

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Object

Genshin Impact is an adventure, action, fantasy game that revolves around player (or the in-game nickname is Traveler) that is searching for his/her siblings and during her search, she met various friends, battles, and in-depth history of that world the traveler's traveling in. Some of the friends that the traveler meets along the way, are playable characters, which will be the research object in this project. Players can have these characters by playing or "pull" it at that character banner gacha. In the version 2.4 there are 46 characters and to get all of that, will be easy for "whale" player (a term for player that spends a lot of money), but will be a very hard decision for "F2P" (Free to Play a term for player that play completely free) and little spender (a term for player that spends just a little money). That is why this project is intended to help F2P player to decide which characters they should pull or skip.

3.2 Research Method

There are some methodology that can be used for the making of decision support system, and these are some comparison for method that will be use in this project [5] [27] [28].

Table 3.1 Research Methodology Comparison

Comparison	Advantages	Disadvantage
SAW	SAW can be more accurate since its weight is predetermine and using preferences weight	SAW relies heavily on the determination of its weight
WP	WP is using multiplications to attribute rating, making WP have can raise its weight with its ranking	WP is using multiplications to attribute rating, therefore WP does not determine its weight first
Topsis	Topsis can set its criteria value on each alternative and can find the optimal solution	Topsis uses distance principle, therefore the determination of its alternative relies on the ideal distance solution

Based on the comparison table 3.1 above, this project will be using Simple Additive Weighting (SAW). This project will be making a decision support system for game Genshin Impact, therefore this project will need methodology that can choose its criteria weight since the beginning. Weighted products (WP) method is using multiplications to attribute rating, so the rating must be raised first with the weight of the attribute in question. Topsis method is a distance principle, so the criteria weight that is chosen must have the closest distance from the ideal solution. But for SAW, the criteria weight is determined from the get go, and even though the result will relies heavily on that predetermined criteria weight, it can allows this project to freely determine which criteria and based its weight from observation and interviews.

3.2.1 Flowchart for SAW

The methodology for making the decision support system that will be used in this project is SAW (Simple Additive Weighting) method and below is the flowchart for SAW, that is made based on [14] [24];



Image 3.1 Flowchart of SAW Method

1. Determine Criteria and Weight

The first step for calculating decision support system using SAW method is by determining the criteria and weight for each criteria. The determination will be done by conducting an interview with a Genshin Impact player.

2. Assess Benefit & Cost

Each criteria have their own ways of looking, meaning that each criteria's value can be categorize as benefit or cost. In this project though, all of the criteria will be benefit.

3. Create Decision Matrix

After determining the criteria, weight, and type (benefit/cost) then the next step will be to create a decision matrix. To

prepare for the next step (normalization), this step will make tables consist of characters (as alternative), criteria, and weight.

4. Normalization

This step then, will normalize the decision matrix based on the type attributes (max for benefit and min for cost) to obtain normalized matrix R.

5. Ranking

The last step will be obtained by multiplying the respective weight with each criteria normalized matrix and adding each alternative's result in order to achieve the best value as the best alternative to rank them.

3.3 Research Variable

There are two different types of research variable, independent and dependent. Independent variables for this project are Genshin Impact playable characters stats, and criteria weight while dependant variable is the deployed website that has been implemented by the decision support system.

3.4 System Development Method

There are a few methodology that can be used for system design and development, but not all of them compatible with the nature, background, and need for this project [6] [29].

Table 3.2 System Development Comparison

Comparison	Prototype	Agile	Waterfall
User Requirement	Prototype requires feedbacks and suggestion from the user	Agile requires an active user to continue in each of its stage	Waterfall works well for project with a clear and easy to understand requirement, since the very start
Error Detection	Prototype can detect of an error or possible system failure, because it will be detected early on the process	Agile can detect an error as soon as the user's detects it	Waterfall error might not be able to be detected early on, and possibly adding up after each stage
Development Duration	Prototype's development won't be delayed too much, since it already	Agile's development will depends entirely from its user's feedback	Waterfall's development will be quite slow since its

Comparison	Prototype	Agile	Waterfall
	have a prototype	and changes, possibly delaying the development	thoroughly planned, but won't be delayed because of the user's changes

While it is true that the Waterfall model allows developers to thoroughly develop the systems as detail as possible, since the user only involved on the last stage, and Agile method requires an active feedback from its user to continue in each stage, but the Prototype method's development only requires user or fans' involvement at prototype stage. By allowing the fans to evaluate the prototype, to give the fans chances to see if the prototype has fulfilled its needs. This does not necessary applied to Agile method, since the Agile method will require user's feedback and possibly changes in each of its stage, therefore possibly delaying the project until pass the deadline. That is why Prototype will be used for the development of this web-based project, because this method is believed to be able to mi-ize the delay when waiting for user's approval using a semi-made website or prototype.

