# Asm1 Software Development Life Cycle Truong Ky Nguyen GCD210354

Software Development Life Cycles (Greenwich Việt Nam)

UNIVERSITY of GREENWICH
Alliance with FPT Education

BTEC

# ASSIGNMENT 01 FRONT SHEET

| | | | |
|---|---|---|---|
| **Qualification** | **BTEC Level 5 HND Diploma in Computing** | | |
| **Unit number and title** | Unit 09: Software Development Life Cycle | | |
| **Submission date** | | **Date Received 1st submission** | |
| **Re-submission Date** | | **Date Received 2nd submission** | |
| **Student Name** | TRUONG KY NGUYEN | **Student ID** | GCD210354 |
| **Class** | GCD1105 | **Assessor name** | PHAN THANH TRA |
| **Student declaration**<br>I certify that the assignment submission is entirely my own work and I fully understand the consequences of false declaration is a form of malpractice. | | | |

| | | | |
|---|---|---|---|
| | | **Student's signature** | |

**Grading grid**

| P1 | P2 | P3 | P4 | M1 | M2 | D1 | D2 |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

❒ **Summative Feedback:** ❒ **Resubmission Feedback:**

| | | |
|---|---|---|
| **Grade:** | **Assessor Signature:** | **Date:** |
| **Internal Verifier's Comments:** | | |
| **Signature & Date:** | | |

UNIVERSITY of GREENWICH
Alliance with FPT Education

BTEC

# Contents

**I. Introduction** ..... 6

**II. Describe two iterative and two sequential software lifecycle models** ..... 7

1. Describe the following SDLC ..... 7

a. Waterfall model ..... 8

b. V-model ..... 11

c. Prototyping ..... 13

d. Scrum ..... 14

e. Spiral ..... 16
f. Model suitable for the project ..... 17
2. Discuss the suitability of each of the SDLC models for the project ..... 18
**III. Explain how risk is managed in the Spiral lifecycle model** ..... 19
1. Identify some risks and discuss an approach to manage them ..... 19
2. Risk Management process with clear illustrations and explanations ..... 20
**IV. Explain the purpose of a feasibility report** ..... 21
1. Definition of feasibility report ..... 21
2. Discuss the purpose of conducting a feasibility study ..... 21
3. Discuss how the three feasibility criteria ..... 21
• Technical feasibility ..... 21
• Economic feasibility ..... 22
• Organizational feasibility ..... 23
4. Discuss whether the project is feasible or not ..... 23
• Technical feasibility ..... 23
• Economic feasibility ..... 23
• Organizational feasibility ..... 23
**V. Describe how technical solutions can be compared** ..... 24
**VI. References** ..... 26

# I. Introduction

Software Development Life Cycle (SDLC) is the process of determining how an information system can support business needs, designing the system, building it, and delivering it to users. It is a framework that has a set of tasks to be performed at each stage in the software development process. It is a process of giving a complete idea of the development, design and maintenance of a software project by ensuring that all functionality along with user requirements, goals and final objectives are resolved together. With SDLC, the quality of the software project and the overall software development process is enhanced. If you've taken a coding class or have programmed yourself, this might sound simple. However, in the real world, it is not so easy. So, in my assignment, I will introduce clearly about how SDLC is important.

# II. Describe two iterative and two sequential software lifecycle models

## 1. Describe the following SDLC

SDLC or the Software Development Life Cycle is a process that produces software with the highest quality and lowest cost in the shortest time possible. SDLC provides a well-structured flow of phases that help an organization to quickly produce high-quality software which is well-tested and ready for production use.

