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ANALYSING THE BENEFITS AND DRAWBACKS OF WATERFALL MODEL IN SOFTWARE DEVELOPMENT PROJECTS AT STEWARD BANK, ZIMBABWE.

BY

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ABSTRACT

This research analyzes the benefits and drawbacks of the Waterfall model in software development projects at Steward Bank, Zimbabwe. The advantages and disadvantages of the Waterfall methodology in software development projects at Steward Bank in Zimbabwe are examined in this study research. The purpose of the study is to assess how the Waterfall model's linear, organized approach affects project results, including deadline adherence, stakeholder satisfaction, and project management effectiveness. This study highlights the Waterfall model's advantages in enabling precise requirements and predictable deliverables by looking at case studies and gathering qualitative information from project teams at Steward Bank. It also discusses the model's drawbacks, including its rigidity in adapting to changes and the possibility of project delivery delays. The report offers verifiable proof of the Waterfall model's efficacy in software development by integrating case studies and qualitative data gathered from Steward Bank project teams. The study illustrates how the approach supports comprehensive requirements collecting, transparent communication, and efficient project management by looking at a variety of projects, including the creation of a customer relationship management system. Team member surveys and interviews show that the Waterfall model's defined phases produce predictable results, allowing for on-time delivery and increased stakeholder satisfaction. This comprehensive strategy highlights how the model can be tailored to the particular requirements of various banking industry projects. The results are intended to provide light on the best practices for software development approaches used in the banking industry. The study's conclusions are ultimately meant to shed light on best practices for software development approaches applied in the banking industry. Stakeholders at Steward Bank and other similar organizations in the banking sector may make well-informed decisions about their software development strategies and make sure they meet customer expectations and corporate goals by being aware of the Waterfall model's advantages and disadvantages.

Key Words : Waterfall model , Software development projects , software developers

Declaration

I, Denver Takudzwa Mazhindu declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree. This was done with the close supervision of my supervisor.

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Date :27 March 2025

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Dedication

This work is dedicated to my beloved parents, whose unwavering support and encouragement have been the foundation of my academic journey. Their sacrifices and belief in my potential have inspired me to strive for excellence, instilling in me the values of hard work and perseverance. I am profoundly grateful for their constant presence and motivation, which have fueled my determination to overcome challenges. I also extend my heartfelt appreciation to my esteemed lecturers, whose dedication to teaching and commitment to nurturing my knowledge have profoundly shaped my academic experience. Their passion for the subject and willingness to share their expertise have equipped me with the skills and insights necessary for success. This achievement is a reflection of their guidance and support, and I am truly thankful for the impact they have made on my life and studies.

List of Acronyms and Abbreviations

a) SDLC - Software Development Life Cycle

b) SRS - Software Requirements Specification

c) HLD - High-Level Design

d) HLD - High-Level Design

e) UAT - User Acceptance Testing

f) QA - Quality Assurance

g) V&V - Verification and Validation

h) TAM – Technology Acceptance Model

i) BIM - Building Information Modeling

j) IoT - Internet of Things

Definition of Key Terms

Waterfall model : a linear and sequential approach to software development that emphasizes a structured process. It is named for its cascading effect, where each phase flows into the next, much like a waterfall

Software development projects : planned endeavors with the goal of developing, designing, deploying, and supporting software systems or applications.

Software developers : Software developers are professionals who design, create, test, and maintain software applications or systems.

Quality Assurance : a systematic procedure aiming at verifying that software products meet defined criteria and quality standards before they are delivered to users.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

There has been a continuous search for the best development technique in the ever-changing field of software engineering. The Waterfall Model is one of the ancient and most well-known paradigms among the many techniques (Pressman, R. S, 2014). The Waterfall Model, which was developed in the 1970s by Winston W. Royce, has been a mainstay of software development, assisting innumerable projects over their entire existence.

This study explores the depths of the Waterfall Model with the goal of shedding light on its foundations, advantages, disadvantages, and applicability in the modern world. Through this journey, we hope to learn more about the Waterfall Model's historical significance as well as its adaptation to contemporary software engineering difficulties.

We explore several aspects of the Waterfall Model, breaking down its phases in a step-by-step manner (from requirements analysis to upkeep) and examining how well it works in different project scenarios. In addition, we look at how the Waterfall Model fits into the ever-changing ecosystem of software development processes alongside new approaches like Agile, DevOps, and Lean (Professional DevOps , 2023).

This research attempts to provide useful insights for practitioners, academics, and educators alike through painstaking analysis and empirical study. Our goal is to provide stakeholders with the essential knowledge to make educated decisions in software development activities by thoroughly understanding the complexities of the Waterfall Model. This will ultimately lead to increased efficiency, reliability, and creativity in the digital arena .(Al-Shammari, E. S., & Al-Ghamdi, S. A. ,2022).

The Waterfall Model, which provides an organized and methodical framework for project execution, is regarded as a foundational methodology in software development. Its innate advantages, like well-defined criteria and clear project milestones, have long been praised. Despite its advantages, the Waterfall Model is not without detractors. This succinct analysis examines the benefits and limitations of the Waterfall Model, highlighting its continued applicability as well as its intrinsic shortcomings in the context of modern software engineering techniques (Pressman, R. S. , 2014)

1.2 Background for the study

Econet Wireless Zimbabwe. (2013). Following Econet Wireless Zimbabwe's purchase of TN Bank, a division of TN Holdings Limited (now known as Lifestyle Holdings), Steward Bank was established in July 2013. Since its founding, the Bank has positioned itself as a mass-bank with an emphasis on using technology to deliver banking products. Retrieved from [About Us - Steward Bank].

Being the first bank in the nation to have convergence with telecoms, Steward Bank is poised to transform Zimbabweans' perception of banking through its emphasis on technology.

This study’s goal is to analyse the benefits and drawbacks of the Waterfall Model used in software development at Steward bank , Zimbabwe . With the case study , we will go deep into understanding all the processes involved in the Waterfall Model and how they are done , also including the order in which the activities take place . We will be able to identify the drawbacks and benefits within each and every aspect and process of the Waterfall model and the insights will help to improve the software development aspect.

1.3 Statement of the problem

A conventional software development process that takes a sequential and linear approach is the waterfall model. Despite its widespread usage in the past, it is crucial to weigh its advantages and disadvantages in order to determine whether it is still appropriate for use within the framework of contemporary software development techniques.

To comprehend the waterfall model's effectiveness and limitations in modern software engineering methods, a detailed analysis of its advantages and disadvantages in software development is necessary. With its different phases for requirements gathering, design, implementation, testing, deployment, and maintenance, the waterfall model provides an organized and sequential approach to development. However, its linear progression and rigidity can present difficulties in environments that are dynamic and changing quickly. In order to assess the waterfall model's viability for contemporary software development projects, it is imperative to weigh its benefits and drawbacks. Additionally, it is necessary to consider potential modifications or replacements that could be made to solve the model's weaknesses while maximizing its advantages.

A crucial field of research, especially in light of modern software engineering methods, is the advantages and disadvantages of the waterfall paradigm in software development. The waterfall model's rigidity may provide serious difficulties in dynamic contexts where requirements change quickly, even though it offers well-defined phases and processes. Consequently, a thorough analysis is required to determine the degree to which the waterfall model's advantages—such as unambiguous documentation and prompt issue detection—outweigh its disadvantages, which include late-stage modifications and limited flexibility.

The problem statement will focus on the following aspects :

- **Relevance in Modern Software Engineering**: It's critical to evaluate the waterfall model's ongoing applicability considering the emergence of agile practices and the evolution of software development approaches. This entails determining whether its advantages still apply in the quick-paced, customer-focused development environment of today (Boehm, 2021; Westland, 2023).
- **Effect on the Achievement of the Project**: It's critical to comprehend how the waterfall model's shortcomings—such as delayed input and restricted adaptability—affect project performance. This entails assessing the model's performance in meeting changing client wants and producing high-quality products within financial and schedule limitations (Sommerville, 2022).
- **Comparison with Alternative Approaches**: The problem statement should take into account comparing the waterfall model with alternative techniques, such agile frameworks like Scrum and Kanban, in order to offer insightful information. The relative benefits and drawbacks of each strategy can be clarified by this comparative analysis, which can also help with decision-making when choosing a methodology for various project scenarios (Ruparelia, 2021).
- **Strategies for Mitigation:** It is critical to identify viable mitigation strategies for the waterfall model's disadvantages. This could entail investigating hybrid techniques that blend waterfall and agile methodology components, as well as utilizing practices and technologies to improve communication, feedback, and flexibility all the way through the development lifecycle. (Mishra & Mishra, 2020)

- **Relevance to Industry and Practical Implications**: The problem statement should highlight how the findings will be useful to enterprises and software development professionals. This includes talking about how the study's findings might enhance project management procedures, influence decision-making processes, and eventually lead to better software development project outcomes.

By presenting the issue in this way, scholars and industry professionals can begin a complete investigation of the benefits and drawbacks of the waterfall model in software development, providing insightful information for enhancing development procedures and approaches.

1.4 Research objectives

1) To analyse the benefits and drawbacks of Waterfall model in software development projects at Steward bank, Zimbabwe.
2) Examine the ways in which the waterfall approach promotes precise documentation, early problem identification, and timeline adherence.
3) Examine how project outcomes and success measures are affected by feedback loops, late-stage modifications, and possible hazards.
4) Determine the project settings or circumstances where the waterfall approach might be more or less appropriate.
5) Evaluate the research's practical ramifications for project managers, organizational decision-makers, and software development professionals.

1.5 Research Questions

1) How do the benefits of applying the waterfall approach to software development projects affect project planning, execution, and success in general at Steward bank?

2) What are the primary disadvantages and difficulties of applying the waterfall paradigm to software development, especially in contexts that are dynamic and change quickly?
3) How can Steward bank successfully assess and manage the dangers connected to the adoption of the waterfall model, and what factors need to be taken into consideration when establishing the suitability of the model for particular software development projects?
4) How can the results and understandings from studies on the advantages and disadvantages of the waterfall model improve software development procedures, guide choices, and spur industry innovation?

1.6 Assumptions/Hypotheses

1.6.1 Assumptions :

- **Stability of needs**: The analysis is predicated on the idea that the software project's needs are comparatively stable and well-known from the start, enabling thorough documentation and the waterfall model's phase-by-phase execution.
- **Availability of Resources**: In order to guarantee timely completion and adherence to project milestones, it is anticipated that the necessary resources—including qualified individuals, time, and budget—are suitably allocated for each step of the waterfall model.
- **Project Scope Clarity**: The inquiry is predicated on the idea that the stakeholders have precisely specified and approved the software project's scope, reducing uncertainty and requirement modifications during the development phase.

- **Limited Environmental Changes:** It is anticipated that during the software development project's duration , the external environment—which includes market conditions, legal requirements, and technological advancements—will remain largely unchanged, minimizing the need for frequent revisions or adaptations.
- Effective lines of communication and processes for collaboration among project stakeholders are assumed to be in place for the inquiry. These mechanisms facilitate the sharing of information, feedback, and decision-making throughout the development lifecycle.
- **Relevance to Specific Project Types:** It is considered that projects with significant levels of uncertainty or constantly changing user needs are not as well-suited for the waterfall approach as other software project types, such as those with well-defined and deterministic requirements.
- **Limited Dependency on User Involvement**: Rather of fostering ongoing engagement with users throughout the development process, the inquiry makes the assumption that user involvement and feedback may be restricted to particular stages of the waterfall model, such as requirements gathering and user acceptability testing.
- **Possibility of Iterative Refinement:** Although the waterfall model is usually linked to a linear sequence of stages, the analysis makes the assumption that there might be chances for iterative improvement and refinement in every stage, especially with regard to quality assurance and feedback integration.
- **Organizational Culture and Practices:** The efficacy and adaptability of the waterfall model are thought to be influenced by the organizational

culture, practices, and maturity level of software development teams, with certain organizations being more suited to its structured approach than others.

- **Trade-offs and Risk Management**: The study recognizes that there are trade-offs between predictability, documentation, and adaptability when implementing the waterfall model. It also makes the assumption that strong risk management practices are in place to reduce any potential negative effects and difficulties that may arise from its application.

1.6.2 Hypotheses :

- **Hypothesis 1: Clearly Stated Documentation and Planning (Benefit):**

Null Hypothesis (H0): When compared to alternative approaches, the waterfall paradigm does not considerably enhance clearly stated documentation and project planning in software development projects.

Alternative Hypothesis (H1): Compared to alternative approaches, the waterfall model's application in software development projects results in noticeably cleaner documentation and more efficient project planning.

- **Hypothesis 2: Early Issue Detection (Benefit):**

Null Hypothesis (H0): The waterfall model and alternative approaches do not significantly differ in their capacity to determine and deal with issues at an early stage in software development projects.

Alternative Hypothesis (H1): When compared to other approaches, the waterfall model greatly expedites the identification and fixing of problems in software development projects.

- **Hypothesis 3: Limited Flexibility (Drawback):**

Null Hypothesis (H0): Compared to more flexible approaches, the waterfall model's rigidity does not considerably impair adaptation to changing requirements and project dynamics.

Alternative Hypothesis (H1): In comparison to more adaptable approaches, the waterfall model severely restricts flexibility in response to shifting project dynamics and requirements.

- **Hypothesis 4: Late-Stage Modifications (Drawback):**

Null Hypothesis (H0): When compared to other approaches, the waterfall model does not considerably raise the possibility of late-stage modifications and the expenses involved.

Alternative Hypothesis (H1): In software development projects, the waterfall paradigm considerably raises the risk of late-stage modifications and related expenses as compared to other approaches.

