. More specifically, this research will investigate the degree of Agile principal compliance, the satisfaction of Agile practitioners, and the organizational contributors to successful or unsuccessful adoption of Agile practices.

## 1.2 Problem Statement

Although Agile methodologies have been successful across the globe and have proven benefits in improving flexibility, productivity, and stakeholder collaboration for software development (Baxter et al., 2023; Kamal et al.,2020) it still remains challenging for many Bd. This partial or hybrid implementation Agile frameworks like Scrum, Kanban and Extreme Programming (XP) has become a new trend in Bangladeshi software industry (Syeed et al., 2021). As with other clinical applications, this fragmented adoption, which may lead to suboptimal outcomes and increased risk of project failure (eg reduced efficiency in system set-up times, lower practitioner satisfaction or loss of competitive advantage) depends on the local realities in a health care delivery setting (Sattar et al., 2019; Karmaker et al., n.d.).

There are several intertwined challenges faced in trying to implement Agile fully in the broader context of Bangladesh. Such factors like organizational culture and structural barriers, which include deep-rooted hierarchical decision-making, inertia to change and management lack of support contradict essentially with the Agile values such as team empowerment and adaptive processes (Baxter et al., 2023; Syeed et al., 2021). What is more, according to Sattar et al. (2019) the problem is further aggravated by a considerable skills and training gap as a majority of organizations have not been appropriately trained or mentored in Agile methods, which would provide practitioners competence and confidence? The nature of these obstacles is exacerbated by the absence of locally appropriate evidence from empirical research on which to base targeted interventions and thereby few clues to enlightened management about how best to enhance Agile maturity in companies. These challenges result in suboptimal project outcomes, impeded practitioner satisfaction, and lost chances for operational efficiency. If evidence is localized but not coupled with targeted interventions informed by that local context these issues will continue.

The Bangladesh software sector is expanding at a rapid pace such that it is also fitting in the global market without difficulties (Binboga & Gumussoy, 2024), hence the identification and addressing of these issues becomes the number-one priority. Unless further exploration of Agile-context alignment occurs, any increase in the scalability, or additional adoption will at best be shallow and spotty to keep the general growth and innovation in the industry somewhat hampered.

The proposed thesis will fill these gaps by focusing on the level of Agile adoption, practitioner and organizational satisfaction levels, as well as, the organizational barriers that are currently present in Bangladeshi software companies through the use of empirical studies. Based on this study, we hope to come up with quantitative and qualitative studies that can inform operational strategies to develop more meaningful, impactful Agile integration that can be more reflective of the socio-cultural dynamics and organizational environment of Bangladesh.

## 1.3 Research Question

Developing the research questions was a formal process that aimed to unite academic relevance, research specificity and methodological possibility. The development of the model started with the literature review at both global empirical studies, mainly on Agile methodologies (e.g., Baxter et al., 2023; Binboga & Gümüşsoy, 2024) and Bangladeshi context specific limited yet growing body of knowledge (e.g., Syeed et al., 2021; Sattar et al.,2019). Therefore, this review recognized critical

research void as most of the empirical evidences on Agile are from developed economy and Bangladeshi software industry lacks rigorous and systematic studies instead it has few anecdotal fragmented evidence.

To provide contextual relevance, exploratory conversations were held with professionals in Bangladesh who work as project managers and software engineers using varied roles (including designer and product owner) at small, medium, or government-level software organizations. Feedback through these consultations identified three common concerns:

- Expected limited and soft dynamic behavior in practice resulting from uncertainty about the real adoption of Agile ie not just in name/across the board.
- Practitioner satisfaction (varied by job role, experience in profession, and organizational culture).
- Commitment to change from staff, reliance on hierarchy, and lack of Agile-specific training capabilities.

Based on these insights, the research questions were adjusted to specifically tie with the Problem Statement and to keep methodological alignment. Every dimension of the research focus having its own question and yet being addressed through both quantitative survey data and qualitative contextual insights, needed to be made answerable.

Therefore, the study aims to answer the following research questions:

i. Where do we stand with Agile adaptation in the Bangladeshi Software Industry?

   Since previous research studies on Agile adoption are ten years old or not demarcating partial/hybrid/total agile implementations contextually in Bangladeshi environment, a need to set out an evidence-based baseline on how widely Agile is being currently used. This question provides reference to both national and global practices respectively.

ii. How satisfied is the software practitioner with Agile practices in their organizations?

   Satisfaction is a soft surrogate measure of perceived effectiveness. The study compares satisfaction by work experience level, role in the job and type of organization, to evaluate

whether working with agile processes brings for those that do it a certain amount of satisfaction.

iii. What are the Major Organizational Challenges which impede Agile Implementation in an Organization?

The results and process of implementation studies are likely to be highly influenced by context factors in the setting where they are performed, which adds to the prior work at initial implementation and helps explain a gap identified between successful adoption in early adopter sites with significant external technical assistance, versus focal first movers (FFMs) without that level of support

## 1.4 Research Objectives

This study is aimed at investigating the extent of Agile adoption within the software industry in Bangladesh, how satisfied are practitioners with Agile and what level of barrier they face for a successful implementation. Specific objectives so they can be operationalized via empirical datasets and linked to the gaps found in the literature review and distinguished in the problem statement.

i. To explore the existing trends and present state of Agile acceptance among software and flat companies of Bangladesh.

This paper contributes to utilizing context-sensitive benchmarking that is supported through empirical investigations, and which is particularly important as nearly all previous studies of Agile adoption are based on firms and markets in the West or multinational contexts. Some of the focus areas include how often specific Agile practices are being employed from a range of frameworks like Scrum, Kanban, XP or other strategies and to what extent they are applied in complete form or part of a hybrid approach.

ii. To evaluate Agile methodologies as used by practitioners in everyday life and organizational settings, from the perspective of practitioner satisfaction.

Satisfaction is modeled as a multi-dimensional construct that includes perceived quality of collaboration, perceived productivity, perceived delivery efficiency and role engagement. To fully evaluate the practical effectiveness of Agile, it is important to have an idea of

satisfaction levels by role (developer, product owner, designer and manager) and experience group.

iii. Study of organizational and cultural barriers, which prevent full and co-ordinated use of Agile practices across the enterprise

The focus of the research in light of the available literature that largely cites as constraints, hierarchical decision-making cultures, resistance to procedural change, inadequate training and a lack of leadership support which might appear in a unique configuration within context-specific configurations in Bangladesh's socio-economic landscape.

iv. Formulate evidence-based suggestions for incorporating agile development practices in Bangladeshi software companies.

Given the observed statistical evidence from surveys and interviews this objective will lead to a set of actionable recommendations for surmounting these barriers, enhancing team engagement, and aligning with Agile values to drive increased project and organizational performance.

As such the study aims to provide an understanding of the current practices of how Agile is being used in Bangladesh, along with contributing practical insights for practitioners, managers, and policymakers who are interested in fostering agility within the local software sector.