In detail, the SDLC methodology focuses on the following six phases of software development, popular SDLC models include the waterfall model, spiral model, and Agile model *(ALEXANDRA ALTVATER, 2020).*

There are six phases of SLDC:

- **Requirement analysis**
  At this stage comprises receiving input from various stakeholders, including customers, salespeople, industry experts, and programmers. Determine the present system's strengths and flaws in order to improve it *(Altvater, 2020).*
- **Planning**
  At this stage of the SDLC, the team assesses the cost and resources required to accomplish the analyzed requirements. It also discusses the dangers and suggests sub-plans for minimizing them *(Altvater, 2020).*
- **Software design such as architectural design**
  The software specifications are turned into a design plan known as the Design Specification in this level of the SDLC. All stakeholders then analyze the proposal and provide feedback and ideas. It is critical that a strategy for obtaining and incorporating stakeholder feedback into this document be in place. Collapse at this stage nearly often results in expense overruns at best and project failure at worst *(Altvater, 2020).*
- **Software development**
  Actual development begins in this stage. Each developer must strictly stick to the agreed-upon strategy. Also, ensure that developers have a proper coding style and process norms in place *(Altvater, 2020).*
- **Testing**

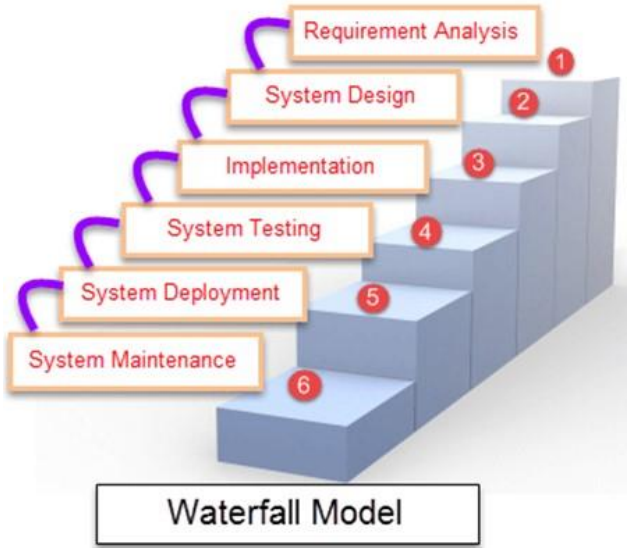
At this stage, the developers check and detect the errors that arise in the software and fix them so that the software has the best quality before it comes to customers *(Altvater, 2020).*

- **Deployment**
  The purpose of this step is to deploy the software to the production environment so that users can begin utilizing the product. Furthermore, this permits any last flaws to be identified before the product is released *(Altvater, 2020).*

SDLC is important because it provides an effective framework and method to develop software applications. It helps in effectively planning before starting the actual development. SDLC allows developers to analyze the requirements. It helps in reducing unnecessary costs during development.

**a. Waterfall model**

Waterfall Model is a sequential model that divides software development into pre-defined phases. Each phase must be completed before the next phase can begin with no overlap between the phases. Each phase is designed for performing specific activity during the SDLC phase. It was introduced in 1970 by Winston Royce *(Matthew Martin, 2022).*




*Waterfall Model*

**Different Phases of Waterfall Model in Software Engineering**

| Different phases | Activities performed in each stage |
|---|---|
| **Requirement Gathering stage** | During this phase, detailed requirements of the software system to be developed are gathered from client |
| **Design Stage** | • Plan the programming language, for Example Java, PHP, .net<br>• or database like Oracle, MySQL, etc.<br>• Or other high-level technical details of the project |
| **Built Stage** | After design stage, it is built stage, that is nothing but coding the software |
| **Test Stage** | In this phase, you test the software to verify that it is built as per the specifications given by the client |