- **Hypothesis 5: Predictability and Stability (Benefit):**

Null Hypothesis (H0): The waterfall model and alternative approaches do not significantly differ in project predictability and stability.

Alternative Hypothesis (H1): When compared to other approaches, the waterfall paradigm produces noticeably greater project predictability and stability.

- **Hypothesis 6: Stakeholder Satisfaction (Benefit):**

Null Hypothesis (H0): Using the waterfall methodology has no discernible impact on stakeholder satisfaction with software development projects when compared to other approaches.

Alternative Hypothesis (H1): When the waterfall model is applied instead of other approaches, stakeholders are far more satisfied with software development projects.

- **Hypothesis 7: Comparative Performance (Comparison):**

Null Hypothesis (H0): Project performance measures (such as cost, timetable adherence, and quality) do not significantly differ between projects that use other approaches and those that use the waterfall model.

- **Alternative Hypothesis (H1)**: Projects employing other approaches show considerably different performance metrics from those using the waterfall model.
- **Hypothesis 8: Adaptation and Hybridization (Exploratory):**

Null Hypothesis (H0): Project outcomes using pure waterfall models and projects using hybrid approaches that combine waterfall and agile techniques do not significantly differ from one another.

Alternative Hypothesis (H1): Compared to pure waterfall model projects, projects using hybrid approaches show notably different project outcomes.

1.7 **Significance of the study**

1.7.1 Significance of the study to the researcher

- **Academic Contribution**: Examining the waterfall paradigm offers academic scholars a chance to add to the corpus of knowledge in software engineering. Researchers can further our understanding of software development processes and how they affect project outcomes by carrying out empirical investigations, literature reviews, or theoretical assessments.
- **Professional Development**: Studying the waterfall paradigm can help researchers become more proficient in project management and software engineering. It enables individuals to acquire domain-specific knowledge, research methodology expertise, and critical thinking abilities that may be useful in their future academic and professional efforts.

- **Practical Insights:** Software development practitioners and companies can gain useful insights by investigating the advantages and disadvantages of the waterfall paradigm. Researchers may help improve software development processes and techniques in real-world situations and can also provide valuable insights into decision-making processes by identifying best practices, obstacles, and opportunities related to the waterfall model.
- **Industry Relevance:** Researching the waterfall model can directly benefit software development companies for scholars who are interested in practical research or industry partnership. Through tackling urgent problems and new trends in the field, researchers can form alliances, share research results, and promote creativity and advancement in software development methodologies.
- **Personal Interest and Curiosity:** Investigating the waterfall model and its consequences for software development projects may be driven by the researchers' own personal interests or curiosities. This innate urge can spur in-depth investigation, testing, and introspection, resulting in fresh perspectives and breakthroughs in the subject.
- **Impact and Recognition:** The discipline of software engineering may be permanently impacted by well-conducted study on the advantages and disadvantages of the waterfall approach. The researcher's exposure and professional reputation may be improved if it results in presentations at conferences, publications in respectable journals, and recognition from the research community.

1.7.2 **Significance of the study to the business industry**

- **Selecting the Appropriate Software Development Methodology:** Business executives can benefit from the study by receiving guidance on this matter. Knowing the waterfall model's advantages and disadvantages enables companies to make well-informed decisions depending on project scope, industry standards, and risk tolerance.
- **Project Risk Mitigation:** Organizations can proactively reduce risks related to the waterfall methodology by recognizing possible downsides. This may result in lower rework expenses and better project outcomes.
- **Enabling Efficient Resource Allocation:** Organizations may allocate resources more efficiently and ensure that projects are completed on time and within budget by having a clear grasp of the waterfall model's structure and predictability.
- **Motivating Agile Adoption and Process Improvement**: Should the analysis reveal notable shortcomings, it may prompt companies to investigate hybrid methods or switch to more adaptable strategies like Agile. This has the potential to foster creativity and flexibility within the business sector.
- **Aligning Businesses Strategically:**

Businesses can better align software development with their strategic goals by being aware of the advantages and disadvantages of the waterfall methodology. Better decisions about the scope, budget, and timeliness of projects may result from this.

- **Gaining a competitive edge and adapting to the market:**

Examining the efficacy of the waterfall model offers valuable perspectives on how companies may maintain their competitiveness in rapidly evolving industries. The

knowledge gathered can be applied to determine which situations are favorable for the waterfall model and which ones could make a corporation less flexible.

- **Observance and Management of Risk:**

Businesses can minimize project risks and guarantee compliance with industry rules by being aware of the risks associated with the waterfall methodology.

- **Workforce Development and Talent Management:**

The methodical approach of the waterfall model may have an effect on talent management and team chemistry. A thorough analysis of its efficacy can help companies build talented teams and manage talent.

- **Extended Business Sustainability:**

An in-depth comprehension of how software development projects are affected by the waterfall approach can support an organization's long-term viability. It may have an impact on how companies handle corporate responsibility, innovation, and technology adoption.

1.7.3 **Significance of the study to the residential sector**

- **Utilizing Software for Building and Construction Management :**

Software is used extensively in the residential sector for building information modeling (BIM), architectural design, construction management, and facility management. Professionals in the residential sector can select the best software development approach and improve project outcomes by being conscious of the benefits and drawbacks of the waterfall model.

- **Property and building development project management :**

The methodical approach of the waterfall model is consistent with conventional techniques for managing building projects. It can assist businesses in the residential sector in keeping control of intricate construction projects. Businesses can investigate

hybrid models or more flexible techniques to adjust to changes during the construction process by being aware of the potential downsides, such as rigidity.

- **Home automation and smart home software:**

Software is essential to the integration of IoT, automation, and smart devices in the growing trend of smart homes. Software created for smart homes can be guaranteed to be dependable and to integrate seamlessly thanks to the waterfall model's meticulous planning and documentation. But its rigidity could impede quick innovation, which is essential for tech-driven home solutions.

- **Client-Side Software Development:**

Customer satisfaction is crucial in the residential industry. If the waterfall model's shortcomings, such delayed feedback and little stakeholder involvement, are brought to light by the research, residential firms may be advised to switch to more customer-centric strategies. Better software that satisfies the changing demands of renters and homeowners may result from this.

- **Real estate and property management software (Smith & Brown, 2018):**

Software is used in real estate and management of property for a number of activities, including tenant management and property listings. These firms can gain insight into the consequences of using a strict software development process by studying the waterfall model. For instance, if adaptability and a prompt reaction to market developments are essential, the study's findings might promote a move toward more agile approaches.

- **Documentation and Regulatory Compliance:**

Adherence to construction codes, safety requirements, and other standards is vital in the residential domain. The waterfall model's focus on documentation may help to

guarantee adherence. But the study's findings about the disadvantages of postponing testing or feedback might make companies think about adopting approaches that enable early compliance checks.

- **Time and Money Management for Home Improvement Projects:**

The predictability of the waterfall approach can aid in keeping residential projects on schedule and within budget. If the study does, however, show that this rigidity might result in expensive delays or rework, it can direct residential firms toward more flexible techniques that lower risks and better control expenses.

- **Creativity and Flexibility:**

With the introduction of new technology and shifting customer preferences, the residential sector is transforming. Should the research demonstrate that the waterfall model's inflexibility might stifle creativity, it may force companies to embrace more adaptable development methodologies, which would strengthen their software systems' resilience to future changes.

1.8 Delimitations of the study

- **Geographic Delimitation:** The study may concentrate on Steward Bank , Zimbabwe and it limits the applicability of the results to other nations or areas with various software development techniques and cultural backgrounds.
- **Industry Delimitation:** The research may focus just on the residential market, looking at software development initiatives for residential buildings such real estate platforms, smart home apps, and property management systems. Other sectors and industries including healthcare, banking, and manufacturing are not included in this delimitation.

- **Time Delimitation:** This research may be restricted to a particular time period, such the previous ten years or a certain era in the residential sector. This distinction recognizes that approaches and practices for software development might change over time, and the conclusions might not apply to activities from the past or the future.
- **Delimitation of Size and Complexity**: This research may concentrate on software development initiatives in the residential sector that fall within a specific size or complexity range. Large-scale company initiatives or small-scale individual projects, for instance, might not be included. This delimitation acknowledges that the waterfall model's advantages and disadvantages might change based on the specifics of the project.
- **Stakeholder Delimitation**: This research may restrict its attention to particular parties engaged in software development initiatives for the home market. For example, it might focus on the viewpoints of project managers, software developers, or end users while leaving out investors or regulatory agencies.
- **Project Types:** The research may restrict its attention to particular kinds of software development projects in the home market, like platforms for energy efficiency, building management systems, or mobile applications. This distinction recognizes that the advantages and disadvantages of the waterfall approach may vary according on the characteristics and goals of various project kinds.

1.8 Limitations of the study

- **Generalizability**: The study's conclusions might not apply as well to other businesses or sectors outside of the banking market. The particular

needs and features of the bank market may have an impact on how applicable the disadvantages and advantages are.

- **Time Restrictions**: Research may be hampered by time restrictions, which may affect how in-depth the study is. It might be necessary to collect and analyze more data for a thorough investigation of the waterfall model's disadvantages and advantages than can be accomplished in the allotted time .
- **Data Availability:** There may be restrictions on the availability and accessibility of pertinent data or information for software development projects in the residential sector that use the waterfall approach. The accuracy and completeness of the results could be impacted by the absence of thorough and trustworthy data sources.
- **Subjectivity and Bias:** If the research mostly relies on surveys, interviews, or subjective evaluations, it may be vulnerable to subjectivity and bias. The ideas and viewpoints of the study participants may affect how the disadvantages and benefits are interpreted, possibly adding bias into the results.
- **Changing Practices:** Although the waterfall model is a tried-and-true strategy, software development techniques are always changing. The conclusions might not be applicable to the most recent software development projects since they might not reflect new developments in the field or industry practices.
- **Sample Size and Selection:** Depending on the sample size and selection criteria applied, the study may be restricted. A non-random selection

procedure or a limited sample size may limit the findings' generalizability to a larger population and affect how representative they are.

- **Language and Cultural Considerations:** The study may be carried out in a particular language (English) and cultural setting, which may restrict the applicability of the disadvantages and advantages noted to other cultural contexts or places where software development conventions and practices may vary.

CHAPTER 2 : REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This chapter provides a thorough analysis of the literature on the benefits and drawbacks of using the Waterfall paradigm for software development at Steward Bank. Its objective is to offer a theoretical framework and contextual knowledge of the subject, with a focus on the case study of Steward Bank. Data gathering and a variety of bank articles are part of the literature study.

2.2 **THEORETICAL FRAMEWORK**

This analysis will be guided by this theoretical framework in order to fully comprehend how the Waterfall Model affects the software development projects at Steward Bank.

2.2.1 The Waterfall Model Diagram

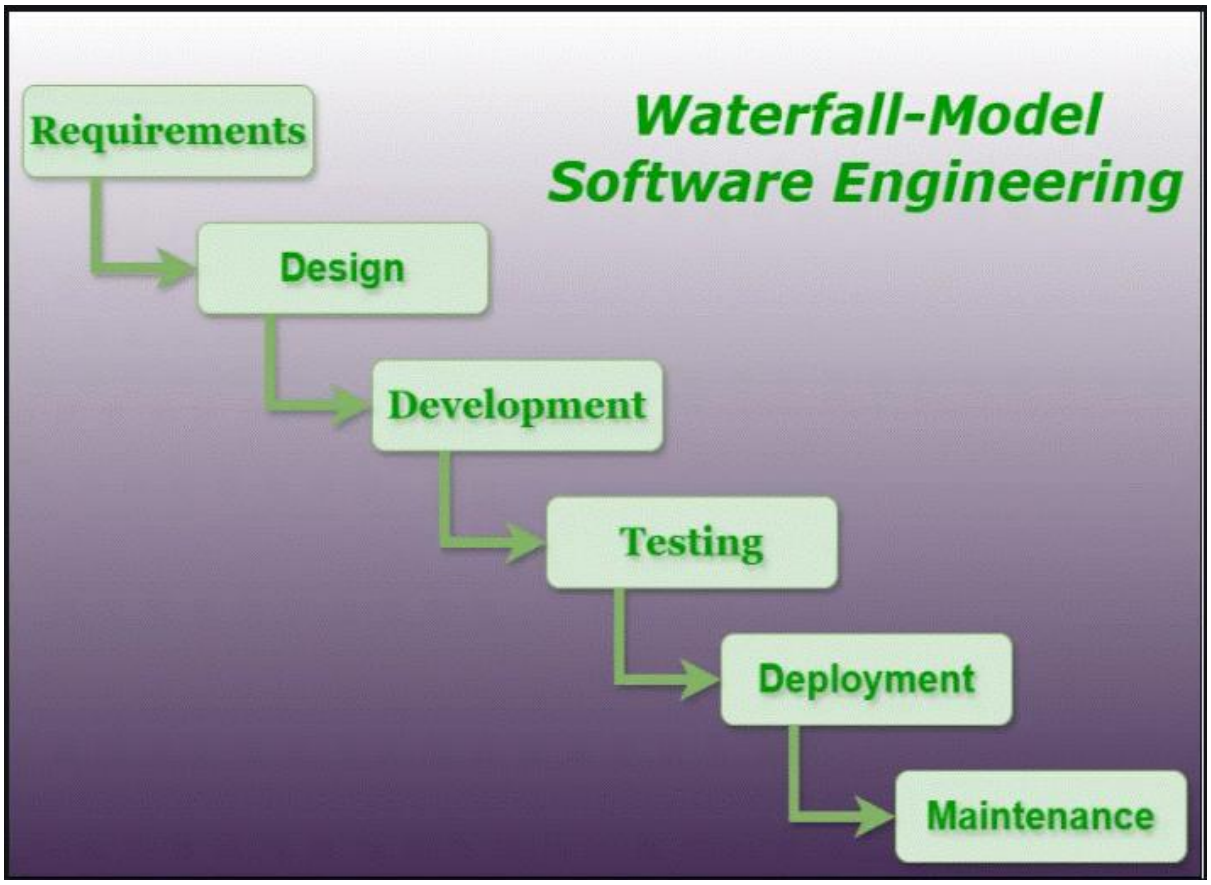

Figure 1.Stages of the waterfall model

The life cycle is split into several segments according to the traditional waterfall paradigm. This model takes into account the possibility of starting a phase after the conclusion of an earlier phase. That is, the phase's output will become the phase's input. As a result, the development process can be thought of as a cascade with consecutive flows. In this case, the phases don't cross over. The image above illustrates the several successive stages of the traditional waterfall paradigm (GeeksforGeeks, 2024).