## 1.5 Research Scope

This is important for specifying the scope of the study to help show its applicability, boundaries, and limits to both academic and industry stakeholders. Consequently, the current investigation is bounded as follows :

i. **Geographical Scope** – The study focuses on IT and software companies in Bangladesh. Participating firms might be using their capabilities in terms of offshore outsourcing or international projects, the survey however focuses on Agile practices within Bangladesh-operation only.
ii. **Organizational Scope** – We concentrated the majority of our efforts at small to medium enterprises (SMEs) and some part of governmental related software development teams, due to their large share in the national software workforce and long term plans for data

collection. This is out-of-scope because it is not possible to have access outside Bangladesh beside large multinational corporation and having different governance structure as well being a unit of other non-Bangladeshi companies.

iii. **Participants Scope** – Respondents are practitioners developers, product owners, project managers, designers, quality assurance engineers, business analysts and C-level executives who have real-world experience with their organization's software development process. This helps us to analyse across roles, and levels of experience.

iv. **Methodological Scope –** The study uses a primarily quantitative survey methodology with additional, limited qualitative insights from follow-up interviews. The data was collected via on-line questionnaires distributed through professional networks and industry contacts, yielding 263 valid responses. Statistical analysis includes descriptive statistics, ANOVA, t-tests, and correlation/regression which contribute to both breadth and depth in answering the research questions.

v. **Topical Scope and Delimitations -** The research focuses on:

- Level and style of Agile adoption.
- Practitioner satisfaction with Agile processes.
- Organizational challenges and barriers.

It has not explored non-software domains, multinational corporate units outside the country or government departments which have nothing to do with software development. This also represents a known limitation of the work, e.g., that we have not examined particular technical tooling in detail, detailed economic competition with methodologies other than Agile or long-term longitudinal adoption patterns (though these are all suggested as areas for future research

# Chapter 2

## Literature Review

Kuhrmann et al. (2021), in their empirical study analyzing the characteristics of Agile software development. According to the research, most companies do not follow Agile guidelines, and instead prefer a hybrid method, mixing Agile with traditional processes. According to the study which gets data from 556 data points from an international survey, the final conclusion is that the Agility impacted by the teams' practices and culture than following Agile frameworks too strictly. Agile adoption, however, in developing economies such as Bangladesh was not part of the scope of the study but provides opportunities for further exploration. While this is a significant limitation, the research lays the groundwork for future investigation into the metamorphosis of Agile methodology within existing firms.

Mariz et al. (2010) used a cross-sectional survey of 62 software engineers to explore the relationship between Agile practices and Scrum project success. Only 8 of the 25 examined Agile practices had a substantial effect on project outcomes, indicating that not all Agile principles are of equal effectiveness in practice. This means that for any project, companies have to choose which Agile practices are truly relevant. However, the study was limited inspiring only to Scrum and not including other Agile frameworks such as Kanban or Extreme Programming. These results highlight the need to take an empirical approach in choosing which Agile methodologies to focus on.

Baxter et al. (2023) discussed institutional limitations in Agile in public sector IT projects. Their research singled out bureaucratic obstacles, resistance to change, and inflexible hierarchical frameworks as significant barriers to the complete adoption of Agile. The results show that although Agile provides benefits such as enhanced flexibility and stakeholder engagement, its implementation in structured government agencies is challenging. This research will help software companies in Bangladesh, which face the same type of bureaucracy. However, as the study is focused on the nature of Agile implementation in the public sector, examining Agile implementation in private software firms is another line for future research.

Kamal et al. (2020) studied Agile Requirements Change Management (ARCM) in the context of Global Software Development (GSD). The study resulted in 21 identified success factors for moving to an Agile change management process, these included resource allocation for overseas sites, communication and even support from top management. The research prioritized those

factors through Analytical Hierarchy Process (AHP) using a set of systematic mapping studies combined with some industry surveys. Given that software firms in Bangladesh often take on offshore projects, the study is very much relevant to Agile adoption in this country. However, the study appears to concentrate solely on international teams and does not address the cultural and economic challenges specific to Bangladeshi software companies.

Syeed et al. (2021) investigated Agile adoption in Bangladeshi software companies via a 38 professional 16 companies survey. The study mentioned above found that even though 82% of the surveyed firms use the Scrum methodology, a lot of them struggle to become fully Agile, except for some practices like backlog management, sprint reviews and daily stand-ups. Although there is strong preparedness for Agile adoption, there are still some gaps in implementation. A primary limitation is the reliance on self-reported data, which may not account for complete Agile adoption challenges. Moreover, this study does not consider micro and small enterprises of Dhaka. Despite that, it still gives insightful things about Agile fitness in Bangladesh and suggestions for improvements.

Karmaker et al. (2021) identified the best Agile SDLC for the software industry of Bangladesh and compared Scrum and Extreme Programming (XP). Scrum is superior in project management, whereas Extreme Programming is a better fit for requirements, development, and testing according to their study. Based on the fact that the industry core service is outsourced projects with evolving requirements and limited resources, XP (with modifications) was the best fit identified. Nevertheless, it does not have empirical evidence from local companies, which would limit its generalizability. Nevertheless, it provides a valuable baseline for the assessment of Agile adoption in the software industry of Bangladesh.

In a study by Binboga and Gumussoy (2024), the critical success factors (CSFs) of Agile software projects were examined through a systematic literature review and a survey of 596 Agile practitioners. Their results indicated that customer, Agile, and team factors have a strong influence on success, whereas organizational and technical factors have a more modest effect. This study has limitations of self-reported data as well as being limited to Scrum and Kanban excluding other Agile frameworks. Nonetheless, it offers a useful Agile Software Project Success Model to support Agile implementation and project undertaking.

| Sl | Author | Title | Data source | Method | Outcome | Gap | Feature |
|---|---|---|---|---|---|---|---|
| 1 | Burcu Binboga et al.,2024 [1] | Factors Affecting Agile Software Project Success | Survey (596 Agile practitioners) | Systematic literature review and survey | Identified customer, Agile, and team factors as key for project success | Excludes other Agile frameworks, relies on self-reporting | Developed a model for Agile project success |
| 2 | David Baxter et al., 2023 [2] | Institutional challenges in Agile adoption: Evidence from a public sector IT project | Case study. survey | Qualitative analysis | Bureaucratic obstacles and resistance hinder Agile in public IT projects | Only covers public sector, not private software firms | Illustrates challenges to Agile adoption |
| 3 | Mahbubul Syeed et al., 2021 [6] | Agile Fitness of Software Companies in Bangladesh: An Empirical Investigation | Survey (38 professionals from 16 firms) | Empirical study | 82% use Scrum, but struggle with full Agile adoption | Does not include micro/small enterprises, self-reported data | Evaluates readiness and gaps for Agile in Bangladesh |
| 4 | Marco Kuhrmann et al., 2021[5] | What Makes Agile Software Development Succesful? | Large-scale international survey (556 data points) | Empirical study | Agile effectiveness impacted more by team culture than frameworks | Does not cover Agile adoption in Bangladesh; international context | Provides basic evolution and understanding of Agile |
| 5 | D karmaker et al., 2020 [8] | Determining the Best Agile SDLC for Bangladesh's Software Industry | Qualitative analysis | Comparative study | Scrum best for management XP best for software development | Lacks validation from local firms | Empirical SDLC framework for selection in Bangladesh |
| 6 | Tahir Kamal et al., 2020 [10] | Identification and Prioritization of Agile | Systematic mapping & industry survey | Analytical Hierarchy Process (AHP) | Identified 21 success factors for Agile | Focuses on global teams, not Bangladesh's | Relevant for offshore Agile adoption in |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Requirements Change Management Success Factors in Global Software Development | | | change management globally | local challenges | Bangladesh |
| 7 | Souza Mariz et al., 2010 [19] | An empirical study on the relationship between the use of agile practices and the success of Scrum projects | Cross-sectional survey (62 engineers) | Empirical study | Only 8 out of 25 Agile practices significantly affect project outcomes | Limited to scrum; excludes other frameworks | Empirical selection of Agile practices |

*Table 2: Competitive Analysis Summary of key literature on Agile Adoption and Effectiveness*

Table 2 provides a summarized comparison of the existing scholarly work related to the Agile adoption and success, focusing on where each study sits within the Bangladeshi Software industry context. The table provides an outline of the authorship, year, data resource research method for each source along with a summary of the principal findings, gaps and notable features. The visual summary allows for direct comparison of international, regional and Bangladesh case-based explorations to see where the literature corresponds or diverges, especially in terms of implementation challenges, context-specific enablers and policy recommendations for emerging economies.