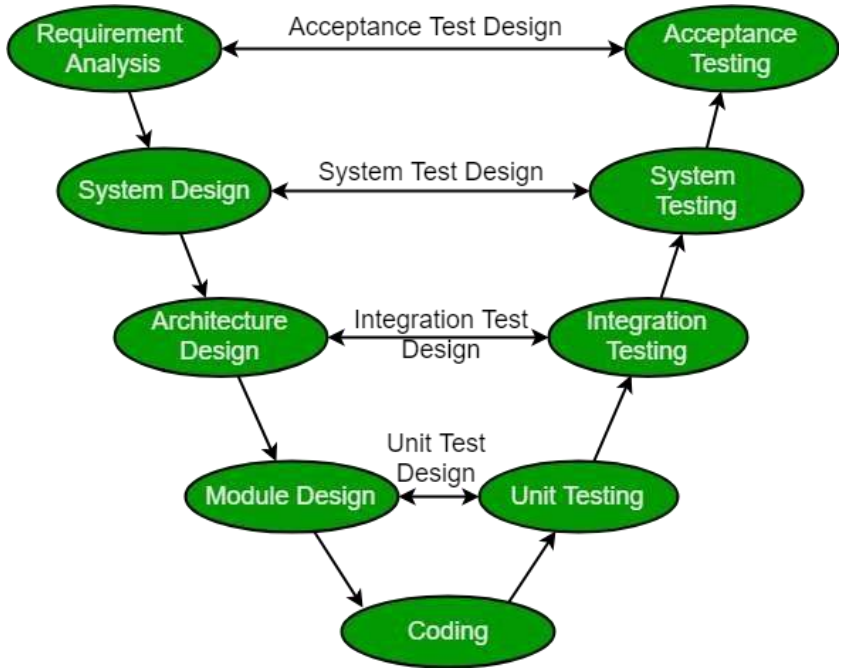
| | |
|---|---|
| **Deployment stage** | Deploy the application in the respective environment |
| **Maintenance stage** | Once your system is ready to use, you may later require change the code as per customer request |

**Advantages and Disadvantages of Waterfall Model**

| **Advantages** | **Disadvantages** |
|---|---|
| Before the next phase of development, each phase must be completed | Error can be fixed only during the phase |
| Suited for smaller projects where requirements are well defined | It is not desirable for complex project where requirement changes frequently |
| They should perform quality assurance test (Verification and Validation) before completing each stage | Testing period comes quite late in the developmental process |
| Elaborate documentation is done at every phase of the software's development cycle | Documentation occupies a lot of time of developers and testers |
| Project is completely dependent on project team with minimum client intervention | Clients valuable feedback cannot be included with ongoing development phase |
| Any changes in software is made during the process of the development | Small changes or errors that arise in the completed software may cause a lot of problems |

**b. V-model**

V Model is a highly disciplined SDLC model in which there is a testing phase parallel to each development phase. The V model is an extension of the waterfall model in which testing is done on each stage parallel with development in a sequential way. It is known as the Validation or Verification Model *(Thomas Hamilton, 2022).*




*V-Model*

**Different phases of the Software Development Cycle**

| Different phases | Activities performed in each stage |
|---|---|
| **Requirement Gathering stage** | Gather as much information as possible about the details & specifications of the desired software from the client. This is nothing but the Requirements gathering stage. |

| | |
|---|---|
| **Design Stage** | Plan the programming language like Java, PHP, .net; database like Oracle, MySQL, etc. Which would be suited for the project, also some high-level functions & architecture. |
| **Build Stage** | After the design stage, it is build stage, that is nothing but actually code the software |
| **Test Stage** | Next, you test the software to verify that it is built as per the specifications are given by the client. |
| **Deployment stage** | Deploy the application in the respective environment |
| **Maintenance stage** | Once your system is ready to use, you may require to change the code later on as per customer request |