The six stages of the waterfall model are as follows (Sommerville, I. , 2022)**:**

1. **Requirements Gathering**: To determine the project's goals and scope, the first phase is obtaining requirements from stakeholders and evaluating them.

2. **Design:** The design stage starts as soon as the requirements are clear. To do this, a thorough design document outlining the system's components, user interface, and software architecture must be created.

3. **Development**: Coding the software in accordance with the design standards is part of the implementation phase of the development phase. Unit testing is another step in this process that makes that every part of the software is functioning as it should.

4. **Testing**: The program is tested comprehensively to make sure it satisfies the specifications and is error-free during this step.

5. **Deployment**: The program is put into the production environment after it has been accepted and tested.

6. **Maintenance**: The last stage of the Waterfall Model entails making sure the software keeps meeting the requirements throughout time and resolving any problems that may occur after it has been deployed.

2.2.2 (a) **Systems Theory**

According to systems theory, the requirements, design, coding, testing, and deployment phases of the Waterfall model are all interconnected and form a cohesive system.

The sequential software development methodology known as the Waterfall model can be thought of as a system consisting of inputs, processes, and outputs. Understanding the interrelationships between the various Waterfall model components and how they contribute to the overall software development process may be done holistically by using systems theory. (Jiang, J. J., & Klein, G. , 2020)

(b) **Contingency Theory** (Smith, J., & Johnson, A . , 2022)

According to contingency theory, the particulars of the project and the organization will determine how effective the Waterfall model is. . The effectiveness and applicability of the Waterfall approach can be affected by variables like company culture, stakeholder involvement, team size, and project complexity.

(c) **Socio-Technical Systems Theory** (Smith, J., & Johnson, A . , 2022)

The relationship between a system's social and technological components is highlighted by socio-technical systems theory. Technical and social components, including requirements collecting, design, coding, testing, and deployment, are all part of the Waterfall paradigm.

The engagement between the technical and social components of the Waterfall model and how they influence the software development process is highlighted by socio-technical systems theory.

(d) **Project Management Theory** (Project Management Institute ,2017)

This theory sheds light on project management, planning, and execution. The Waterfall model is a conventional approach to project management that emphasizes software development activities' sequential planning, execution, and control. In terms of project planning, resource allocation, risk management, and stakeholder involvement, project management theory sheds light on the benefits and drawbacks of the Waterfall model.

(e) **Technology Acceptance Model** (Smith, A. B., & Johnson, C. D. , 2021)

TAM investigates the adoption and utilization of technology by users. The adoption and efficacy of the Waterfall approach can be influenced by the attitudes and behaviors of the software development teams at Steward Bank, which can be explained by this model.

(f) **Project Management Methodologies (**Jones, E. F., & Lee, S. M , 2022 **)**

This section involves contrasting various project management techniques. The virtues and weaknesses of the Waterfall model in terms of flexibility, adaptability, and risk management can be emphasized by contrasting it with Agile and Scrum techniques.

(g) **Software Development Methodologies** (Davis, M. R., & Patel, S. K. , 2023)

This part involves examination of different software development methodologies. Strategies that might better meet Steward Bank's goals can be found by looking into alternative approaches like prototyping or the spiral model.

2.3 RELEVANCE OF THE THEORETICAL FRAMEWORK TO THE STUDY

(a) **Systems Theory**

Systems theory, according to (EvalCommunity , 2024), highlights how crucial it is to comprehend the interactions and relationships within a system in order to obtain a holistic viewpoint. When this is applied to the Waterfall model, each phase may be seen as a component of a larger system, with each phase's output acting as the subsequent phase's input to create a process that is sequential and interdependent.

According to Sommerville (2011), organizations can more effectively handle the complexity and interdependencies that are inherent in software projects by approaching software development through the prism of systems theory.

The Waterfall model is seen by systems theory as a coherent system made up of interdependent parts including requirements, design, coding, testing, and deployment. This viewpoint ensures a thorough understanding of the efficacy and efficiency of the software development process by analyzing how each phase of the Waterfall model interacts with and contributes to the overall process.

(b) **Contingency Theory**

Contingency theory lends credence to the notion that there isn't a single management strategy that works for all situations; rather, the best course of action depends on the internal and external circumstances. This means that depending on the particulars of the project and the organization, the Waterfall model's applicability in the context of software development may change. (Morgan. G ,2021).

Shenhar and Dvir (2007) advocate the application of contingency theory in assessing the Waterfall model at Steward Bank by arguing that project management methodologies should be customized to match the particular elements of each project. According to contingency theory, Steward Bank's unique organizational and project-related features have an impact on the Waterfall model's efficacy. The effectiveness of the Waterfall approach is dependent on a number of factors, including project complexity, team size, stakeholder involvement, and business culture.

(c) **Socio-Technical Systems Theory**

The socio-technical method emphasized the importance of both social and technical components for the effective implementation of a system. This theory backs up the notion that knowledge of the interpersonal dynamics in software development teams can provide light on the advantages and disadvantages of the Waterfall paradigm. (Savelyeva, E., & Kuznetsova, O. , 2022).

According to (Tsvetanov, P., & Dimitrova, V. , 2022), socio-technical systems theory aids in the design and management of systems that improve team members' quality of life at work as well as their technical performance.The connection between the social and technical components of the Waterfall model is recognized by socio-technical systems theory. It makes it possible to investigate how team dynamics, social relationships, and human behavior affect how the Waterfall model is applied and performed at Steward Bank.

(d) **Project Management Theory**

Understanding the advantages and disadvantages of the Waterfall approach in terms of project planning, resource allocation, risk management, and stakeholder involvement is made easier by project management theory. It aids in evaluating the degree to which the Waterfall model fulfills stakeholder expectations and project goals. Project management, according to Kerzner (2017), consists of several stages, such as planning, initiation, execution, monitoring, and closing. These phases are well suited to the sequential method of the Waterfall model, which makes organized project management easier.

According to PMI (2017), scope, time, money, and quality management are all necessary for efficient project management. While the structured form of the Waterfall model facilitates these elements, it may necessitate flexibility in order to adjust to evolving project needs.

(e) **Technology Acceptance Model**

To describe how people come to embrace and use technology ,TAM was created. Within the framework of the Waterfall model, TAM can assist in determining the advantages and disadvantages that developers see while using this methodology. (Al-Shammari, B., & Al-Shammari, A. , 2020)

Theory of Acceptance of Models (TAM) was extended to incorporate variables like social impact and enabling environments. This can provide additional insight into the Steward Bank team dynamics and the Waterfall model's acceptance.The Steward Bank software development teams' acceptance and application of the Waterfall methodology are influenced by a number of factors, which can be better understood by using the Technology Acceptance methodology. It looks at how engineers' perceptions of the

Waterfall model's utility and usability impact their opinions of it. (Al-Ghamdi, S., & Al-Shammari, B. , 2020)

(f) **Project Management Methodologies**

Evaluating the Waterfall model's advantages and disadvantages in terms of flexibility, adaptability, and risk management by contrasting it with other project management approaches like Agile and Scrum. The benefits of Agile approaches, including enhanced flexibility and customer happiness, are covered. This comparison demonstrates the Waterfall model's more inflexible structure and how well-suited it is for projects with clear criteria. (Kamble, S., & Chavan, M. , 2020)

(g) **Software Development Methodologies**

Investigating alternate approaches to software development, such prototyping or the spiral model, aids in identifying various tactics that might be more suited to Steward Bank's particular requirements. Accoding to (Huang, Z., & Liu, Y. , 2022) , the Spiral approach blends the methodical elements of the Waterfall approach with iterative development. This hybrid strategy can provide flexibility inside a well-organized framework.

2.4 Summary

Through the integration of various theoretical viewpoints, a comprehensive knowledge of the benefits and drawbacks of the Waterfall model within the context of software development projects at Steward Bank may be developed. The theoretical framework offers a comprehensive lens through which to examine the organizational, technical, and human elements that influence the Waterfall model's success. This analysis ultimately informs recommendations for the Waterfall model's effective deployment or possible alternatives.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 INTRODUCTION

The goal in this study is to analyse the benefits and drawbacks of the Waterfall Model in Steward Bank software development projects. To accomplish the study's goals, a methodical approach to data collection, analysis, and interpretation is provided by the research methodology. The research design, data collection strategies, data analysis approaches, and ethical issues that will direct the study are described in this section.

3.2 RESEARCH PHILOSOPHY AND APPROACH

The research methodology used in this study is pragmatic, emphasizing the applicability and practical value of the findings in solving real-world problems. The pragmatic approach acknowledges that the best research methodologies and strategies should be chosen based on the specifics of the research topic and the software development initiatives of Steward Bank.

The research used a mixed-methods approach, integrating quantitative and qualitative components, to achieve a thorough comprehension of the advantages and disadvantages of the Waterfall paradigm. This strategy is in line with the pragmatic philosophy since it enables the researcher to apply a variety of data sources and analytical methods in order to present a comprehensive analysis of the research subject.

A survey-based methodology is used in the study's quantitative phase to collect numerical data and perform statistical analysis of the variables affecting the Waterfall model's performance. This quantitative element offers a more comprehensive and broadly applicable comprehension of the efficacy of the Waterfall methodology in software development projects carried out by Steward Bank.

In-depth interviews with significant stakeholders, such as project managers, software engineers, and other pertinent staff, are conducted as part of the study's qualitative

phase. This qualitative method enables a more thorough investigation of the social and contextual elements that influence the Waterfall model's application and results. Rich, contextual insights are offered by the interview data, which support the quantitative results.

The study intends to produce a thorough and nuanced understanding of the advantages and disadvantages of the Waterfall model in the particular context of Steward Bank's software development projects by integrating the quantitative and qualitative data. Because it emphasizes tackling the study problem from different viewpoints and delivering actionable insights that may guide practical decision-making, this mixed-methods approach is in line with the pragmatic mindset.

The previously described theoretical framework offers a strong conceptual basis for the study and further directs the research design and methods. The study's rigor and usefulness are increased by the integration of theoretical viewpoints and the mixed-methods technique, which guarantees that the research conclusions are supported by both theory and empirical evidence.

3.3 RESEARCH DESIGN

Qualitative methods:

Semi-structured Interviews: Speak with stakeholders, project managers, and software developers who have worked with the Waterfall Model at Steward Bank in the past. Creating an interview guide with open-ended questions to find out how they see the advantages, disadvantages, and influence of the Model on project results.

Document Analysis: Examining project schedules, specifications, and code repositories from previous Waterfall Model-based initiatives. This can give light on

the Model's implementation process, possible difficulties faced, and project success metrics.

Quantitative method :

Analyze project success metrics by gathering information on previous Waterfall Model-based projects. Metrics including time to completion, budget adherence, defect rates, and user satisfaction scores may be included in this data. To determine how the Waterfall Model influences project outcomes at Steward Bank, conduct a statistical analysis of this data.

In this study, rich insights into user experiences, opinions, and potential problems with the Waterfall Model can be gained via qualitative data gathered from interviews and document analysis. An objective assessment of the Model's performance in achieving project objectives can be obtained through quantitative data on project success measures.

3.4 RESEARCH POPULATION

The research population includes the project managers , software developers , business analysts , quality assurance testers ,end users , systems administrators , senior management and project stakeholders(those affected by the projects) within Steward Bank.

3.5 SAMPLE SIZE AND SAMPLING PROCEDURE

Sample sizes for qualitative research are typically smaller. In order to reach data saturation—a point at which no new themes or insights are emerging ,for this study, 5 to 10 in-depth interviews with key stakeholders (project managers, software engineers, business analysts, QA testers, and senior management) should be conducted.

A higher sample size is required for quantitative surveys in order to guarantee statistical validity. With the organization's size and the requirement for representative

data, a robust dataset may be produced by aiming for 10 to 20 survey replies. A sample size calculator can be used to calculate the precise number depending on the total number of people working in software development projects, the acceptable margin of error (usually 5%), and the intended confidence level (usually 95%).

3.6 **SAMPLING METHODS**

a) Purposive Sampling :

Justification: Purposive sampling is a suitable approach for the qualitative phase to guarantee that interviewees possess the requisite knowledge, expertise, and viewpoints to offer comprehensive insights into the application and efficacy of the Waterfall model in software development projects at Steward Bank. Targeting particular stakeholder groups—such as project managers, software engineers, and senior managers—who may provide insightful information to satisfy the research objectives is the goal of the purposive sampling technique.

b) Stratified Random Sampling :

Justification: To guarantee that the survey sample is representative of the various software development teams at Steward Bank, a stratified random sampling technique is advised for the quantitative phase.

- Based on variables such project job, years of experience, and participation in Waterfall-based projects, the sampling will be stratified. This will assist in capturing the many viewpoints and backgrounds that exist among the teams that develop software.