3.4.1 Flowchart for Prototype

Methodology chosen for developing the system that will be used in this project is Prototype method and below is the flowchart for Prototype methodology [6];

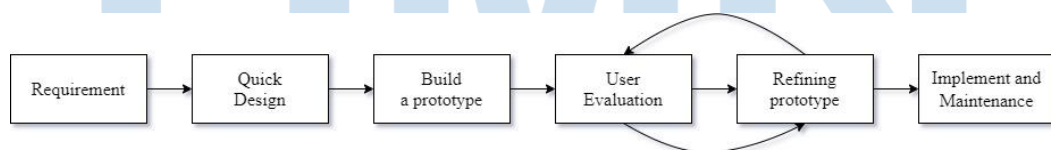


Image 3.1 Flowchart of Prototype Method

1. Requirement

The first step is to gather information about the requirement of the decision support system. An interview via zoom will be conducted to ask a long time Genshin Impact player, for

determining the criteria weight, and so the answer can be applied in designing and developing the prototype.

2. Quick Design

Accordance with the requirement given, the next step is to make a quick overall design of the website. In hope that the users will have some kind of an idea of how this system will be, and if there are some changes in the design, then a revision can be made fast.

3. Build a prototype

This third step is to develop the very first prototype of this project, a mockup that can will be shown to the user how will the system look like or be, in the end, and it will be made based from the requirement and the quick design.

4. User Evaluation

In this step user will be able to evaluate how the website works, and by evaluating the prototype in this step, some fans or users will be chosen and asked on the performance of the system, a second interview with the same chosen Genshin Impact player as the first interview will be conducted, and if revision is needed then the prototype will need to be refine.

5. Refining prototype

If by any chances the prototype is rejected or required to make some changes, then the website will be refined in accordance with the fans' evaluation, and until it is approved, this step might go in loop with step four. If there is no change, then this step can be skip, or can be used to make small adjustment for the website or the system.

6. Implement and Maintain

The purpose of this project is to help fans on choosing which characters they should pull, to allow easy access for them, this system will be implemented as a web-based and be maintain.

3.5 Data Collection Technique

Due to the nature of this research, that is making a project out from a game, the only way to get the data is by doing observation at game Genshin Impact. The character have basic stats that can be made high depending on how each player build it, therefore the stats of playable characters that will be used are from trial characters, in hope that it can serve as base for F2P fans to choose. Beside observation, the setting of weight on each five combat roles (DPS, Heal Support, Shield Support, Buff Support, and Elemental Support), will need to have other player's opinion, and so it will be decided through interview. That is why this project used Qualitative as its data collection method.

3.6 Sampling Technique

This project main goal is to help F2P fans to decide which characters they should pull based on five combat roles (DPS, Heal Support, Shield Support, Buff Support, and Elemental Support) by design and develop a web-based decision support system that can rank each combat role, using data gathered from observation and interview. So the sampling technique this research used is purposive sampling. Since this research have a clear goal or purpose, making it to be in need of data that corresponding with its goal.

3.7 Tools

3.7.1 Visual Studio Code

This project uses Visual Studio Code as its main tools for script writing and editing PHP and HTML languages while developing the website and for writing the script for the decision support system. Visual Studio Code has a lot of extensions, and even though because those extensions, it loss at speed compared with Notepad++, Visual Studio Code able to cover it with benefits and features that come with that extensions.

For instance, Visual Studio Code capable of handling errors faster, debugging programs, have features like auto-complete and auto-correct that can predict accurately the exact words/codes that will be use. Below is the table of tools comparison from Visual Studio Code, Notepad++, and Sublime [20] [30] [31] [32].

Table 3.3 Tools Comparison

Criteria	Visual Studio Code	Notepad++	Sublime
Performance	Visual Studio Code's auto-complete is faster and more sharp at predicting words/code that will be use, basing itself from the extensions installed	Notepad++ does have auto-complete, but its required to choose from lists of predicted words/codes	Sublime have auto-completion that are based from existing code in a program
Handling Error	Visual Studio Code has built-in debugging support and can help to fix programming error	Notepad++ only shows the error from the suspected lines	Sublime does not have the support to do debugging
Cost	Visual Studio Code is open source and free to use.	Notepad++ is open source and free to use	Sublime can be downloaded for free, but comes with purchase license

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