Overall, the reviewed literature and comparative summary table consistently highlighted key themes. Although insights from international research on the advantages of Agile methodologies are broad, they largely focus on problems and applications in mature economies and companies. Regional research, especially in the Bangladesh context, identifies ongoing challenges of limited uptake, cultural / structural barriers and gaps in practitioner training & support. Indeed, a number of notable recent studies argue that empirical evidence needs to be localized, and theoretical frames adjusted, since the challenges experienced by Bangladeshi software firms are fundamentally different than in other cases.

An integration of these works results in a good base for the current research to fill those gaps through deliberate empirical examination of Agile adoption, satisfaction among practitioners and barriers within the software industry of Bangladesh. This thesis presents new empirical research to inform the continuing evolution within a still relatively mature yet rapidly growing industry of practice at scale, building upon existing research to more specifically identify both strengths and limitations.

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.1 Introduction

In this chapter, the methodological approach for meeting the aims and objectives of the study "Embracing Agile: Evaluating the Adoption and Effectiveness of Agile Methodologies in Bangladesh Software Industry" has been explained. It was developed in a manner to make sure that the research questions are thoroughly addressed starting from planning till final recommendations. The process was broken into three sections for ease of explanation: data collection, data analysis and recommendation development. This approach was designed for the systematic completion of research objectives from data collection through analysis and recommendations. Due to the paucity of specific and recent studies in Bangladeshi context, we used a structured methodology that could yield interpretable and implementable results.

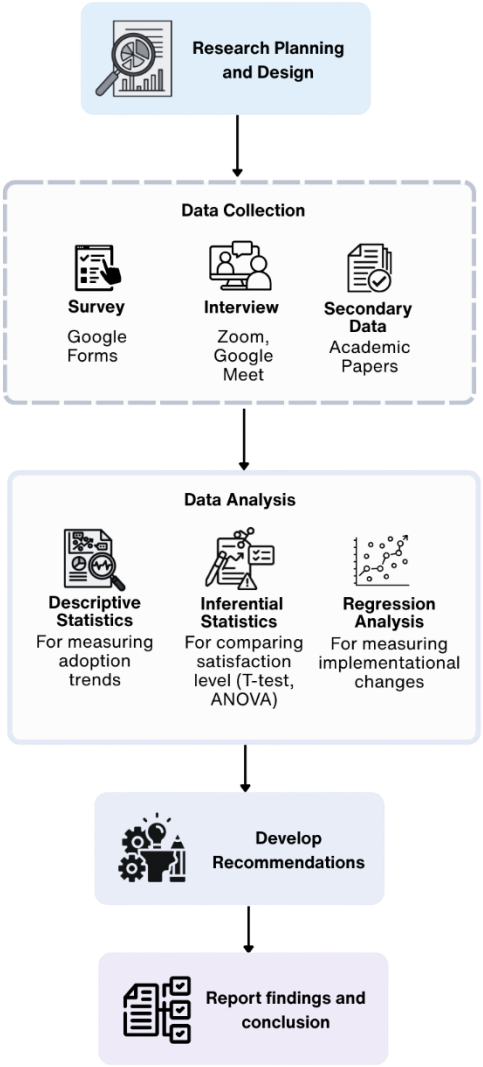


*Fig 3.1: The proposed workflow of our research*

## 3.2 Data Collection

The procedure of data collection of this research was designed in an all-encompassing manner for the full fledge comprehension of Agile adoption in the software industry in Bangladesh. It involved three complimentary strategies: a wide survey; selective depth interviews; and a review of a secondary literature. Each mechanism has been selected for its specific strength to adding valuable survey data for measuring the research objectives adequately.

### i. Survey (Primary Data- Major source)

Online survey was used to collect data from the professionals of Bangladeshi software industry in different job levels. This survey is designed to provide a quantitative indication of how prevalent Agile methodologies are today, how satisfied practitioners are with Agile techniques, and where and why organizations are having problems with Agile. The questionnaire was designed to be concise and clear to maintain participant engagement and avoid response fatigue, the result being a high response rate and quality of data. Quantitative approach was selected on account of the possibility to measure a large range of experiences and perceptions directly from industry professionals, enabling to do statistical comparisons to answer research questions.

| Question No. | Survey Question | Rationale for Selection |
|---|---|---|
| 1. | What is your current role in your organization | It's important to understand different "role based" views; the role affect views of Agile. |
| 2. | How many years of experience do you have in the software industry? | Experience correlates with Agile satisfaction and adoption maturity. |
| 3. | What type of company do you work in? | Company size/context affects Agile adoption; capturing this assists in contextualizing results. |
| 4. | Do you hold any of the following Agile certifications? | Certification indicates knowledge level, a factor in effective Agile implementation. |
| 5. | Has your organization adopted Agile methodologies? | Establishes the baseline adoption status to focus analysis, reflecting scope. |
| 6. | Which Agile frameworks does your team use? | Identifies frameworks applied (Scrum, Kanban, XP), relevant for understanding partial or hybrid adoption. |
| 7. | How frequently does your team follow Agile practices like sprint planning, retrospective, backlog grooming, and daily stand-ups? | Measures practical application frequency, critical to evaluation of real adoption. |
| 8. | How long has your organization been practicing Agile development? | Duration influences maturity and satisfaction. |
| 9. | How satisfied are you with Agile processes in your organization? | Overall satisfaction with Agile processes, a key outcome measure. |

| | | |
|---|---|---|
| 10. | To what extent has Agile improved the following? [Team collaboration, Project success, Code quality, Time to market] | Evaluates Agile impact on critical software development success factors, following multiple frameworks. |
| 11. | Has Agile helped reduce project delays in your organization? | Direct measure of Agile effectiveness regarding delivery timeliness, a recurring benefit in Agile literature. |
| 12. | What are the biggest challenges in Agile adoption in your company? | Captures user-perceived barriers, supporting identification of improvement areas, aligned with prior barrier analyses. |
| 13. | Rate the following barriers to Agile adoption in your company (Lack of training, Resistance to change, Others) | Quantifies specific organizational barriers, validated by negative correlations with satisfaction. |
| 14. | Does your company provide Agile training and mentorship? | Assesses organizational support mechanisms, key for effective Agile adoption. |
| 15. | What improvements would help Agile adoption in your company? | Gathers actionable recommendations from practitioners, aligning with research aim of providing practical guidance. |
| 16. | Would you be interested in further Agile training or certification? | Indicates readiness for development, helping prioritize interventions, supported by training emphasis. |
| 17. | Any additional comments or recommendations? | Allows open feedback for qualitative insights complementing quantitative data. |

*Table 3.2: Survey questions and rationale*

The particular items included in this scale have been selected by careful reference to the thematic coherence and empirical status observed in the selected studies. Works such as Syeed et al. (2021), Binboga and Gumussoy (2024) and Baxter et al. (2023) identified the focus on adoption extent, satisfaction, and barriers. It led to incorporating questions about the frequency with which Agile practice events occurred, perceptions of the benefits of Agile and organizational inhibitors such as lack of training, hierarchical culture and unwillingness to change all variables that were highly related with Agile success and satisfaction in prior research.