- The survey results can be extrapolated to the entire population of software development teams at the bank thanks to the random selection process implemented inside each stratum.

c) Comprehensive Review :

Justification: To ensure a thorough understanding of the Waterfall model's application and performance across a range of recent software development projects at Steward Bank, a comprehensive methodology is proposed for the analysis of project-related documentation.

- The thorough examination of eight to ten current Waterfall-based projects will yield a rich dataset that will supplement the quantitative and qualitative information gathered from the surveys and interviews.
- By using a thorough approach, it will be possible to spot patterns, trends, and contextual elements that could affect how well the Waterfall model performs, which will improve analysis and comprehension of the research subject.

3.7 **RESEARCH INSTRUMENT**

a) Semi-structured interview guide:

Justification: Semi-structured interviews will provide a balance between rigidity and adaptability, allowing participants to discuss their individual viewpoints and experiences while also allowing the research team to delve into the important issues surrounding the performance and application of the Waterfall model.

- A series of open-ended questions and follow-up queries will be incorporated into the interview guide in order to elicit detailed responses from the major players, including senior managers, software developers, and project managers.
- Semi-structured interviews allow for the investigation of unexpected themes or concerns that may come up during the discussions, while also ensuring uniformity across the interviews.

b) Structured Questionnaire (Google form):

Justification: It is advised that the quantitative survey use a structured questionnaire in order to gather standardized data from the Steward Bank software development team members.

- To collect both quantitative and qualitative data, the questionnaire will consist of a mix of closed-ended questions and a few open-ended questions.
- In the part of Steward Bank's software development projects, the questionnaire will be created to gather participants' perspectives, experiences, and evaluations of the advantages, disadvantages, and general performance of the Waterfall approach.

c) Document Analysis:

- Justification: To methodically examine and extract pertinent data from project-related paperwork, including project plans, progress reports, and performance measures, a document analysis process will be employed.
- A structured template will be included in the protocol to record important information such as project characteristics, the specifics of the Waterfall model's execution, project results, and any disadvantages or advantages that may have been discovered.
- We will be able to find patterns, trends, and insights that can be cross-checked with the qualitative and quantitative data gathered thanks to the document analysis procedure, which will guarantee a consistent and exhaustive assessment of the project documentation.

3.8 **DATA COLLECTION**

a) Face to face interviews:

Justification: For the qualitative portion of the study, one-on-one, in-person interviews are the best technique for gathering data. The research team will be able to obtain extensive, nuanced insights into the application and performance of the Waterfall

model by using this approach to interact in-depth with key stakeholders, including project managers, software engineers, and senior managers.

- In-person interviews will encourage candid and participatory dialogues, giving participants the chance to fully explain their experiences, viewpoints, and background information.

- By using this approach of data collecting, the research team will also be able to pay attention to nonverbal cues and gain a better grasp of the perspectives and experiences of the participants.

b) Online survey:

- Justification: For the quantitative portion of the study, an online survey is the suggested technique of gathering data. With this strategy, the research team will be able to effectively contact a greater number of Steward Bank software development team members.

- The study team will be able to compile quantifiable data on participant perceptions, experiences, and evaluations of the Waterfall model thanks to an online survey that offers a uniform and consistent data collection platform.

- Additionally, the online format will allow participants to complete the survey whenever it is most convenient for them, which could lead to a higher response rate.

c) Document Review and Abstraction:

Justification: The best data gathering technique for the evaluation of project-related documentation at Steward Bank is a document review and abstraction approach.

- This approach will extract and synthesize the data required to meet the research objectives by methodically going over the project plans, progress reports, performance measurements, and other pertinent paperwork that is currently available.

- The previously created document analysis protocol will serve as a guide for the document review and abstraction process, guaranteeing a rigorous and uniform data collecting procedure.

3.9 **ETHICAL CONSIDERATION**

Informed Consent:

Make sure everyone gives their informed consent before taking part in surveys or interviews.

Confidentiality:

Maintaining the privacy of participants' names and answers is important. Data should also be stored securely.

Ethical Approval:

Prior to starting data collecting, get approval from the appropriate institutional review board or ethical committee.

Fairness and Respect:

Respect each and every participant, irrespective of their position, background, or views regarding the Waterfall Model. During interviews, steer clear of biased or leading questions.

Make sure that participants are chosen fairly by using purposive sampling. Aim for diversity in terms of positions, kinds of projects, and degrees of expertise.

Ownership and Sharing of Data:

Adequately inform participants about who owns the data. Generally speaking, you are allowed to utilize their data for research as long as you stay within the predetermined boundaries, but they still control the data.

It is necessary to seek participants' consent and indicate in the consent form any plans to share any anonymised data with outside researchers.

Rebriefing:

Give participants a quick rundown of the study after the interview and give them a chance to ask questions.

3.10 Summary

With an explanatory sequential design and pragmatic guidance, the mixed-methods approach of this study guarantees a comprehensive and fair review of the Waterfall Model's efficacy in software development at Steward Bank. The research will produce rich, deep insights and statistically significant conclusions by integrating qualitative and quantitative data gathering approaches, as well as purposeful and random sampling strategies. This approach will offer a thorough and nuanced comprehension of the advantages and disadvantages of the Waterfall Model, ultimately making a significant contribution to the field of project management for software development.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

The collected data is examined in detail in this chapter. It provides a thorough analysis of the benefits and drawbacks of applying the waterfall paradigm to software development projects at Zimbabwe's Steward Bank. Important information regarding Steward Bank's implementation of the waterfall model will be known by the questionnaire and interview findings. Additionally, it will demonstrate the commercial implications of this paradigm and offer suggestions for enhancing software development initiatives .Furthermore, the chapter will offer significant insights into the bank's procedures, obstacles faced, and critical elements that make software development projects successful. We intend to learn more about the waterfall model's

practical use and how Steward Bank may improve software development efficiency by investigating these topics.

4.2 DATA PRESENTATION AND ANALYSIS

4.2.1 RESPONSE RATE ANALYSIS

Table 1 Response Rates

Participants invited to fill in the questionnaire	Participants that filled in the questionnaire	Completed responses
15	15	15

15 participants were invited to fill in the questionnaire and they all did since the software development department at Steward bank consists of very few people .

4.2.2 SAMPLE ROLE DEMOGRAPHIC CHARACTERISTICS

Participants selected	Questionnaires sent	Questionnaires filled in
All	15	15
Project managers	10 %	10 %
Software developers	40 %	40 %

System analysts	15 %	15 %
Quality Assurance Testers	10 %	10 %
DevOps Engineers	25 %	25 %

Table 2 Response rate by numbers

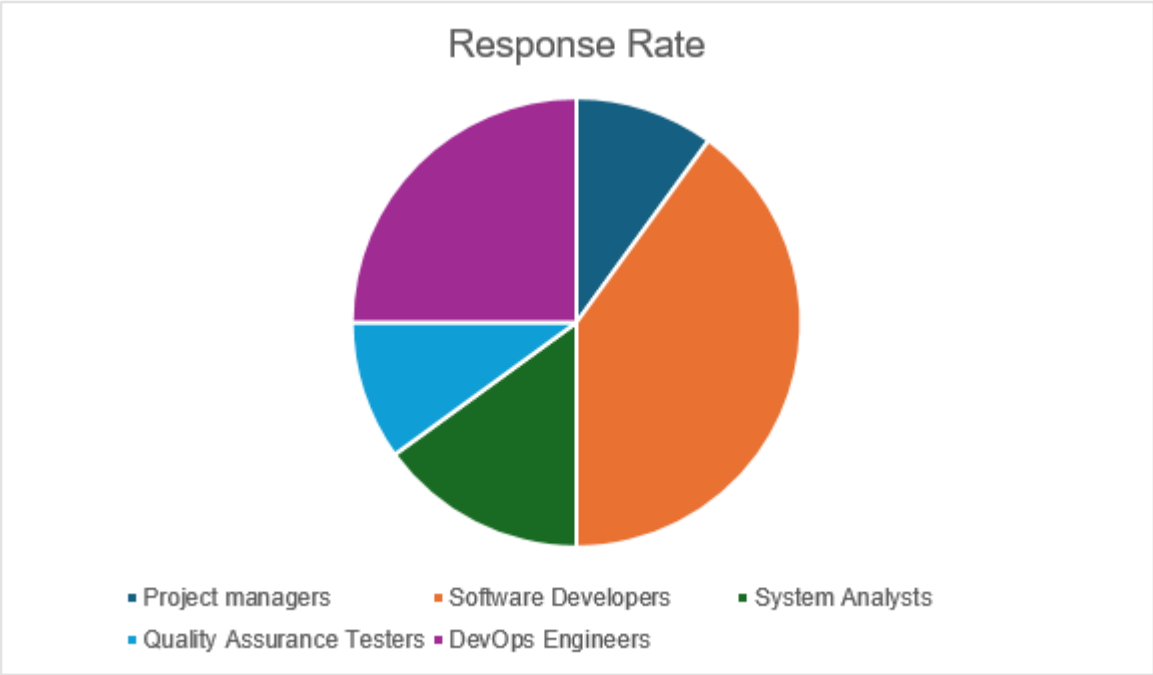

Figure 2. Response rate by percentage

The sample population include the different roles that are involved in the software development projects at Steward Bank. The software developers make up the greatest percentage as they are the ones that are involved in developing the project systems , guided by the project managers and the DevOps Engineers. The Quality Assurance Testers and system analysts also cover a huge part in the process as the review the results of the developed systems for the projects.

4.3 Findings

4.3.1 Benefits of Waterfall Model

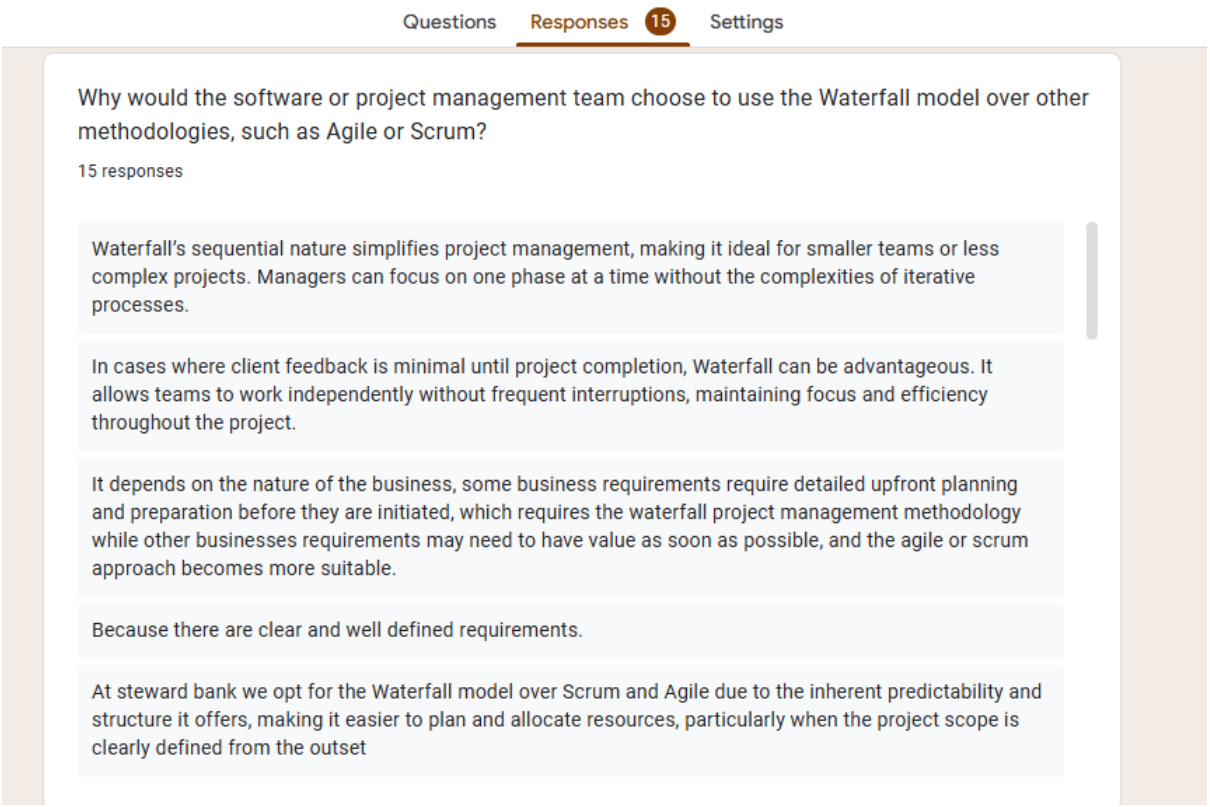

Figure 3. Screenshot of responses on benefits of the Waterfall model

According to the responses I got when I collected data , Waterfall model is distinguished by its straightforward, linear development through a number of discrete phases, including requirements gathering, design, implementation, testing, deployment, and maintenance. Project management is made easier with this methodical approach, which makes it particularly useful for smaller teams or projects with simpler objectives. Project managers can concentrate on one step at a time by following a sequential flow, which removes the complexity that Agile approaches' iterative procedures frequently entail. Better planning and resource allocation are made possible by this emphasis, which guarantees that each phase is finished before going on to the next and improves the project's overall coherence. In the other data collection of face to face interview , three respondents talked about “Waterfall model having clear requirements which makes everything easy to understand”.

The Waterfall model's applicability to projects with clear and consistent criteria is one of its main benefits. The Waterfall methodology enables a methodical task execution when the project's scope is well defined and unlikely to change. For stakeholders, this dependability is very comforting because it offers a solid schedule and budgeting path. In the fast-paced banking industry, where deadlines frequently determine market competitiveness, stakeholders can accurately predict project milestones and completion dates.