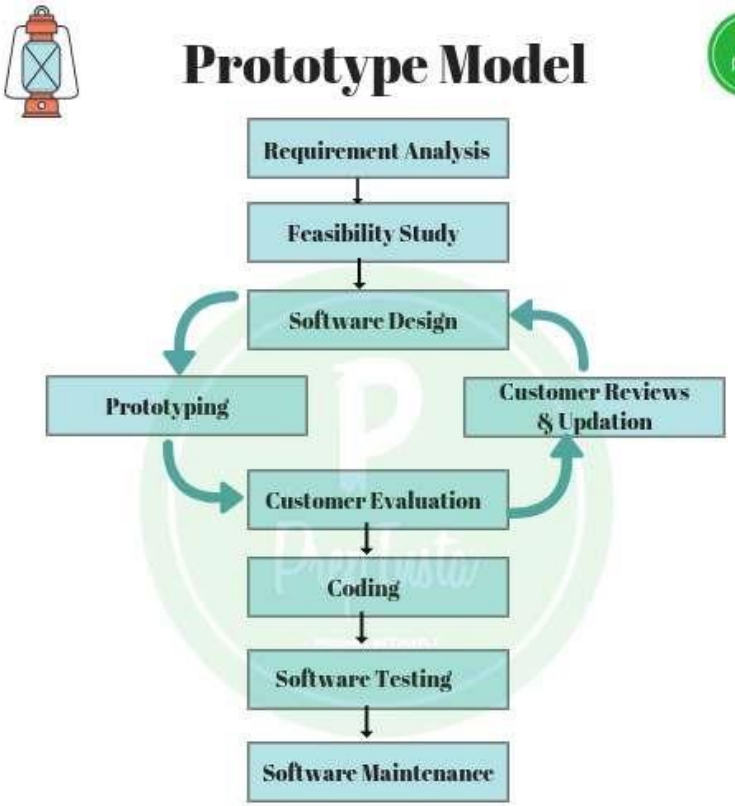
**Advantages and Disadvantages of V-Model**

| **Advantages** | **Disadvantages** |
|---|---|
| Simple and easy to use | Very inflexible, like the waterfall model. |
| Each phase has specific deliverables. | Adjusting scope is difficult and expensive. |
| Higher chance of success over the waterfall model due to the development of test plans early on during the life cycle. | The software is developed during the implementation phase, so no early prototypes of the software are produced. |
| Works well for where requirements are easily understood. | The model doesn't provide a clear path for problems found during testing phases |
| V-Model Improves the quality and reliability of the software. | Moreover, it is costly and required more time, in addition to a detailed plan |
| It reduces the amount of re-work because of the early detection of defects and issues | |

| | |
|---|---|
| It provides better management for project risks. | |
| Verification and validation of the product in the early stages of product development ensure better quality. | |
| The V-Model concept can be combined with other models, for example, the iterative and agile models | |

**c. Prototyping**

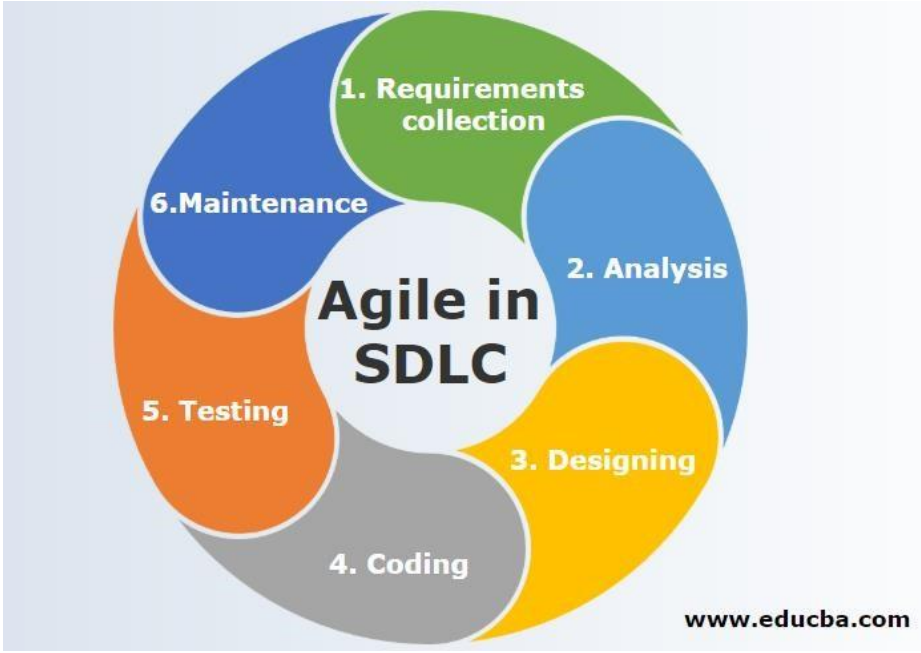
The prototyping model is a systems development method in which a prototype is built, tested, and then reworked as necessary until an acceptable outcome is achieved from which the complete system or product can be developed. This model works best in scenarios where not all of the project requirements are known in detail ahead of time. It is an iterative, trial-and-error process that takes place between the developers and the users *(Sarah Lewis, 2019).*