**Effectiveness of these questions for this research**

These questions are useful to understanding the multiple dimensions of Agile adoption in Bangladeshi software industry. They allow to quantify to what extent Agile is used, to compare how happy different groups of experiences and roles are and to analyze how factors related to the organizations impact on Agile results. The structured data allows statistical analysis in order to find relationships and patterns which are needed to answer the research questions and to form

evidence-based recommendations to improve Agile adoption in the local context. The use of both open-ended and closed-ended questions enables deeper understanding and offsets the breadth of inquiry.

### ii. Interviews (Qualitative Support)

This phase of the research included rich discussions with professionals of Agile software practitioners who are currently engaging in the Bangladesh software industry. The interviews were conducted online through platforms such as Zoom and Google Meet, in a semi-structured manner. This implied the presence of a guided list of open-ended question which made possible to deeply explore how Agile adoption has been experienced while encouraging interviewees to express own viewpoints.

The primary objective of this entry was to bring in-depth, contextually rich, information that does not easily fit in structured surveys. Although the survey presented a holistic picture of Agile adoption and satisfaction on quantitative terms, some root causes, and intricate issues may not have been as clearly recognizable from the survey results. These subtleties were observed and witnessed through the perspectives of the individual practitioners into the interviews. This qualitative perspective enriched and clarified the research findings by bringing to light personal experience, organizational culture impact and the unique barriers or enablers to Agile adoption.

### iii. Secondary Data (Contextual Review)

In the absence of official, industry-wide reports on Agile implementation in Bangladesh's software industry, secondary data especially from academic literature played a crucial role in the research. Extensive search was carried out, however only few relevant research papers (maximum 2-4) could be found and were not recent. This scarcity indicates a serious lack of scholarly Insight of Agile adoption in Bangladesh software industry Reemphasizing the of the study.

The relevant literature was critically reviewed and summarized the principal findings from these academic sources. The review provided support to common challenges such as partial implementation of Agile, organizational resistance, incomplete training, and cultural issues claimed by other researchers working in similar developing country context and sectors. This established a contextual backdrop and contrastive framework for the present study, which helped to situate the latter in relation to prior research and to put emphasis on this topic.

## 3.3 Data Analysis

Collected data was analyzed by using both descriptive and inferential statistical methods to answer the research objectives:

### I. Descriptive Statistics

Descriptive statistics were used to establish an overview for answering the first research question in the research, describe how the use of Agile methods is spreading out through software companies in Bangladesh and to discover the visible patterns and trends in the dataset.

**Metrics Used:**

1. **Mean (Arithmetic Average):**

The mean provides the average of a data set, representing the point of balance of the frequency scores with respect to the Agile adoption. The formula for mean $\underline{x}$ is:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i \quad 3.1$$

Where $x_i$ are observations and **n** is the sample size.

Why collected: The mean is a convenient measure that indicates the average degree of Agile adoption of those responding and can be compared across different groups.

2. **Standard Deviation (SD):**

Standard deviation indicates how much individual values in a set deviate from the mean. It is calculated as:

$$\text{SD} = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2} \quad 3.2$$

Why included: It quantifies the confidence or the dispersion that exists in Agile practice use among organizations. A low SD indicates homogeneity in adoption but a high SD shows diversity.

3. **Frequency Distribution:**

Frequency distribution calculates the quantity of each of possible range of values which data or scores can assume in the data. It is commonly displayed in tables or histogram.

Why used: This provides a way to view how frequently the different practices of Agile are

being used across the member counties, providing some sense of the mainstream and outliers/gaps.

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

# Load data (assuming DataFrame 'df' contains Agile practice scores in column
'Agile_Frequency')
data = df['Agile_Frequency']

# Calculate Mean
mean_score = data.mean()

# Calculate Standard Deviation
std_dev = data.std()

# Frequency Distribution
freq_dist = data.value_counts().sort_index()

# Display results
print(f"Mean Agile Practice Frequency: {mean_score:.2f}")
print(f"Standard Deviation: {std_dev:.2f}")
print("Frequency Distribution:")
print(freq_dist)