The Waterfall approach fits in very well with the requirement for a great deal of documentation and tight adherence to regulations in sectors like banking, where regulatory compliance is crucial. Every stage of the Waterfall model necessitates extensive documentation, which guarantees adherence to internal and external rules while also acting as a record of progress. In the banking industry, where regulatory agencies want thorough records for audits and evaluations, this degree of documentation is essential. Because all team members may go back to the requirements and decisions that have been documented throughout the project lifetime, the Waterfall model's comprehensiveness improves responsibility.

The Waterfall model's sequential structure also makes resource management and project tracking simpler, especially for large-scale financial software projects. Project managers may more efficiently distribute resources when each phase is well-defined, guaranteeing that team members are working on projects that complement their knowledge and abilities. This clarity facilitates in-depth upfront analysis and risk assessments by lowering uncertainty in scope and deliverables. As a result, the group can spot any problems early on and take action before they become serious problems. The Waterfall methodology also works well when there is little client input until the project is finished. In these situations, teams are able to focus on their task without

being distracted frequently, which improves efficiency and attention. Because team members can focus on finishing each step to a high standard without being distracted by constant modifications based on customer input, this unbroken flow of work frequently results in increased productivity.

Clarity and accountability are crucial in regulated businesses, and the Waterfall model's emphasis on thorough documentation further improves these qualities. The Waterfall model offers a dependable framework for monitoring project progress and confirming regulatory compliance by making sure that every facet of the project is thoroughly recorded. In addition to helping with present project management, this comprehensive documentation is a useful tool for upcoming projects, enabling teams to improve their procedures and gain knowledge from previous experiences.

Furthermore, the Waterfall model's hierarchical structure can be more in line with Zimbabwean corporate culture, which frequently favours traditional management systems. This paradigm fits perfectly with current institutional frameworks by offering clearly defined responsibilities and a chain of command. The Waterfall paradigm provides a more organized environment that can be helpful in situations when clarity and direction are crucial, in contrast to Agile approaches that encourage self-organizing teams and flexibility.

Steward Bank prefers the Waterfall model because it is predictable, structured, compliant with regulations, and appropriate for projects with consistent needs. The bank may guarantee efficient project management that satisfies organizational objectives and regulatory requirements by utilizing these benefits, which will finally result in favorable project outcomes. In addition to meeting the bank's operational requirements, this methodology raises stakeholder trust in the project management procedure.

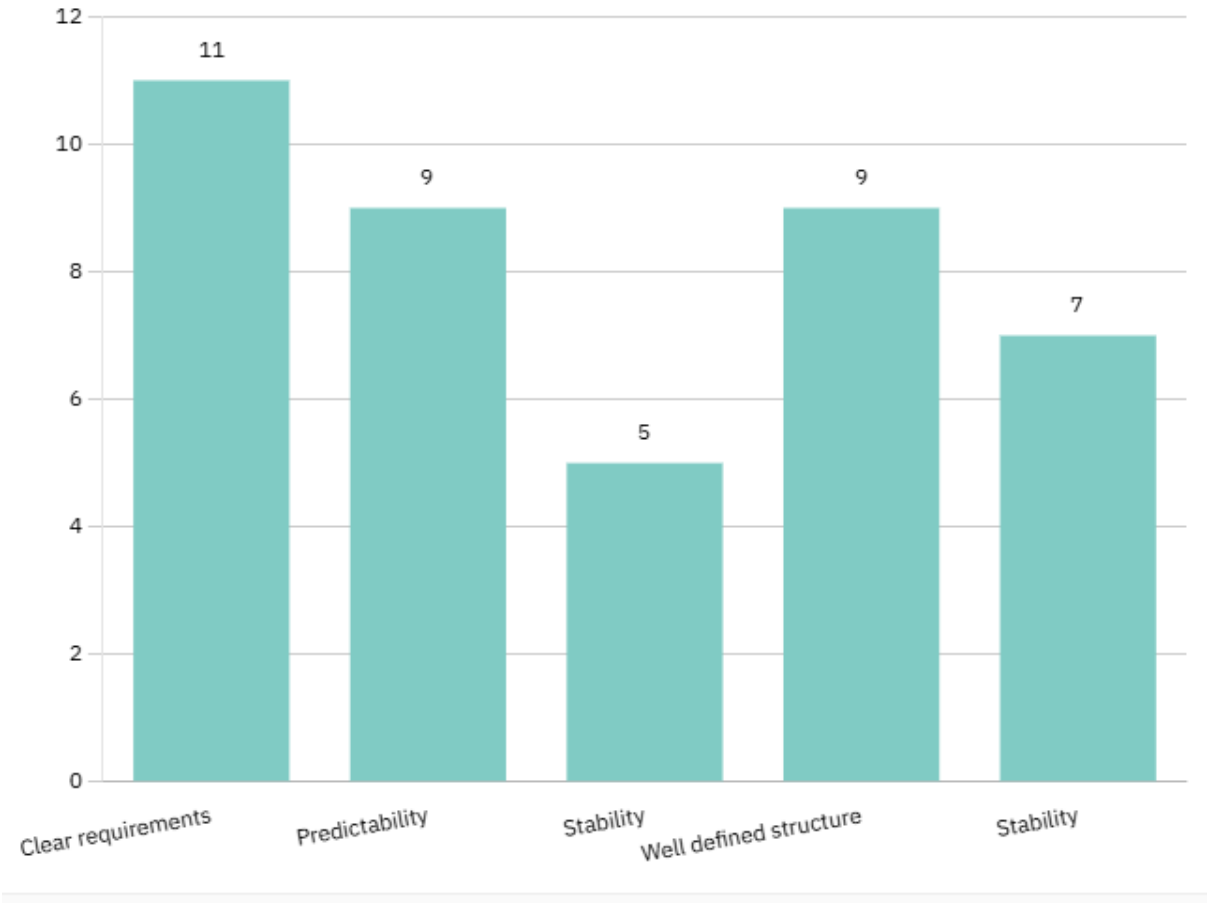

Figure 4. Benefits that appeared the most

4.3.2 Drawbacks of Waterfall Model

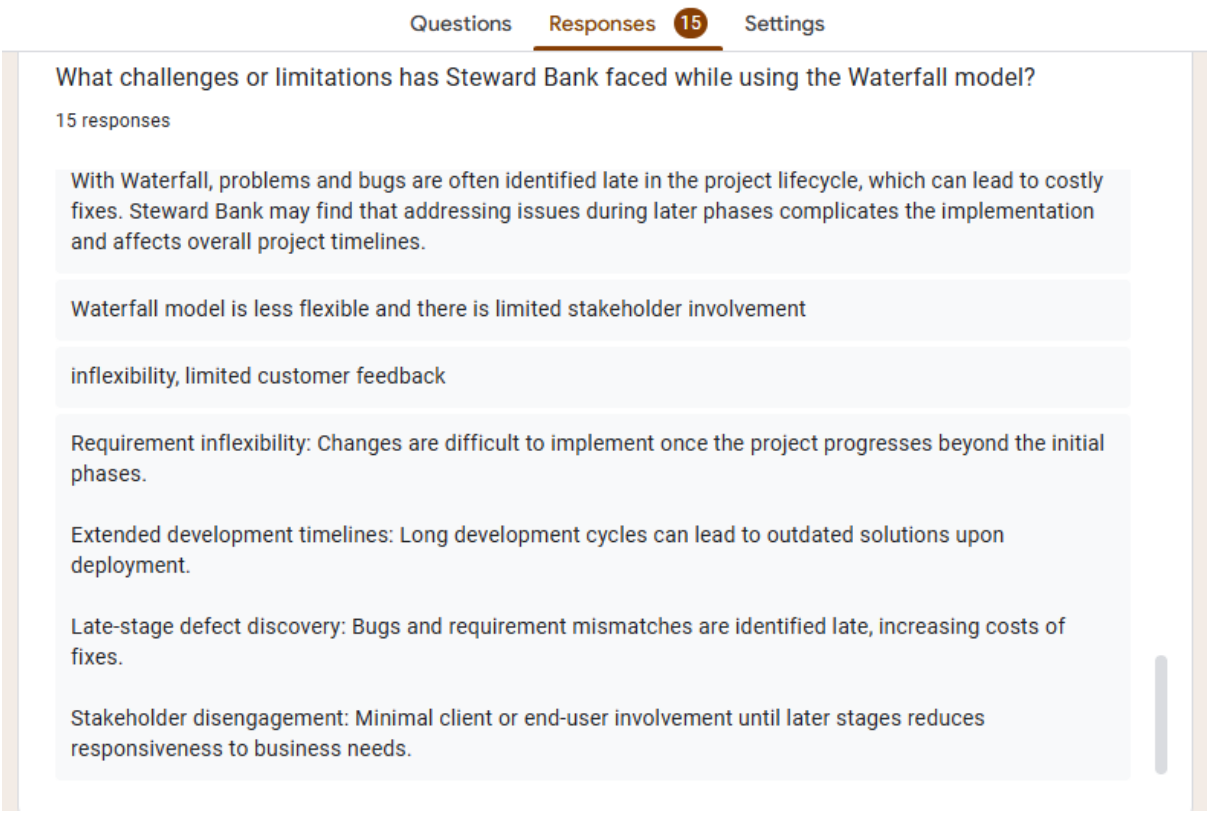

Figure 5. Screenshot of responses on drawbacks of the Waterfall model

According to the responses I got when I collected data , despite providing an organized method for project management, the Waterfall model poses a number of serious difficulties for Steward Bank, mostly because of its strict and sequential requirements. The restriction on client participation in the development process is one of the biggest disadvantages. Stakeholders usually only become involved in the Waterfall model during the requirements phase and again for final approvals at the end. Misaligned expectations may result from this lack of ongoing input since the finished product might not fully satisfy customer needs or take into account the changing market demands. As a result, the bank runs the risk of providing solutions that are out of date or inconsistent with present business goals, which could result in unhappy customers and missed opportunities.

The Waterfall model's rigidity severely limits flexibility. It gets more challenging to go back and make changes or revisions after a phase is finished, and it frequently

necessitates extensive rework. For instance, it might be expensive and time-consuming to adopt changes if regulatory requirements change or if new business needs arise throughout the project. In the fast-paced financial industry, where flexibility is crucial for upholding compliance and satisfying client expectations, this rigidity is especially troublesome. The bank's responsiveness and general competitiveness may be hampered by its failure to quickly adjust as laws or market conditions change.

The Waterfall model's late problem identification is another major drawback. Critical problems, such security flaws or compliance gaps, might not be discovered until much later in the process because testing usually only takes place in the last stages of the development cycle. Since resolving these problems frequently necessitates going back to earlier stages, this delay might result in significant delays in project timelines. The budget and overall resource allocation of the project may be impacted by the rapidly rising expenses of late-stage modifications. Since adherence to strict standards is necessary in the banking industry, this condition can be especially harmful.

Additionally, the Waterfall methodology frequently results in a "all-or-nothing" attitude to project completion. Since value is typically only recognized at the conclusion of the project cycle, there may be long stretches of time without any noticeable benefits. This can lead to lost opportunities and a lack of responsiveness to new trends or customer wants in a market that is changing quickly. Furthermore, the Waterfall model's lengthy development schedules may result in solutions that are out of date by the time they are implemented. Solutions that take too long to create might not be relevant when they emerge in a time when the acceptance of digital banking is changing quickly.

The Waterfall model may also result in unequal resource distribution. There may be times when team members are overworked or underutilized as a result of certain project phases requiring greater concentration and effort. Team morale and productivity may suffer as a result of this unequal workload, which may cause disengagement during slower times or burnout during more intense ones. Project managers have to strike a balance between fulfilling deadlines and making sure that resources are used effectively, which makes it difficult to manage team workloads effectively.

The Waterfall model's extensive documentation requirements can be very resource-intensive and take focus away from the actual development process. Although documentation is necessary to ensure compliance and clarity, an overemphasis on paperwork might hinder the team's capacity to innovate or address new problems. This may result in a bureaucratic culture that inhibits innovation and delays development as a whole.

Furthermore, the lengthy feedback loops of the Waterfall model may make it more difficult for the bank to adjust in a dynamic regulatory environment like Zimbabwe, where financial regulations are subject to rapid changes. The sequential aspect of the model might make it more difficult for the bank to adjust its operations iteratively, which would make it less responsive to market needs. The shortcomings of the Waterfall approach are becoming more noticeable as the financial sector moves toward greater digital transformation and agile tactics.

In order to embrace Banking 2.0 and digital transformation, Steward Bank must change its approach and way of thinking. The shortcomings of the Waterfall paradigm in promoting creativity and quick adaptation are further highlighted as the bank teaches its executives in agile and lean startup techniques to stay up with the digital revolution.

Navigating the intricacies of the contemporary financial world requires more flexible and adaptive project management techniques.