*Prototype Model*

**d. Scrum**

Scrum is a framework for projects. It follows the agile methodology and defines roles, procedures, tools, processes to make sure to deliver an efficient and effective project well on time through iterative development cycles. This methodology is basically followed where there is the demand of high development process, high involvement of stakeholders. Scrum methodology repeatedly monitors software development while the project is being developed *(StarAgile, 2020).*



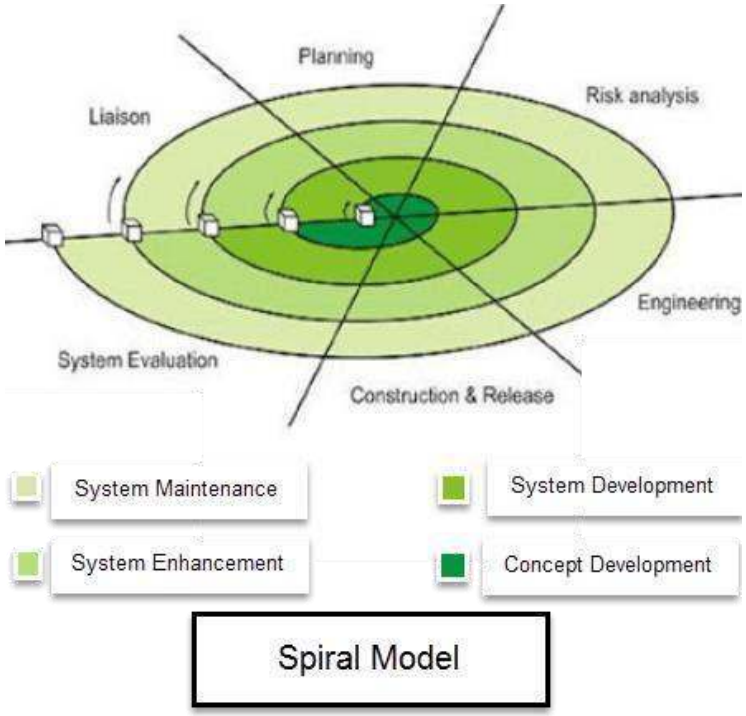

*Scrum Model*

**Advantages and disadvantages of Scrum Model**

| Advantages | Disadvantages |
|---|---|
| Transparent system pushes developers to comply with their assignments and deliver it on time | Difficult to plan, structure and organize a project with no clear mission and vision |
| Defined deadline at every step keep developers motivated and empowered at every step | Frequent changes in the project lead to a delay in the delivery time of the project |
| Feedback at every level of the project ensures that quality project is delivered in the end | Utilizes more resources and stakeholder's involvement in every small detail change and discussion |

**e. Spiral**

Spiral Model is a risk-driven software development process model. It is a combination of the waterfall model and the iterative model. Spiral Model helps to adopt software development elements of multiple process models for the software project based on unique risk patterns ensuring an efficient development process *(Matthew Martin, 2022).*




*Spiral Model* **Spiral**

**Model Phases**

| Spiral Model Phases | Activities performed during phase |
|---|---|

| | |
|---|---|
| **Planning** | It includes estimating the cost, schedule and resources for the iteration. It also involves understanding the system |
| | requirements for continuous communication between the system analyst and the customer |
| **Risk Analysis** | Identification of potential risk is done while risk mitigation strategy is planned and finalized |
| **Engineering** | It includes testing, coding and deploying software at the customer site |
| **Evaluation** | Evaluation of software by the customer. Also, includes identifying and monitoring risks such as schedule slippage and cost overrun |

**f. Model suitable for the project**

According to the information given, the project of Tune Source company has an initial investment capital and an estimated annual income of about 2 million USD, so this is a large-scale project, serving crowded customers. So, the company must careful organization and development to avoid mistakes.