# Visualizing Distribution with Histogram
sns.histplot(data, bins=5, kde=False)
plt.title('Distribution of Agile Practice Frequency')
plt.xlabel('Agile Practice Frequency (1 to 5)')
plt.ylabel('Number of Respondents')
plt.show()
```

*Fig 3.3: Implementation of Python code with Pandas and Visualization Libraries*

4. **Impact on Data Analysis:**

These measures could contribute to elucidating the essential structures and variability of Agile adoption, and emphasize that although many organizations often adopt Agile, practice is extremely heterogeneous, revealing uneven perception or implementation maturity. It guided subsequent inferential tests and strategic suggestions of tailored interventions.

How this helped: Processed using pandas to calculate and ensure the calculations were accurate and able to quickly computed across hundreds of responses, seaborn and matplotlib for clear and graphical representation to visually representing and infer data trends for better understanding and showcases the trends in the data

## II. Inferential Statistics

### 1. Independent Sample T-test

Independent samples t-test is a statistical technique that is used to compare the means of two independent groups and determine if there is a significant difference between their means. It compares the means of the groups of a continuous variable to see if it differs more than expected by chance.

Formula: The T-test statistic is calculated as

$$t = \frac{\underline{X}_1 - \underline{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad 3.3$$

Where:

- $\underline{X}_1 \; and \; \underline{X}_2$ are sample means of groups 1 and groups 2
- $s_1^2$ and $s_2^2$ are the sample variences
- $n_1$ and $n_2$ are the sample sizes

Purpose: The independent samples t-test was conducted for comparing satisfaction between two groups under consideration (e.g. between two roles or between certified and non-certified practitioners). This test helped to determine whether the disparity found in satisfaction scores between two groups could have been due to chance or the error of random.

Effect on Data Analysis: Through the T-test, we realized that significant differences of satisfaction level on Agile related factors might come with categorical group membership (e.g., years of experience, role, etc.) and that supported our hypotheses of satisfaction variation.

1. **One-way ANOVA (Analysis of Variance)**

One-way ANOVA is a statistical method to test for a significant difference between the means of three or more independent groups to know if at least one mean of group differ from the other ones. A variance measure within- and between-groups was set up to test for group mean differences.

Formula:

$$F = \frac{Between-group\ variance}{Within-group\ variance} = \frac{Mean\ Square\ Between\ Groups\ (MSB)}{Mean\ Square\ Within\ Groups\ (MSW)} \quad 3.4$$

ANOVA calculates the F-statistic as:

- The variability is the MSB which accounts the interaction between samples.
- The MSW reflects the dispersion within each sample.

**Purpose:**

In this research, one-way ANOVA was applied to examine difference about the satisfaction scores between experience (less than one year, 1 to 3 years, 4 to 7 years, 8 and more year experiences) and different type of prospect role. ANOVA calculations enabled us to examine statistical differences in Agile satisfaction across a number of groups without increasing Type I error rates that would accompany use of multiple t-tests.

**Effect on Data Analysis:**

Using one-way ANOVA it is found that the general effect of experience level and job role on satisfaction with Agile processes, which trended, for example, from increasing satisfaction with experience and decreasing satisfaction with role. The approach supplied a rigorous confirmation that distinctions between groups were statistically significant and guided targeted advice using group-specific knowledge.

## III. Regression Analysis

Regression analysis is a statistical process that uses one or more independent variables to explain or predict the dependent variable. In this research it was beneficial particularly, when measuring the impact of the various organizational obstacles (independent variables) in terms of absence of Agile training and resistance to change hierarchical organizational structure on the practitioner satisfaction with Agile practices (dependent variable).

Why it was used: The objective of this work was to find out not only why barriers exist for Agile adoption, but also the intensity of each barrier on the satisfaction of software practitioners to be working with such Agile means. This relation can be put in numbers using

regression analysis:

- Determine which obstacles have the worst impact on your Agile success.
- Determine both the direction (positive or negative) and the magnitude of impacts of each barrier.
- Give data-based insight into what interventions and improvements organizations should prioritize.

How it assisted with data analysis:

- When satisfaction (output) was entered into the model as a covariate, and barriers as the predictor, the regression analysis derived the coefficients which indicated the relative strength of each factor contributed.
- For instance, the fact that Agile training printed the largest negative correlation to satisfaction means it is the most negative barrier in this sense.
- This quantitative perspective was critical in identifying areas that organizations need to invest in (e.g., training) to increase success of Agile adoption.
- Following descriptive statistics and group comparisons, the regression analyses provided additional predictive power and underscoring of the causal or correlational relationship.

## 3.4 Developing Recommendations

The recommendations segment of the thesis provides a way forward for software companies in Bangladesh to deal with some typical impediments and get better project outcomes for adopting Agile. The Series aims to point out barriers, provide an overview of research and suggest a path forward for industry.

**Barrier Identification and Solutions**

The study identifies three key themes: learning needs, cultural willingness, and embedding of Agile jobs across firms.