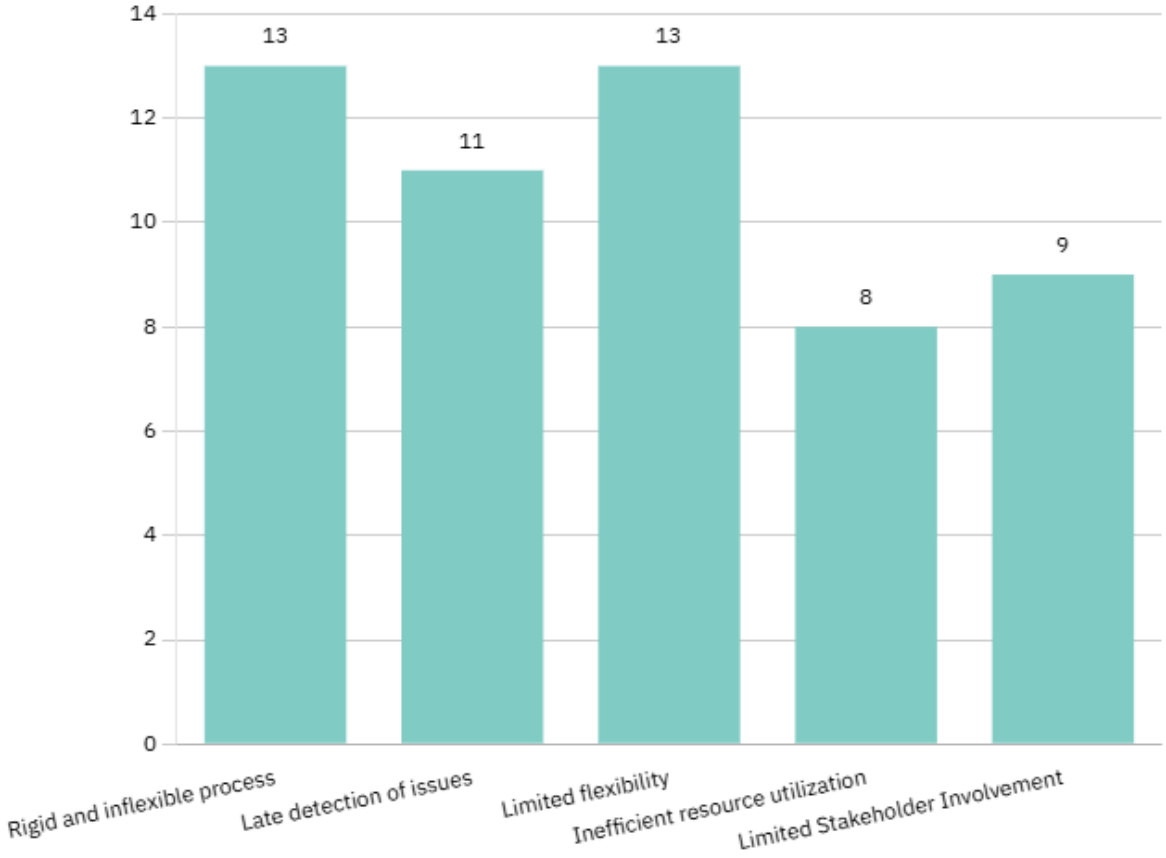

Figure 6. Drawbacks that appeared the most

4.4. Emerging technologies and trends influence on the effectiveness of the Waterfall model at Steward bank

Emerging technologies increasingly require a more agile approach than traditional Waterfall methodologies can offer. As such, Steward Bank foresees a transition in how the Waterfall model is implemented, moving towards a hybrid approach that combines the strengths of both Agile and Waterfall. This hybrid model will allow the bank to

remain responsive to the fast-paced changes associated with new technologies while maintaining the structured framework that Waterfall provides.

By integrating agile practices within the Waterfall structure, Steward Bank can prioritize iterative development, continuous feedback, and flexibility in project execution. This shift will enable teams to adapt quickly to evolving requirements, ensuring that projects align with the latest technological advancements and client needs. As the bank embraces this hybrid approach, it will be better positioned to implement emerging technologies effectively, enhancing overall project outcomes and maintaining competitiveness in a rapidly changing financial landscape.

Security concerns, particularly cyber security, are indeed a top priority for banks like Steward Bank. The increasing sophistication of emerging threats and security vulnerabilities necessitates a proactive approach to continuously enhance security measures.

To address these challenges, banks must invest in robust security frameworks that include regular assessments, real-time monitoring, and incident response strategies. Implementing advanced technologies such as machine learning and artificial intelligence can help detect anomalies and potential threats more effectively. Additionally, fostering a culture of security awareness among employees through ongoing training and education is crucial, as human error remains a significant factor in security breaches.

Collaboration with industry partners and regulatory bodies can also enhance security protocols by sharing information on emerging threats and best practices. By

prioritizing cyber security, Steward Bank can protect sensitive customer data, maintain regulatory compliance, and build trust with clients, ultimately ensuring the integrity of its operations in an increasingly digital landscape.

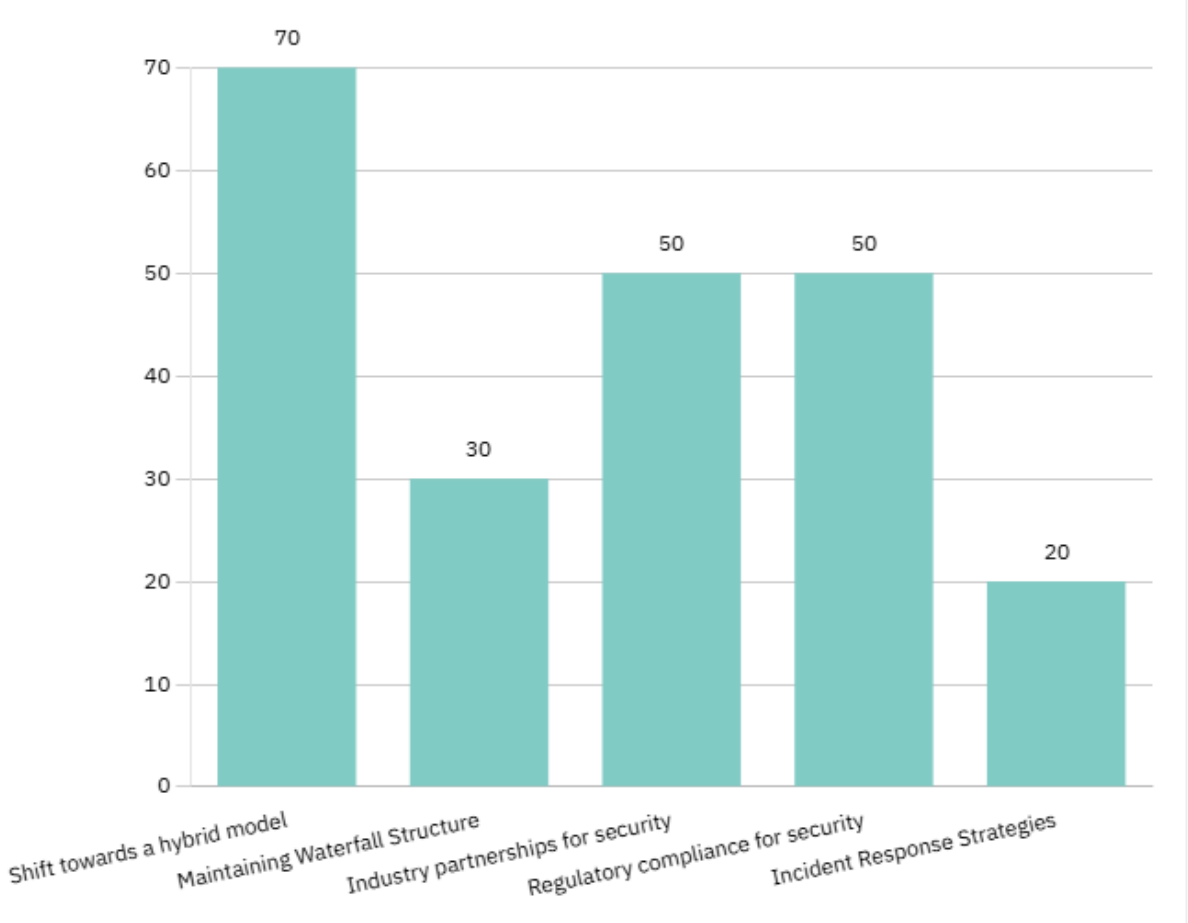

Figure 7. Emerging technologies and trends influence on the effectiveness of the Waterfall model at Steward bank.

4.5. Conclusion

In conclusion, these findings provide a thorough analysis of the benefits and drawbacks of the Waterfall Model in software development projects at Steward Bank. The questionnaire responses highlight the impact of both sides, revealing a complex landscape where the advantages of the Waterfall Model often outweigh its limitations. The structured approach, clear milestones, and well-defined phases contribute to

effective project management and accountability, making it a preferred choice for many projects.

However, the analysis also indicates that some drawbacks, such as rigidity, late issue discovery, and limited stakeholder involvement, carry significant weight. These challenges may prompt project members to reconsider the model, especially in light of the dynamic regulatory environment in which Steward Bank operates. As the organization continues to evolve, it is crucial to remain open to adapting methodologies that can better address both client needs and project complexities. Balancing the strengths of the Waterfall Model with flexibility and iterative processes can enhance project outcomes and maintain competitiveness in an ever-changing landscape.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents a detailed review of the important findings, conclusions, and suggestions drawn from the research undertaken on the analysing the benefits and drawbacks of Waterfall model in software development projects at Steward Bank , Zimbabwe.

5.2 Discussion

The background, research topic, objectives, questions, significance, assumptions, delimitations, limitations, and key terms of the study were described in Chapter 1. The

research topic was briefly summarized in the introduction, which also examined the advantages and disadvantages of applying the waterfall paradigm. The contrast between the advantages and disadvantages of applying the waterfall approach at Steward Bank was determined to be the research problem. Research questions were developed to delve into certain areas of inquiry, and clear objectives were articulated to drive the course of the study.The study's importance was emphasized, along with its possible ramifications for different stakeholders. To maintain openness and rigor, assumptions, boundaries, and limits were addressed. Finally, definitions of important terminology were provided to ensure clarity throughout the research. All things considered, Chapter 1 successfully set the stage for the ensuing research, creating a strong basis for the investigation.

In order to lay the groundwork for comprehending the advantages and disadvantages of the Waterfall approach in software development projects at Steward Bank, Chapter 2 included a thorough assessment of the literature. Utilizing the Project Management and Technology Acceptance Paradigm, Systems Theory, Contingency Theory, and Socio-Technical Systems Theory, the chapter examined the strengths, weaknesses, and potential of the Waterfall model within the bank’s context. It emphasized the distinct phases of the Waterfall approach—requirements gathering, design, implementation, testing, and maintenance—and explored how each theoretical framework aligns with these stages. This comprehensive analysis provides valuable insights into the applicability of the Waterfall model, laying a solid foundation for understanding its role in Steward Bank's software development initiatives.

Using primary and secondary data sources, Chapter 3 described the research methodology employed to analyze the advantages and disadvantages of the Waterfall

model in software development projects at Steward Bank, Zimbabwe. It outlined the research design and employed a mixed-methods approach, combining qualitative and quantitative research to provide a comprehensive analysis. The chapter detailed the research philosophy guiding the study, along with the specific data collection methods utilized, such as surveys and interviews. Ethical considerations were also addressed to ensure the integrity of the research process. Serving as a guide for the subsequent chapters, Chapter 3 provided a robust framework for data analysis and interpretation, ensuring that the findings would be well-supported and relevant to the study's objectives.

The results of the study, which are explained by various sources, look at both the good and bad sides of the topic in Chapter 4. The research found important details about how the waterfall model is used in software development projects at Steward Bank. This was discovered by examining the answers from surveys that were given to people involved in these projects.

According to the study, the people who responded to the surveys recognized that the Waterfall model is important for software development. However, they also pointed out some problems. For example, they mentioned that the model has strict rules that can be hard to change. There is also a lack of opportunities to go back and make changes during the development process. Additionally, issues can arise when trying to roll back or revert to a previous version after deployment. These factors were identified as significant challenges that can prevent software development projects from being successful.

5.2.1 Research objectives and the key findings:

Objective:

1) To analyse the benefits and drawbacks of Waterfall model in software development projects at Steward bank , Zimbabwe .

Key finding:

Although the Waterfall approach provides a predictable and organized framework for managing software development projects, especially in settings with clear requirements, it is not without serious drawbacks. It is appropriate for smaller teams and compliance-driven sectors like banking because of its sequential nature, which streamlines project management and permits explicit resource allocation. The rigidity of the model, however, may result in a lack of client involvement, delayed problem discovery, and challenges in adjusting to evolving needs, all of which could raise the likelihood that the project would fail. Understanding these advantages and disadvantages is essential for businesses like Steward Bank to use the Waterfall model to its full potential while taking into account other approaches that might better suit the dynamic nature of contemporary software development.

Objective:

2) Examine the ways in which the waterfall approach promotes precise documentation, early problem identification, and timeline adherence.

Key finding:

In order to preserve clarity and consistency throughout the project, waterfall's defined phases guarantee thorough documentation at every stage. Every stage, including requirements collection, design, implementation, testing, deployment, and maintenance, generates comprehensive documentation that encapsulates the goals,

procedures, and results related to that stage. In addition to facilitating traceability, which enables teams to monitor how requirements and decisions have changed over time, this comprehensive documentation improves accountability by outlining roles and expectations for each team member participating in the project. Stakeholders now have a trustworthy resource that promotes openness and aids in regulatory compliance, which is especially crucial in sectors like banking.

However, Issues are frequently found late in the project lifecycle, usually during the testing phase, which is a major disadvantage of the Waterfall paradigm. The linear evolution of the model, which precludes repeated feedback or corrections until the full system has been constructed, may be the cause of this delay. Any flaws or inconsistencies found at this point may therefore necessitate a great deal of revision or perhaps a return to earlier stages, which can cause delays and extra expenses. Because teams may feel pressured to implement remedies rapidly in order to achieve predetermined deadlines or deliverables, this delayed problem detection might impede fast problem resolution.Furthermore, since the original plans might have been predicated on assumptions that are now incorrect, having to go back might aggravate stakeholders and team members. In the end, the Waterfall model's organized approach helps with responsibility and documentation, but it also has dangers that, if not properly handled, could jeopardize project success.

Objective:

3) Examine how project outcomes and success measures are affected by feedback loops, late-stage modifications, and possible hazards.