Water fall model is an old model and is used a lot in a small project, but the percent of failure in the project is very high if it used for complex and object-oriented projects. Furthermore, the cost of correcting those flaws is too high because we must update everything from the documentation to the reasoning. Another way, if the software development documentation is not correctly completed, the project will most likely go astray when developing this product.

V-model also contains some weakness that is not suitable for this project. All requirements are known up-front so this model cannot readily manage dynamic changes in requirements. But, V-model does not contain risk analysis activities, it is hard to manage risk and it has high percent of projects failure.

So, after all reason I prepared, Spiral model is the best because:

- Environment is balance
- The technology used is dynamic or stable.
- There are resources and training available.
- The requirements do not change on a regular basis  The project is short.

2. Discuss the suitability of each of the SDLC models for the project

| Factors | Unclear User Requirement | Unfamiliar Technology | Complex System | Reliable system | Short Time Schedule | Strong Project Management | Cost limitation | Visibility of Stakeholders | Skills limitation | Documentation | Component reusability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Waterfall | Poor | Poor | Good | Good | Poor | Excellent | Poor | Good | Good | Excellent | Excellent |
| Prototyping | Good | Excellent | Excellent | Poor | Good | Excellent | Poor | Excellent | Poor | Good | Poor |
| Spiral | Excellent | Excellent | Excellent | Excellent | Poor | Excellent | Poor | Excellent | Poor | Good | Poor |
| Iterative and Incremental | Good | Good | Good | Good | Excellent | Excellent | Excellent | Good | Good | Excellent | Excellent |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scrum | Excellent | Poor | Poor | Good | Excellent | Excellent | Excellent | Excellent | Poor | Poor | Poor |

*Discuss the suitability of the model*

## III. Explain how risk is managed in the Spiral lifecycle model

### 1. Identify some risks and discuss an approach to manage them

| No | Risk | Possible | Cause | Consequence | Solution |
|---|---|---|---|---|---|
| **1** | Outdated technology | 40% | Employees are not trained or lazy to learn new technologies | Cannot create convenient features to attract users and compete with other brands | Always update the newest and latest technology |
| **2** | Lack of personal | 10% | Employees are resigned or fired | Project completed over time | Prepare more staff and manage staff to do task together |
| **3** | Lack of budget | 15% | Covid-19 affect to source of income | Lack of funds to develop | Take advantage of old but highly effective technologies to reduce costs |

| | | | | | |
|---|---|---|---|---|---|
| **4** | Slow progress | 20% | Unequal distribution of work | Loss of company reputation | bind tasks for easy management as well as unified opinions |

## 2. Risk Management process with clear illustrations and explanations

 *Risk Management process*

A process of risk management in projects is a rational chain of practices taken by decision agents in order to keep the implementation of the project under certain conditions. The decision-agents need to identify, analyze and evaluate the risks in all project life cycle and use their organizational structure and administrative practices in order to act on the risks in favor of the project. Project complexity and the maturity of the organizations are viewed as important factors that can affect the success of a project *(Luiz Henrique Rodrigues-da-Silva and José António Crispim, 2014).*  *Why is Risk assessment important?*

Risk assessments are important because they form an integral part of an occupational health and safety management plan. They have to:

- Create awareness of hazards and risk.
- Identify who may be at risk (e.g., employees, cleaners, visitors, contractors, the public, etc.).
- Determine whether a control program is required for a particular hazard.
- Determine if existing control measures are adequate or if more should be done.
- Prevent injuries or illnesses, especially when done at the design or planning stage.
- Prioritize hazards and control measures.
- Meet legal requirements where applicable

(Government of Canada, 2021)

 *What is the goal of risk assessment?*

The aim of the risk assessment process is to evaluate hazards, then remove that hazard or minimize the level of its risk by adding control measures, as necessary. By doing so, you have created a safer and healthier workplace(Government of Canada, 2021). 