- Training is acknowledged as the most critical time-gap, while limited Agile-oriented knowledge causes practitioners to be unsatisfied and non-effective.
- Cultural orthodoxy such as hierarchical decision making and resistance to change is a major impediment in most Bangladeshi organizations, as opposed to the collaborative nature of the Agile values.
- Integration does require me to extend Agile practices to more than just the core teams and roles (developers and product owners), but to everyone including support staff, and

designers which is critical in order to have whole change and cross-functional work.

**Comparison with Existing Research**

The recommendations are not sitting in a vacuum because these are based on a comprehensive review of literature both in Bangladesh and elsewhere.

- As such main relationships with previous research were tested whereby the same barriers (training, resistance, power distance) were found to remain constant across study context
- Integration does require me to extend Agile practices to more than just the core teams and roles (developers and product owners), but to everyone including support staff, and designers which is critical in order to have whole change and cross-functional work.
- The approach adopted here extends this and makes a statistical relationship between these barriers and practitioner satisfaction, providing empirical weight to the qualitative insights of previous studies.
- New angles, such as detailed role-based analysis and the influence of experience, extend the current findings and open new paths for specific interventions.

**Actionable Guidance**

Guidelines are written in a way that they can be readily adopted by Bangladeshi software companies taking into account industry practices.

- Tangible actions involve implementing a regular training, building leadership capacities which support Agile transformation, defining well roles, as well as measuring continuously to address issues.
- And the guidance is practical productive options like the encouragement of mentorship, newer tools and cross-team workshops, not just theoretical or generic guidance.
- The ultimate prize is increased productivity, collaboration and software quality, as Agile use becomes a new competitive weapon in a fast-evolving sector.

These suggestions realize the main goals of the research, characterizing adoption patterns, practitioner satisfaction, and organizational impediments, and provides a novel set of empirical evidence to the software development community envisaged in Bangladesh.

# Chapter 4

# Results and Discussion

## 4.1 Overview

This section represents detailed analysis of the survey, N = 263 responses received from professionals working in the Bangladeshi software industry. The purpose of the analysis was to evaluate (a) the current state of Agile adoption, (b) practitioners' satisfaction and perceptions, and (c) organizational barriers and impediments to Agile adoption. Data analysis and visualization were conducted using Python- based tools, including descriptive analysis, independent sample t-tests, ANOVA and correlation analysis.

## 4.2 Trends in Agile adoption and practice

Descriptive statistics indicated that Agile practices are commonly used in all surveyed companies, directly addressing our first objective (a), which focuses on evaluating the current state of Agile adoption. On average, participants engaged in 3.85 (SD = 1.15) on a 5-point scale. Agile practices, including activities such as sprint planning, retrospectives, backlog grooming, daily stand-ups to a relatively high extent.

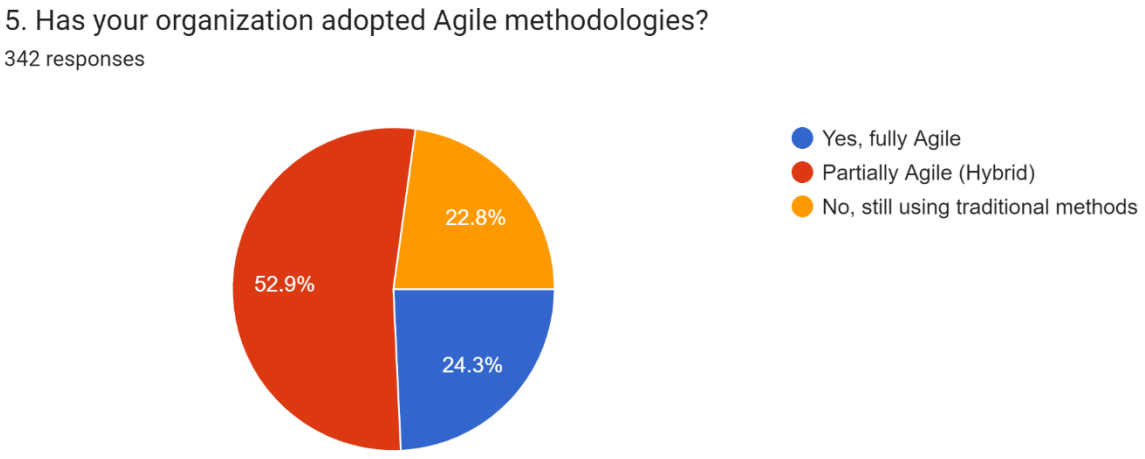


*Fig 4.2: Agile adoption level and practice frequency*

This chart shows organizational adoption states (i.e., full Agile, hybrid, traditional) and adoption frequency of core Agile practices (1—5 scale) from a sample of N≈263 in the Bangladeshi software industry as a crosstab for Table 4.2's central tendency statistics. The distribution is right-skwed toward higher ceremony usage and with hybrid adoption as the norm, which suggests widespread but inconsistent and incomplete adoption of practices.

This theme also relates to RQ1 and demonstrates that the adoption of is not always consistent, with rituals being frequently run without full end-to-end adherence. Practically, this encourages standardization for core ceremonies, clarification of roles, and elevating teams from hybrid to a more consistent practice maturity level before attempting large scale framework changes.

| **Metric** | **Agile Practice Frequency** |
|---|---|
| Mean | 3.85 |
| Standard Deviation | 1.15 |
| Median | 4.00 |
| Minimum – Maximum | 1 – 5 |

*Table 4.2: Agile Practice Frequency Metrics*

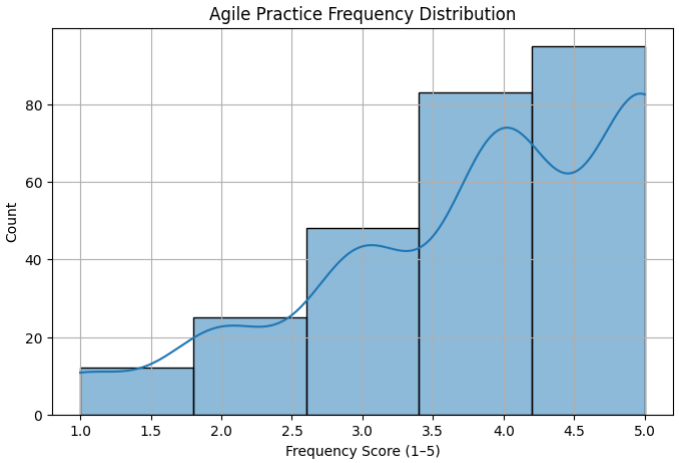


*Fig 4.2.1: Distribution of Agile Frequency Score*

The histogram (Figure 4.2) presented a right-skewed distribution as the majority of responses were grouped with higher frequency scores. It indicates that the teams have differing levels of understanding and application of Agile methods. In addition, there is lack of uniformity in Agile adoption that is also evident in the various responses.

### 4.3 Practitioner Satisfaction and Experience

To address objective (b), which aims to understand practitioners' satisfaction and perceptions, this section analyzes whether years of experience impacts satisfaction with Agile. Respondents were categorized into one of four experience groups:

- Less than 1 year
- 1–3 years
- 4–7 years
- 8+ years

Satisfaction score was rated in a 5-point Likert scale (5 = greater satisfaction with Agile) and (1 = less satisfaction with Agile).

| Experience Group | Mean Satisfaction | Standard Deviation |
|---|---|---|
| Less than 1 year | 3.42 | 0.88 |
| 1–3 years | 3.71 | 0.93 |
| 4–7 years | 3.85 | 0.91 |
| 8+ years | 3.93 | 0.89 |

*Table:4.3: Satisfaction level by experience groups*

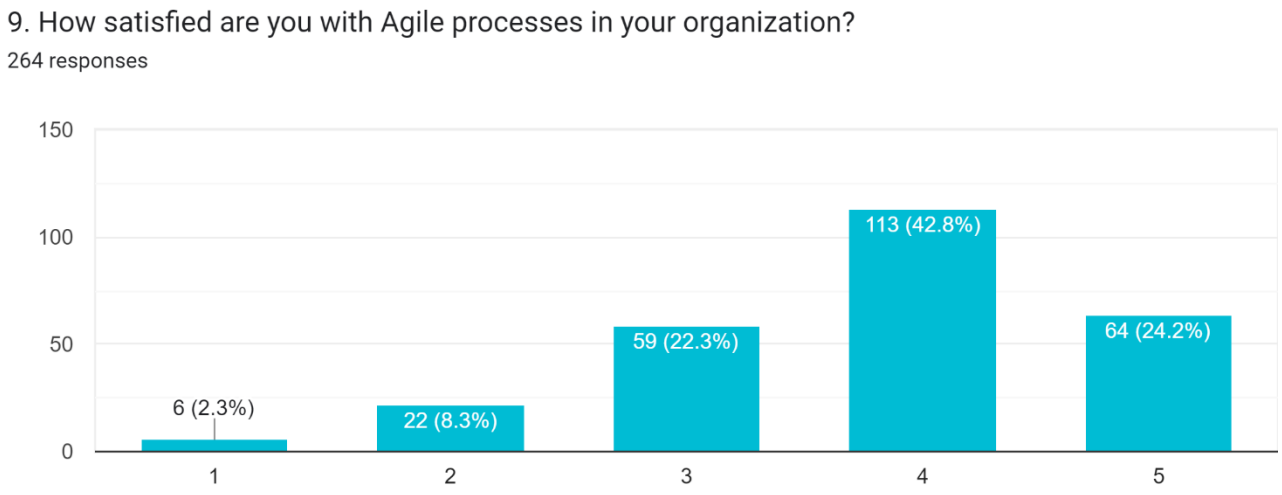


*Fig: 4.3: Agile process satisfaction*

This chart shows Agile Process Satisfaction (satisfaction 1–5) differ between roles (e.g, PO, Dev, Scrum Master, QA, UI/UX, PM) by presenting one-way ANOVA plotted as group means. Core Agile team roles PO/Dev/SM have significantly higher satisfaction levels than peripheral roles (e.g.,UI/UX, QA), suggesting uneven absorption of non-core functions into rituals and decision