Key finding:

The Waterfall model's absence of ongoing input can pose serious problems, chiefly because it causes expectations between the development team and stakeholders to be

out of sync. According to this approach, the majority of client and end-user engagement usually takes place during the requirements-gathering phase at the start of the project and again during testing or delivery at the conclusion. Because the development team could not completely understand how the stakeholders' demands and preferences change throughout the course of the project, this limited interaction could lead to a disconnect. As a result, stakeholders may be unhappy and want expensive changes at a later time if the finished product does not match their expectations when it is presented.Furthermore, projects may encounter higher risks that make implementation more difficult if requirements change at the last minute, whether as a result of evolving technologies, new regulatory requirements, or changes in the market. Making modifications might cause the entire project flow to be disrupted since the Waterfall model's inflexible structure makes it difficult to accommodate changes after a phase is finished. Because teams may need to go back and incorporate new needs into earlier phases, this rigidity can result in a great deal of rework, which can have a big impact on schedules and resource allocation.Furthermore, as deadlines draw nearer and the pressure to provide a working product mounts, the likelihood of project failure grows. Teams might be compelled to make changes quickly, which could lower the final product's quality and lead to technological debt. In conclusion, the lack of ongoing input highlights the significance of iterative communication and flexibility in the development process by increasing the possibility of mismatched expectations and introducing complications that can jeopardize project success.

Objective:

4) Determine the project settings or circumstances where the waterfall approach might be more or less appropriate.

Key finding:

For regulated sectors like banking, where thorough documentation and strict adherence to regulatory rules are critical, the Waterfall model is especially well-suited. Projects in these industries frequently have substantial operational, security, and legal requirements that call for meticulous documentation at every stage of development. Waterfall's organized approach guarantees that all requirements, design decisions, and testing outcomes are painstakingly documented, producing an extensive audit trail that can be examined during compliance audits or regulatory inspections. In addition to promoting accountability and openness, this emphasis on documentation helps firms reduce the possibility of regulatory infractions, which can have serious negative effects on their finances and reputation.

Waterfall is less appropriate for dynamic sectors that demand a high level of adaptation and response to change, even though it performs well in settings that place a premium on stability and compliance. Rapid changes in consumer preferences, market situations, and technological breakthroughs can occur in industries including software development, e-commerce, and technology. The strict, sequential methodology of Waterfall might become a liability in these kinds of settings. Changes that may occur after the initial requirements are established are difficult for the model's sequential phases to handle, which could cause problems if stakeholders need to alter the project scope or add new features in the middle of development.

Agile approaches, on the other hand, flourish in these dynamic environments by encouraging flexibility, iterative development, and ongoing feedback. Agile enables teams to provide incremental improvements and swiftly adjust to customer feedback in response to shifting market conditions and requirements. In addition to encouraging creativity, this iterative approach makes sure that the finished product is more in line

with consumer expectations and the demands of the market. In conclusion, the Waterfall model may not offer the agility required for success in fast-paced, changing contexts, where Agile approaches may provide a more effective approach. However, it is beneficial for regulated businesses that require rigorous documentation and formal processes.

Objective:

5) Evaluate the research's practical ramifications for project managers, organizational decision-makers, and software development professionals.

Key finding:

As they negotiate the complexity of project management and work to choose the best methodology for their particular projects, project managers and decision-makers must have a thorough understanding of the Waterfall model's advantages and disadvantages. The Waterfall methodology is distinguished by its methodical, systematic approach that prioritizes meticulous documentation and consistent deadlines. These characteristics can be especially helpful in regulated projects, such those in the banking or healthcare industries, where strict adherence to legal and regulatory requirements is crucial. In addition to facilitating accountability and traceability, the thorough documentation produced at each stage offers a precise foundation for audits and inspections, guaranteeing that every facet of the project complies with legal standards. However, the model's intrinsic rigidity presents serious problems, particularly in settings where needs could change over time. External variables including shifting consumer tastes, market conditions, and technology breakthroughs can force quick adjustments in fast-paced businesses that Waterfall is ill-prepared to manage. If teams are compelled to go back and add new criteria or revisions after a phase is finished, this rigidity may cause delays and higher expenses. As they evaluate the possible

dangers of applying the Waterfall paradigm in dynamic situations, project managers must be aware of these constraints.

Organizations may need to spend money on training and development in more flexible approaches, like Agile, in order to reduce these risks. Agile methodologies prioritize adaptability, iterative development, and ongoing stakeholder involvement, enabling teams to integrate feedback and react quickly to changes over the course of the project. Organizations can better match project outcomes with changing needs and expectations by cultivating a culture of responsiveness and adaptation.

In the end, a thorough comprehension of the Waterfall model's advantages and disadvantages enables project managers to choose methodologies with knowledge. It pushes them to balance the necessity for flexibility and agility against the advantages of consistency and comprehensive documentation. Sometimes the best course of action is a hybrid strategy that incorporates aspects of both Waterfall and Agile, enabling teams to take use of each methodology's advantages while tackling the particular difficulties of their particular projects. Increased success overall, better project outcomes, and increased stakeholder satisfaction can result from this strategic approach.

5.3: Summary of Findings

Through questionnaires and interviews, I gathered important information about the advantages and disadvantages of using the Waterfall model in software development

projects at Steward Bank in Zimbabwe. The project management team at Steward Bank chose the Waterfall model instead of other methods like Agile or Scrum because it offers predictability and structure. This makes it easier for them to plan and manage resources, especially when the project goals are clearly outlined from the beginning. The Waterfall model has distinct phases and clear milestones, which can be comforting for stakeholders who prefer knowing exactly when things will happen and how much they will cost.

However, there have been some challenges with using the Waterfall model at Steward Bank. One major issue is that it doesn't allow for much flexibility when requirements change, which can happen often in the banking industry. The feedback process is also slower, making it hard to respond quickly to new market demands. Since Steward Bank operates in a dynamic regulatory environment where requirements can change frequently, this rigidity can be a problem.

The Waterfall model helps in project planning and management by providing a clear framework. This includes thorough documentation of requirements, well-defined milestones, and a structured timeline. This organization helps with resource allocation, managing risks, and tracking progress throughout the project.

For future projects, Steward Bank can improve the Waterfall model by adding some flexibility between milestones. Regular reviews with stakeholders can help address changing needs. It’s also important to analyze requirements in detail, maintain clear communication, manage risks effectively, provide ongoing training, and conduct reviews after project completion.

Emerging technologies and trends are changing how banks operate, which increases the need for agility and quick responses to market shifts. This may make Agile methodologies more attractive since they can better adapt to evolving technologies and customer demands compared to the rigid Waterfall model.

To overcome challenges with the Waterfall model, Steward Bank should focus on thorough requirements gathering, clear documentation, regular progress reviews, strong risk management, and a formal process for handling changes. It's important to emphasize testing and quality assurance, and to keep stakeholders engaged throughout the project.

In a Waterfall project, managing stakeholder expectations and gathering feedback happens through regular meetings, such as weekly or daily check-ins. These meetings allow stakeholders to see how the project is progressing and provide their input.

The Waterfall model influences how resources are allocated by requiring detailed planning and estimation of time, budget, and personnel for each phase. This model focuses on completing tasks in sequence, with resources assigned based on a fixed plan, leaving little room for changes once resources are allocated.

To measure how well the Waterfall model achieves project goals, Steward Bank can look at various factors. These include whether the project stays on schedule and within budget, the quality of the work produced, stakeholder satisfaction, and whether all project milestones are met. Feedback from team members and stakeholders after the project can also offer valuable insights into how well the model worked.

However, Steward Bank is now considering a shift to the Scrum methodology. Scrum's iterative and incremental approach allows for more flexibility and adaptability to changing requirements. It also enables faster delivery of usable products, improved collaboration among team members and stakeholders, and quicker identification and resolution of issues through regular feedback.

5.4 Conclusion

The main reason Steward Bank has chosen the Waterfall model for its software development projects is because of its methodical approach, which greatly facilitates

planning and resource allocation when project needs are specified up front. For stakeholders that want to have a firm grasp of project costs and schedules, this model provides a degree of certainty and distinct milestones that can be comforting. But as the bank has developed this model, it has faced a number of difficulties, most notably its rigidity and lack of adaptability to change as needs emerge. This lack of adaptability can be troublesome, particularly in a changing regulatory landscape where the bank may find it challenging to react appropriately.

At Steward Bank, there is increasing agreement that improving the Waterfall model's application could result in improved project outcomes in light of these drawbacks. This could entail giving the procedure more flexibility, holding frequent stakeholder reviews to handle changing demands, and making sure that requirements are thoroughly examined prior to project start. Furthermore, the necessity for a more agile approach to software development is growing due to the quick speed of emerging technologies and changing market demands. Consequently, approaches such as Scrum are gaining popularity due to their capacity to facilitate increased flexibility, speedy reactions to changes, and improved cooperation between team members and stakeholders.

Since actively integrating stakeholders is essential for controlling expectations and enhancing project outcomes, Steward Bank places a high priority on stakeholder involvement and feedback throughout the project lifecycle. The bank uses a number

of criteria to assess the success of its projects, including stakeholder satisfaction, deliverable quality, and deadline and budget adherence. The bank is thinking about switching to Scrum in order to take advantage of its incremental and iterative methodology as it assesses its present procedures and looks to the future. More flexibility, quicker delivery of useful product increments, and a more responsive architecture that better suits the bank's operating requirements and market expectations could all result from this change.

Conclusion of the findings regarding the benefits and drawbacks :

Benefits summarized:

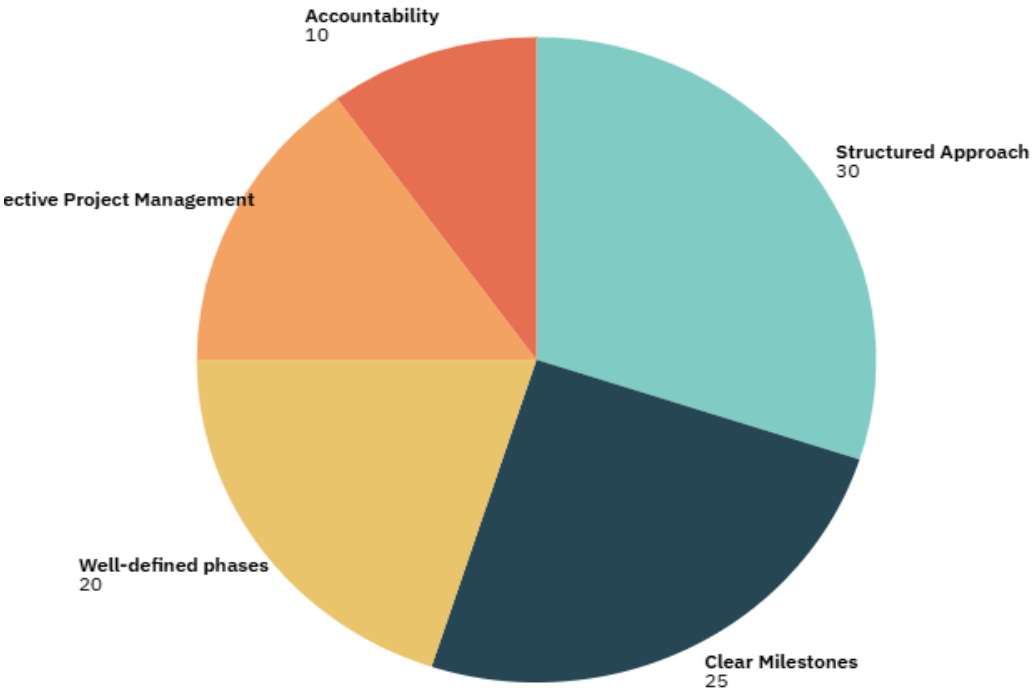

Figure 8 . Summary of the benefits

Drawbacks summarized:

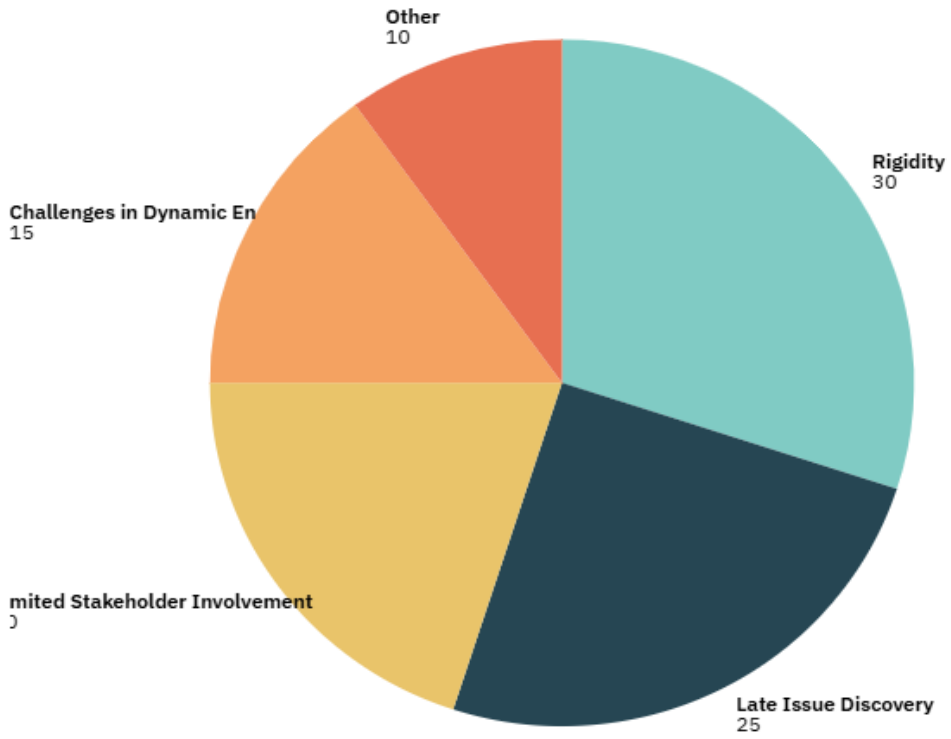

Figure 9 . Summary of the drawbacks

5.5 Recommendations

Project managers and teams concentrating on best practices must receive training in order to improve adherence to the Waterfall methodology. Effective documentation, milestone tracking, and change management techniques are covered in this session, which helps teams better comprehend and use the methodology. Clearly defining when and how to go back and review earlier stages can greatly increase adaptability. Allowing for limited modifications without interfering with the project's main flow enables teams to react to important changes and changing requirements more quickly. Project execution can be optimized by putting in place a hybrid structure that blends Waterfall and Agile approaches. With this method, projects can be finished in stages, with the deployment of essential components taking precedence over the integration

of new features. This adaptability may improve response to corporate demands.It is essential to stress the importance of collecting detailed and comprehensive requirements at the beginning of initiatives. To ensure that all demands are understood from the start, it is possible to reduce changes later in the development process by involving all stakeholders, using techniques like wireframing or prototyping, and putting in place a rigorous sign-off process. Potential problems can be found early in the project lifecycle by introducing regular review checkpoints between phases. This improves overall project efficiency by enabling small changes to be made without affecting the workflow as a whole. Maintaining alignment between business and regulatory requirements throughout the project lifecycle requires increasing stakeholder participation. The bank can lower the likelihood of expensive late-stage modifications by keeping lines of communication open and routinely involving stakeholders. Purchasing cutting-edge project management software can greatly improve monitoring, documentation, and risk control. Better organization and oversight are made possible by these technologies, which eventually improve project results. Iterative development components can be included into the Waterfall architecture to provide "mini-waterfalls" for incremental delivery. This enables teams to take advantage of the flexibility of iterative testing and feedback while maintaining the required structure. The bank can spot such problems early in the development cycle by putting in place more stringent risk assessment procedures that are adapted to the local environment. Better risk management and more informed decision-making are made possible by this proactive strategy. It is essential to create a simplified change management procedure tailored to Zimbabwe's regulatory environment. This makes it possible to respond to changing needs more quickly without sacrificing the integrity of the project.Critical insights and information will be maintained throughout the

project lifecycle by establishing specialist transition teams that are dedicated to knowledge transfer between phases. This technique improves continuity and tackles typical Waterfall project failure points.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

First, comparing the Waterfall paradigm with Agile approaches like Scrum or Kanban in financial institutions could reveal information about performance indicators, stakeholder satisfaction, and flexibility in response to shifting needs. Furthermore, looking at case studies of banks that have made the switch from Waterfall to Agile effectively may help clarify the elements that led to their success as well as the difficulties they faced.Finding the optimal strategies for managing compliance while preserving project agility would be made easier by investigating how regulatory changes affect various methodologies. Collaboration and satisfaction may be improved by investigating successful stakeholder engagement techniques in both Waterfall and Agile systems. Studies that compare Waterfall versus Agile projects and track project outcomes over time would provide information on the long-term advantages and disadvantages of each methodology. Additionally, examining how new technologies like automation and artificial intelligence affect software development processes may show improvements or changes to established procedures. Researching the training and development requirements of project teams could aid in the creation of focused training programs, while examining the cultural aspects of Steward Bank that affect methodology adoption would shed light on reluctance to change.It might also be advantageous to create a framework for assessing project success using pertinent key performance indicators (KPIs) in the banking industry. Finally, investigating the efficacy of feedback mechanisms in software development

projects could evaluate the ways in which consistent input affects stakeholder satisfaction and project success across various approaches. Future project management methods at Steward Bank and other comparable organizations can be informed by the useful insights gained from exploring these research avenues, which can advance our understanding of software development techniques in the banking industry.

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Figure 8. Summary of the benefits

Figure 9. Summary of drawbacks

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APPENDICES

Appendix 1 Consent Form

INFORMED CONSENT

My name is Denver Takudzwa Mazhindu, a final year (Software Engineering) student from Africa University. I am carrying out a study on ANALYSING THE BENEFITS AND DRAWBACKS OF WATERFALL MODEL IN SOFTWARE DEVELOPMENT PROJECTS AT STEWARD BANK. I am kindly asking you to participate in this study by answering the questions I am going to present to you.

Purpose of the study:
The purpose of the study is to analyse the benefits and drawbacks of Waterfall model in Software Development projects at Steward Bank and use the findings (analysis of the benefits and drawbacks) to develop improvements and recommendations for software development projects in the banking sector.

Procedures and duration
If you decide to participate , you will have to answer 15 questions and it is expected that this will take about 5 to 10 minutes to complete. The questions will be based on your how you use the Waterfall model in your roles and duties in the software development projects at Steward Bank and the impact it has .

Risks and benefits

There are no risks encountered or associated with your participation in this research and you can decide to stop participating if you get any discomfort in the process . The outcome of this study will help to develop improvements and recommendations for software development projects in the banking sector.

Confidentiality

Your names will not be stored in any parts of this study and each and every response you give will be kept confidential. Only the researcher and the research team will have access to the data that will be provided.

Voluntary participation
Participation in this study is voluntary and if you decide not to participate in this study, there will be no negative impact or repercussions. If you choose to participate, you are free to withdraw your consent and to discontinue participation without penalty.

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorisation
If you have decided to participate in this study please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

---------- ----------

Name of Research Participant (please print) Date

Signature of Research Participant or legally authorised representative

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committeeon telephone (020) 60075 or 60026 extension 1156 email aurec@africau.edu

Name of Researcher ---Denver Takudzwa Mazhindu----------

Regards ,

Appendix 2 Application for AUREC initial review

For office use only		
Protocol no. ……	☐	Office stamp
Type of review: Full Comm	☐	
Expedited	☐	
Exempted		

AFRICA UNIVERSITYRESEARCH ETHICS COMMITTEE (AUREC)

APPLICATION FOR INITIAL REVIEW

NB: This form must be completed by all persons/teams applying for ethical review by AUREC. Upon completion by the investigator(s) /researcher(s) it should be submitted electronically to AUREC, aurec@africau.edu. . Application fees (to cover the costs of reviewing proposal) should be paid to the Africa University Business Office, and proof of payment should accompany each application. Please complete all sections of this application form. If there is insufficient space on the form you may use additional pages.

Check list

This checklist is meant to aid researchers in preparing a complete application package and to help expedite review by the AUREC. Please tick all boxes as appropriate (Indicate **N/A** where inapplicable).

CONTACT PERSON'S NAME : __DENVER TAKUDZWA MAZHINDU_____

CONTACT ADDRESS: __696 Oak Crescent , Sunway City , Harare _____

EMAIL ADDRESS : dmazhindu@africau.edu

CONTACT NO: +263783255581

UNDERGRADUATES

		Applicant	AUREC
1	Application form duly completed	√	
2	Electronic version of research proposal to aurec@africau.edu	√	
3	Consent forms in English and local language of study population	√	
4	Advertisement or letter or card used for recruiting participants and any supplementary information *(if applicable)*.	N/A	
5	Data collection tools being administered during the study in English and local language of study population *(if applicable)* included in the proposal	√	

6	Budget and timeframe included in the proposal.	√	
7	Approval letter from your academic supervisor/college or institution	√	
8	Approval letter from authorities where study will be conducted	√	
9	Application fee paid at AU Business Office and receipt (or copy) attached to application form.	√	

POST GRADUATES AND OTHER RESEARCHERS

		Applicant	**AUREC**
1	Application form duly completed		
2	Electronic version of full research proposal (chapter 1 – 3 completed) to aurec@africau.edu		
3	Proposal summary (see guidelines below)		
4	Consent form in English and local language of study population		
5	Advertisement or letter or card used for recruiting participants and any supplementary information *(if applicable)*.		
6	Data collection tools being administered during the study in English and local language of study population (if applicable)		

7	Budget and timeframe		
8	Approval letter from academic supervisor/college or institution *(if you are a student)*		
9	Approval letter from authorities where study will be conducted		
10	Application fee paid at AU Business Office and receipt attached to application form.		
12	CV's for D Phil and Phd candidates.		

Denver Takudzwa Mazhindu 25/6/2024

…… ……

……

Signature: Investigator/Researcher Name

Date

1. General information

1.1. Study title: ....Analysing the benefits and drawbacks of Waterfall model in Software development projects at Steward Bank , Zimbabwe.....

1.2. Name of Principal Investigator(PI)/ Researcher:_Denver Takudzwa Mazhindu_

1.3. Nationality of Investigator/Researcher: _____Zimbabwean_____

1.4. Proposed date of start of study: _(dd/mm/yyyy)___01/08/2024_____

1.5. Expected duration of study: _____5 months_____

1.6. Study site(s) in Zimbabwe: _____Steward Bank , Harare_____

1.7. Sites outside Zimbabwe: _____N/A_____

1.8. Study budget:____USD120_____ Source of Funding: _____SELF_____

1.9. Is the researcher a student? Yes

1.10. If Yes, indicate the following:

1.10.1. Name and address of institution: _____Africa University_____

1.10.2. College:_____College of Engineering and Applied Sciences_____

1.10.3. Level of study Undergraduate/Master's/PhD _____Undergraduate_____

1.10.4. Name of Supervisor: _____Mr. T.Makambwa_____

1.11. If No to question 1.10, then indicate the following:

1.11.1. Name and address of institution:

_____

1.11.2. Academic Title of PI:

_____

1.11.3. Existing Qualifications:

_____

1.11.4. Co Investigators:

Names: Qualifications Institution

2. Statement by the investigator

I ___Denver Takudzwa Mazhindu_____certify that the information in this application document and the accompanying documents is true and complete in all respects. I confirm that the application has NOT been rejected by any other ethics review committee.

Signature _____  ___ Date: _____25/06/2024_____

Appendix 3 Questionnaire questions

1. Why would the software or project management team choose to use the Waterfall model over other methodologies, such as Agile or Scrum?
2. What challenges or limitations has Steward Bank faced while using the Waterfall model?
3. How does the rigid structure of the Waterfall model impact flexibility and adaptability to changes in project requirements? Can you provide examples where changes were difficult to implement during the project lifecycle?
4. How does the Waterfall model contribute to project planning and management at Steward Bank?
5. What recommendations can be made for improving the implementation of the Waterfall model in future projects at Steward Bank?
6. How might emerging technologies and trends influence the effectiveness of the Waterfall model in the banking sector?
7. What are the mitigation strategies that can be put up when using the Waterfall model for software development projects ?
8. When is using the Waterfall approach really necessary ?
9. What are some notable successes or failures of projects that utilized the Waterfall model?
10. How do you manage stakeholder expectations and feedback in a Waterfall project?
11. How does the Waterfall model influence the allocation of resources (time, budget, personnel)?
12. How do you perceive the testing phases in the Waterfall model? Are they effective?
13. Do you find the documentation requirements of the Waterfall model beneficial or burdensome?

14. How do you measure the effectiveness of the Waterfall model in achieving project goals?
15. Are you exploring or planning to adopt alternative methodologies in the near future?

Appendix 4 Proof of payment

RTGS FUNDS TRANSFER CONFIRMATION RECEIPT

Your rtgs funds transfer transaction with the following details was

TRANSACTION DETAILS

Date Of Payment	12/06/2024
Transaction Reference	DENVER T MAZHINDU AUREC DISSERTATION
Transaction Amount	USD15.00

BENEFICIARY DETAILS

Beneficiary Bank Code	CBZ
Beneficiary Mobile Number	0772748097
Beneficiary Account Number	01322704290031
Beneficiary Reference	DENVER T MAZHINDU AUREC DISSERTATION
Beneficiary Name	AFRICA UNIVERSITY AUREC

TRANSACTION STATUS

Transaction Status	Successful
Transaction ID	DF24164000000165

PAYER DETAILS

Source Account Number	01344863702001
Sender Mobile Number	263772748097
Payer Name	CRESENCE MAZHINDU

NMB BANK LIMITED
THIS IS AN AUTHORIZED DIGITAL STAMP
DATE: 12/06/2024
TEL: (+263) (242) 759651-9
EMAIL: enquiries@nmbz.co.zw

NOTICE:
NMB Bank Limited will never send you an e-mail requesting you to enter your personal details or private identification and/or authentication details.

1. This application is not a receipt. Sellers should confirm with their bankers that funds have been received before releasing

Appendix 5 Steward Bank Research Approval

STEWARD BANK
Everyday Banking For Everyday People
A Registered Commercial Bank

ADDRESS
79 Livingstone Avenue
P.O Box 5220
Harare, Zimbabwe

+ 263 8677020267

+263-242-791444 / 8
791450 / 60
791461
732408
792032
793290
253672 / 3 / 5

www.stewardbank.co.zw

17 June 2024

Denver Mazhindu
C/o Africa University
MUTARE

Dear Denver

RE: REQUEST TO CONDUCT RESEARCH WITHIN STEWARD BANK LIMITED

Thank you for your interest in conducting research within Steward Bank. Your request to conduct a research on the topic, **ANALYSING THE BENEFITS AND DRAWBACKS OF WATERFALL MODEL IN SOFTWARE DEVELOPMENT PROJECTS AT STEWARD BANK**, has been approved.

You are required to provide the final copy of the research document, which is duly stamped by your university with a clear executive summary, comprehensive research findings and recommendations to:

The Talent Development Manager,

Lorraine.Muchenjekwa@Stewardbank.co.zw

Kindly get in touch with Lorraine on 0771222415 for any additional support.

For and On Behalf of Steward Bank

Lorraine Muchenjekwa
Talent Development Manager