*Steps of the Risk Management Process*

## IV. Explain the purpose of a feasibility report

### 1. Definition of feasibility report

A feasibility report is a report that evaluates a set of proposed project paths or solutions to determine if they are viable. The person who prepares a feasibility report evaluates the feasibility of different solutions and then chooses their recommendation for the best solution. They then present the feasibility report to their company and make their recommendation *(Indeed Editorial Team, 2021).*

### 2. Discuss the purpose of conducting a feasibility study

The purpose of the feasibility report is to present the project parameters and define the potential solutions to the defined problem, need, or opportunity. Having brainstormed a variety of potential solutions, the project team expands on each of these potential solutions, providing sufficient detail, including very high-level costing information, to permit the project leader to recommend to the approving authority all of the viable potential solutions that should be further analyzed in the next phase (Business Case). Project constraints and limitations of expenditure are among the various factors that will determine viability *(Government of Canada, 2011).*

### 3. Discuss how the three feasibility criteria

- **Technical feasibility**

  The engineering feasibility of the project is viewed in the technical feasibility. Certain important engineering aspects are covered which are necessary for the designing of the project like civil, structural, and other relevant aspects. The technical capability of the projected technologies and the capabilities of the personnel to be employed in the project is considered (Umar Farooq, 2020). In certain examples especially when projects are in third world countries, technology transfer between cultures and geographical

areas should be analyzed. By doing so productivity gain (or loss) and other implications are understood due to the differences in fuel availability, geography, topography, infrastructure support, and other problems (Umar Farooq, 2020).

- **Economic feasibility**

  In the Economic Feasibility study cost and benefit of the project are analyzed. This means under this feasibility study a detailed analysis is carried out of what will be the cost of the project for development which includes all required costs for final development like hardware and software resources required, design and development cost and operational cost, and so on. After that, it is analyzed whether the project will be beneficial in terms of finance for the organization or not *(GeekforGeek,2020).*

  - **ROI in economic feasibility:** As the name reflects, the feasibility study use return on investment analysis tool to measure the profitability of investing money and resources into a business idea. So, ROI calculates the profitability of the investment in terms of return or gains from an investment. Moreover, the gain of investment over full investment to calculate the ROI of a business or project plan. Therefore, it's an important factor of consideration for investors to do investment in a business or project plan. The one with higher ROI will provide more profit as compared to others having less ROI *(Jawad Ahmad, 2019).*
  - **NPV:** stand for Net Present Value, is the difference between the present value of cash inflows and the present value of cash outflows over a period. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project. NPV is the result of calculations used to find today's value of a future stream of payments *(JASON FERNANDO, 2021).*
  - **Cash flow:** Cash flow refers to the net balance of cash moving into and out of a business at a specific point in time**.** Cash flow can be positive or negative. Positive cash flow indicates that a company has more money moving into it than out of it. Negative cash flow indicates that a company has more money moving out of it than into it.
  - **Break-Even Point:** The break-even point (BEP) is the point at which cost or expenses and revenue are equal: there is no net loss or gain. Point in time (or in several units sold) when estimated income exactly equals the assessed

aggregate expenses; where loss ends, and profit begins to accumulate. This is the time when a business, loss ends and profit begins to accumulate, or a venture turns out to be financially viable *(Pooja Mathur University of Rajasthan)*

- **Organizational feasibility**

  Organizational feasibility aims to assess the prowess of management and sufficiency of resources to bring a product or idea to market. The company should evaluate the ability of its management team on areas of interest and execution. Typical measures of management prowess include assessing the founders' passion for the business idea along with industry expertise, educational background, and professional experience. Founders should be honest in their self-assessment of ranking these areas.

4. Discuss whether the project is feasible or not

- **Technical feasibility**

  Currently, technology for website development is very developed with many modern technologies such as C#, Java, PHP, JavaScript... Developing a website with useful functions to meet the needs of Tune Source company is made easy and made possible by the above technologies. Therefore, the technological factors are completely feasible.