cycles. lt directly informs RQ2 as it reveals role-based asymmetries that may depress overall satisfaction and practice quality when cross-functional participation is limited. It incentivizes behaviors of involving non-core roles in planning/reviews, clarify responsibilities, and fostering more cross-functional collaboration to raise shared ownership.

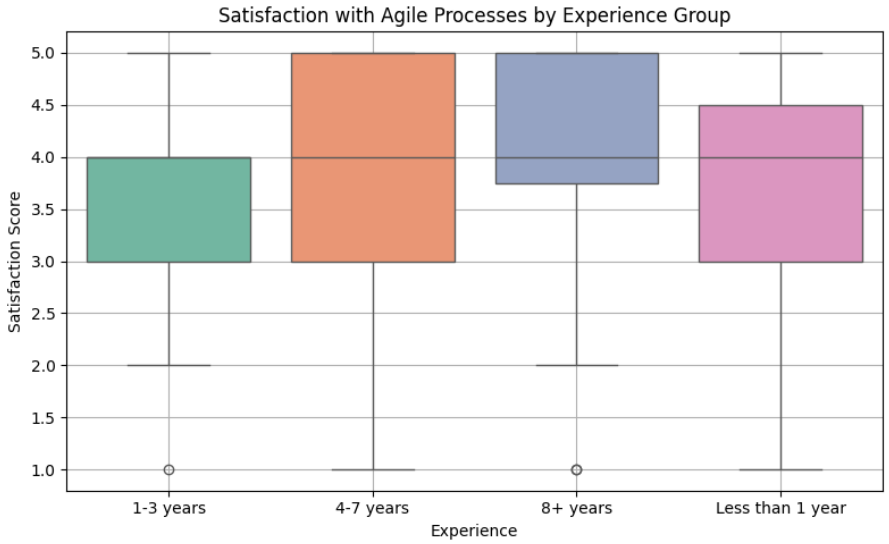


*Fig 4.3.1: Satisfaction with Agile Process by Experience Group*

Over the four groups, a boxplot showed that satisfaction levels were in an upward pattern. Those with under a year of experience reported the lowest satisfaction rates, while satisfaction increased gradually with experience.

## 4.4 Role-Based Satisfaction

Continuing with objective (b) on practitioners' satisfaction and perceptions, this section examines how satisfaction with Agile varies by job role. A visualization of the ANOVA (Figure 4.4) 78 provided further insight regarding satisfaction by job roles. Project Managers, and Product Owners also seemed to report a bit more satisfied and have been varying degrees for support roles and UI/UX Designers. This might be for the reason that central Agile roles (Scrum Master, Product Owner, Developer etc.) are more closely connected to the daily tasks and decision-making of Agile rituals.

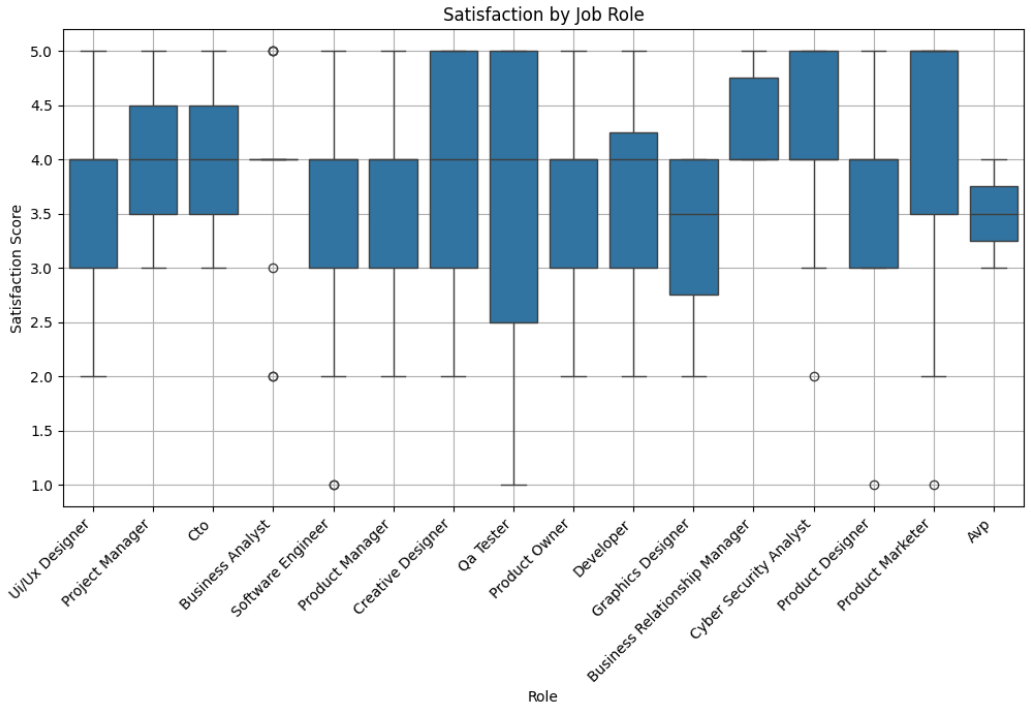


*Fig 4.4: Satisfaction by job role*

## 4.5 Barriers to Agile Implementation

Addressing objective (c), which investigates organizational barriers and impediments to Agile adoption, this section evaluates the challenges reported by respondents and their correlation with overall satisfaction. A series of Likert-scaled organizational competitive barriers were evaluated by respondents (0= No challenge to 3= Significant challenge). Individual barriers were correlated with overall satisfaction:

| **Barrier** | **Correlation with Satisfaction** |
|---|---|
| Lack of Agile Training | -0.19 |
| Resistance to Change | -0.14 |
| Hierarchical Structure | -0.17 |

*Table 4.5: Barriers and the correlation with satisfaction*

These negative correlations are moderate but statistically significant and are in the expected direction.

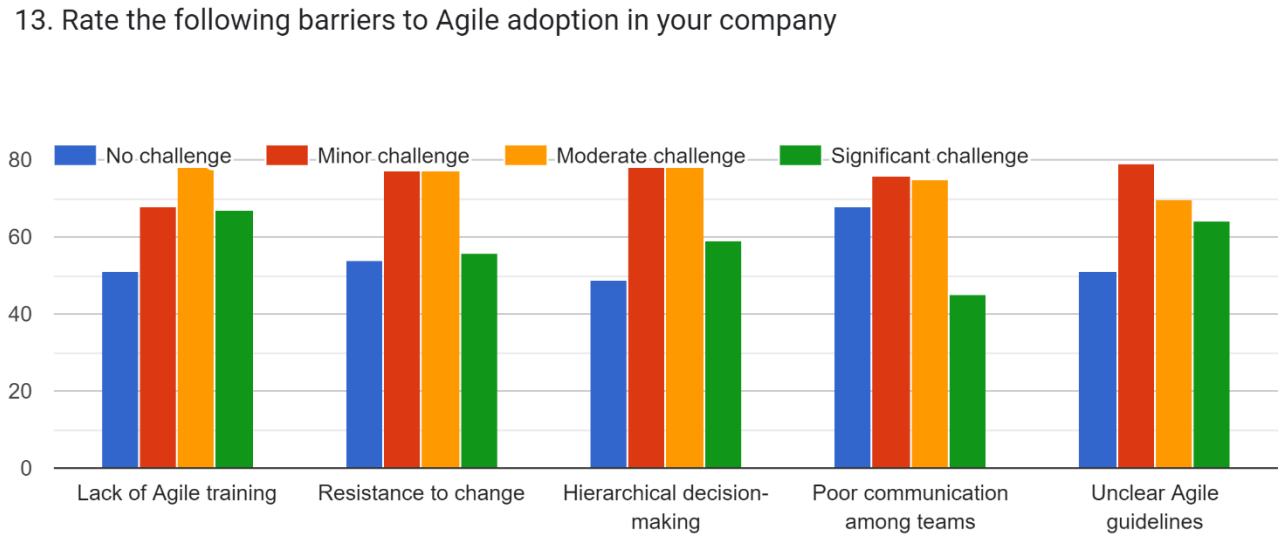


*Fig: 4.5: Barriers to Agile Adoption*

This graph of correlation shows the relationship between barrier ratings and impact on overall satisfaction. All identified barriers are negatively associated with satisfaction; lack of training and hierarchy are among the strongest detractors, proving that capability gaps and power distance reduce perceived Agile efficacy. This is responding to RQ3, by prioritizing depressor of higher impact in the outcomes. It encourages action: invest in training/coaching, develop servant-leader behaviors, and document an organization-wide Agile guide to tackle the most impactful barriers first.

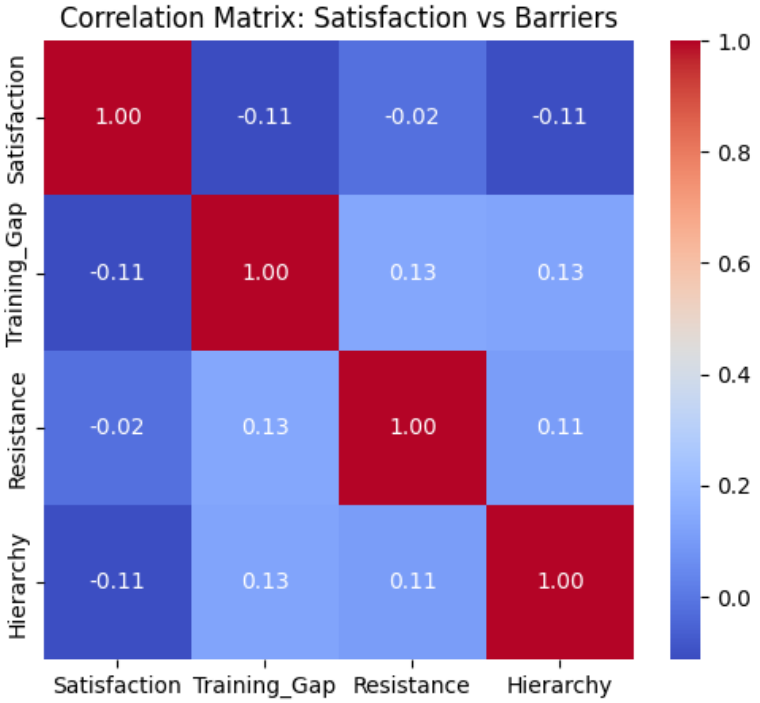


*Fig 4.5.1: Correlation Matrix: Satisfaction vs Barriers*

## 4.6 Discussion

The analysis of the survey results showed remarkable consistency: Agile methodologies are widely known and partially adopted but rarely practiced in their entirety or full structured form. According to our observations, many companies use Agile rituals but not in a consistent manner, as illustrated in Section 4.2. This aligns with Syeed et al. (2021) mentions that some Bangladeshi firms claim to be Agile, but their implementation is fragmented or on a superficial level. Findings further contributed to this by providing quantitative verification that teams that adhere more to Agile practices are likely to report being more satisfied with some of the most important attributes, thus confirming (at least in part) one of the Agile nature claims: improved collaboration, productivity and delivery quality.

The satisfaction by experience analysis performed in Section 4.3 made it considerably clear that practitioners with more exposure to Agile (4-7 years, 8+ years) had the highest level of satisfaction while those with less than a year reported the lowest. This gradient reflects a learning curve where large volumes of Agile practice confer better understanding and outcomes. It raises the question of mentorship and training for young professionals as well. The fact that satisfaction balances with experience is a confirmation of Binboga and Gumussoy's (2024), which suggest that team maturity and learning culture are some of the most significant success factors in Agile software projects.

In Section 4.4, role-based satisfaction, core Agile roles (Product Owner, Developer, Scrum Master) were more satisfied with their roles than support roles like UI/UX Designers or QA. This discrepancy indicates an absence of Agile integration inclusive enough to mean all the surrounding teams and roles may not fully participate in Agile planning or decision-making. Concerns about role-based tension are echoed by Sattar (2019) who recommend training cross-functionally and harmonizing roles particularly in Agile settings in developing economies. Our findings extend this argument by demonstrating directly from respondent data how asymmetric role engagement leads to fragmented Agile experiences.

Finally, Section 4.5 identified organizational barriers impinging on the success of Agile. The most negative correlation was with Agile training absence, followed by a hierarchical structure and resistance to change. Syeed et al. (2021) and Sattar (2019) also echoed these types of challenges and pointed out that cultural and managerial inertia remains a key issue in Agile transformation. Our study on the other hand is a more empirical, data-driven appraisal of how

these barriers have a statistical influence on satisfaction i.e., quantifying what other studies have found out in a qualitative manner.

Overall, this study adds new value through the integration of in-country data from Bangladesh with internationally recognized analytical methods. This not only reinforces the widely held perceptions surrounding Agile challenges in developing contexts, but also provides statistical insight into how satisfaction, experience, roles and barriers are interlinked. Whilst past studies were limited to observations of practice and theoretical modeling, our method provides observable data-driven insights as well as practitioner-grounded perspectives. These findings may provide the background of how organizational strategies should be built for Agile training, adoption and leadership in Bangladesh software industry which is growing very fast.