- **Economic feasibility**

  Annual sales last year were $40 million with annual growth of about 3%–5% per year. Therefore, this is a company with a very stable and growing customer. The economic feasibility of this project is completely feasible

- **Organizational feasibility**

  With the selection of jobs and assigning to each department a commander with the necessary functions, duties, powers, and responsibilities to accomplish the outlined goals of the organization. This feasibility is feasible.

## V. Describe how technical solutions can be compared

| Evaluation Criteria | Relative Importance | Alternative 1: using C# | Score (1-5) * | Weigh ted Score | Alternative 2: using JavaScript | Score (1-5) * | Weigh ted Score | Alternative 2: using PHP | Score (1-5) * | Weighted Score |
|---|---|---|---|---|---|---|---|---|---|---|
| **Technical Issues:** | | | | | | | | | | |
| **Front-end and backend support** | 10 | Only backend | 5 | 50 | Both frontend and 7 70 Only backend 5 50 back - end. | 7 | 70 | Only backend | 5 | 50 |
| **Capable of running on Windows Server** | 10 | Current system uses Window 60server | 5 | 50 | Current system fully supports | 5 | 50 | Current system fully supports J s | 5 | 50 |
| **Multimedia libraries** | 10 | Microsoft support | 6 | 60 | Easy to find | 5 | 50 | Easy to find open- | 6 | 60 |
| | | | | | source code in library | | | source library | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Economic Issues:** | | | | | | | | | | |
| **The license is less than $5 2000** | 10 | Visual studio + .NET Framework cost $4500 | 4 | 40 | Free for commercial use | 5 | 50 | Free for commercial use | 50 | 50 |
| **A server costs less than S1 1,000 per year.** | 10 | Reuse current server | 5 | 50 | Reuse server | 3 | 30 | Reuse server | 5 | 50 |
| **Organizational Issues** | | | | | | | | | | |
| **Capable of hiring a senior developer** | **10** | Very high salary | 3 | 30 | Not easy to find | 5 | 150 | Easy to find | 5 | 50 |
| **Capable of hiring testers for less than $1 1,000 per month** | **40** | Easy to find | 5 | 150 | Easy to find | | | Easy to find | 5 | 150 |
| **Total** | **100** | | | 430 | | | 450 | | | 460 |

**Score: 1-poor fit; 5-perfect fit.**

## VI. References

1. Altvater, Alexandra. “What Is SDLC? Understand the Software Development Life Cycle.” Stackify, 8 Apr. 2020, stackify.com/what-issdlc/.
2. Guru99. “What Is Spiral Model? When to Use? Advantages & Disadvantages.” Guru99.com, 17 May 2019, www.guru99.com/what-isspiral-model-when-to-use-advantages-disadvantages.html.
3. https://www.finoit.com. “Finoit Technologies.” Finoit Technologies, 8 July 2019, www.finoit.com/blog/sdlc-models-methodologies/.
4. Indeed Editorial Team. “What Is a Feasibility Report? (Definition and Template).” Indeed Career Guide, 2021, www.indeed.com/career-advice/career-development/feasibility-report.
5. Jawad Ahmad. “Feasibility Study Analysis - the Professional’s Guide.” Templates Free Download, 6 Apr. 2020, templatesfreedownload.com/business-feasibility-study-analysis/. Accessed 5 Apr. 2022.
6. Lewis, Sarah. “What Is the Prototyping Model?” SearchCIO, 2019, www.techtarget.com/searchcio/definition/PrototypingModel#:~:text=The%20prototyping%20model%20is%20a.
7. Martin, Matthew. “What Is Waterfall Model in SDLC? Advantages & Disadvantages.” Guru99.com, 4 Apr. 2019, www.guru99.com/what-is-sdlc-or-waterfall-model.html.
8. “Types of Feasibility Study in Software Project Development.” GeeksforGeeks, 26 June 2020, www.geeksforgeeks.org/types-offeasibility-study-in-software-project-development/#:~:text=Economic%20Feasibility%20%E2%80%93&text=Means%20under%20this%20feasibility%20study. Accessed 5 Apr. 2022.