# CHAPTER 5

# CONCLUSION AND RECOMMENDATION

## 5.1 Overview

The evaluation of the adoption and use of Agile methodologies in the software industry of Bangladesh was conducted by this study. So we set out to: (1) analyze the data for trends in Agile adoption, (2) understand how satisfied practitioners are, and (3) identify high-impact barriers with strategic recommendations. The results are obtained from a survey of responses from 263 professionals and confirmed by a statistical analysis using Python that, while Agile is well-known and used in practice, most organizations work with hybrid or partially agile forms. There are also reasons related to structure and culture: lack of training, resistance to change and the ingrained hierarchical structures.

The satisfaction indicated an upward trend as it was evaluated against experience. Those in core Agile practitioner roles were more satisfied than their peers in peripheral roles. These patterns form an emphasis on the gradually solution of Agile's previously problems which leads to a broader, longer term commitment to having Agile practices in place across all roles. This is proof of the original suspicions: the implementation of Agile is not complete, satisfaction depends on the role and experience and organizational impediments play a crucial anchoring role. This study contributes over the earlier research as it provides an in-depth view from the practitioner's perspective that highlights the characteristics of challenges within specifically Bangladeshi software industry.

## 5.2 Research Limitation

While the extent of the study, design of its instrument, and inferential approach are robust, a few limitations temper generalization and suggest caution for making causal claims; first, its cross-sectional nature takes a snapshot rather than a maturation trajectory, limiting sensitivity to learning curves and durability of reforms over time. Second, the use of self-reported measures is prone to reporting and social desirability biases, though triangulated across multiple items and role/experience stratifications, future studies employing more objective performance and delivery metrics (e.g., lead time, deployment frequency, escaped defects) would further de-bias estimates of the effects of agility, and tighten the construct validity. Third, even though it intentionally reached out to organizations of all sizes and sectors as start-ups, government and

large enterprises the sampling frame is biased towards practitioners active in professional networks, which may over-sampling populations that are aware of Agile, and under-sampling hard-to-reach units with low adoption maturity, therefore suggested to extrapolate cautiously to the full industry population. Last, qualitative depth while ample through open-ended responses was not pushed into a formal, theory-generating qualitative study (e.g., grounded theory, multi-site ethnographies), thereby under describing profound organizational sensemaking, leadership practices, and socio-technical interdependencies in relation to the quantitative clarification achieved here.

## 5.3 Future Work

A mixed-method, longitudinal research program should combine repetition with deep dive, embedded cases in surveys and interview and over time across many types of firm (startups, SMEs, macros, government IT teams, emerging gig collectives), with stratified sampling, extend the instrument with established Agile maturity scales, psychological safety indices, and servant-leadership measures to validate constructs more rigorously and quantify the degree to which lack of training, hierarchy, and change resistance drive satisfaction and delivery, link survey to objective project metrics (cycle time, deployment frequency, change fail rate, on time percentage) and quality signals (defect escape rate, code review coverage) for triangulation. Compare role inconclusive versus core-only ceremonies to estimate the marginal effect of cross-functional inclusiveness on satisfaction and velocity; evaluate structured training, executive coaching, and Agile playbooks using quasi-experiments to identify high-ROI change levers; study policy enablers like government capability frameworks, vendor accreditation, and procurement guidelines to lower systematic barriers for impact and policy engagement, share an executive summary to BASIS/BCC, form a joint working group to draft a national Agile guideline, pilot test iterative procurement templates through government, convene BASIS roundtables with big buyers around servant leadership and change playbooks, and publish an open source Bangla-first Agile Playbook with checklists, templates.

## 5.4 Conclusion

This thesis contributes to the literature and to practice by reframing the ambiguous, anecdotal conversations unfolding about Agile in Bangladesh as an empirically grounded story with actionable precision: train people, rewire leadership behavior and integrate the flow of value for every role, and agility pays dividends;

neglect capability and culture, and the “hybrid” becomes the limit, not the stepping stone. The contributions the paper makes role and experience stratified satisfaction modeling, barrier-to-satisfaction correlations informing investment priorities, and a unification that integrates the findings and at the same time offer practical utility to managers, coaches and teams engaged in the task of driving transformation in resource-poor, high-hierarchy settings. By modeling methodological discipline, contextual sensitivity and translational implications, this study not only helps to close an important national evidence gap but also provides a template for emerging market economies that aspire for speed with integrity where uptake in adoption is consistent, participation is inclusive, and outcomes are measurable, durable and scalable.

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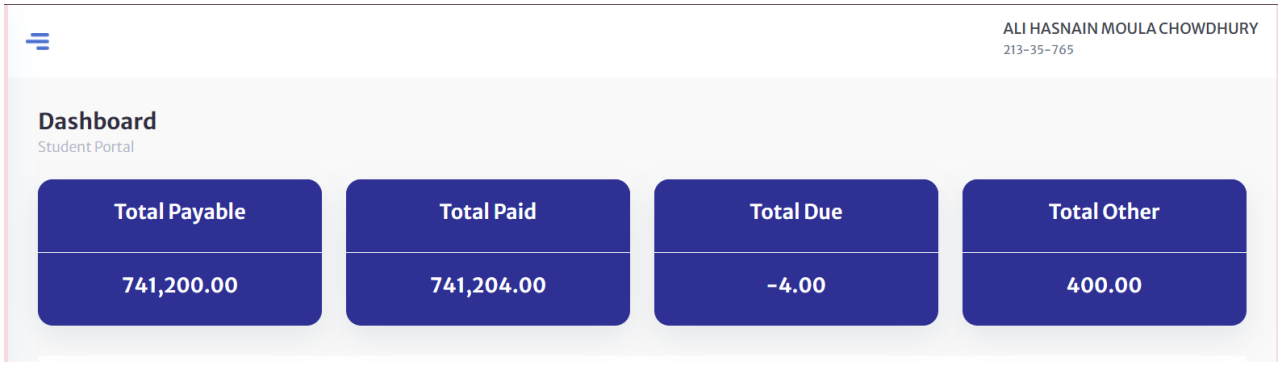

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