A Proposal for Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods for Decision Making Support

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Abstract*: Technology's pervasive influence shapes contemporary communication, learning, and societal interactions. While its advancements bring benefits, they also pose challenges. This study addresses the complexities of technology in social welfare delivery, focusing on the Municipal Social Welfare and Development Office (MSWDO) of Placer, Surigao del Norte, Philippines. The current system of MSWDO faces operational hurdles particularly in managing social protection programs efficiently, leading to delays and frustrations among beneficiaries. Using a mixed-method approach, the study reviews the current provision through an online survey completed by the respondents selected by purposive sampling method. The findings show that respondents have a high level of agreement for the provision of an enhanced integrated information system. The proposed system, with the utilization of data mining techniques such as clustering, classification, and association rule method, can cater to Cash Assistance Budget Monitoring and Sectoral Records Digitalization. The recommendations prioritize Focal Persons, enhanced communication tactics, regular evaluations, and program designs that are adapted to meet local needs. The significance of digital solutions in optimizing social welfare delivery. By implementing recommended features, the MSWDO can enhance program efficiency, responsiveness, and impact, thereby better serving the community and maximizing resident welfare.*

Keywords: Cash Assistance, Budget Monitoring, Digital Solutions, data mining

I. INTRODUCTION

Technological advancement affects the way people communicate, learn, and think. It plays an important role in society today and determines how people interact with each other on a daily basis. The impact is very eminent in the world, both positive and negative effects, particularly with the use of internet and smart phones. The advanced technologies are now paving the way to modernize traditional and manual transactions such as in the government sector.

The Local Government Unit of Placer is located at Barangay Central, Placer Surigao del Norte, Philippines has employed 50 permanent employees and 250 workers in a job order basis. The municipality is composed of 14 local government offices and one of which is the Municipal Social Welfare Development Office. The MSWD Office has many programs for Solo Parent, Persons with Disabilities, Senior Citizens, Violence Against Women and Children (VAWC) Cases, and Assistance to Individuals in Crisis Situation (AICS). Most of the programs availed by many people of Placer is the AICS with an estimated of 700 to 1,000 transactions yearly. Under the AICS program, there is Senior Citizen Assistance, Food Assistance, Educational Assistance, Medicine Assistance and others. Before the local residents can avail the assistance, they are required to submit pertinent documents and requirements which are subject for validation before being forwarded to the Budget Office. Oftentimes, the forwarded documents are misplaced and overridden by piles of papers causing delay of transaction specifically the releasing of the cash assistance to local residents. Many of them sanctioned and report to the concerned management. With the increasing of transactions under this program and due to the heavy workload of the offices, it necessitates immediate actions such as the proposed information system will potentially help the MSWDO, Budget, Accounting, Treasury and the clients of the Municipality of Placer. Upon availing of the program, it will be digitalized and easily monitored by the MSWDO staff

and the client. The office can monitor the remaining budget and prevented from being exhausted until the last quarter of the year. On the other hand, the local residents will be notified through short message service if the cheque is available for claiming. Furthermore, MSWDO also requested to develop the proposed system that stores records of all senior citizens, solo parent, VAWC cases, PWD records and AICS records. Likewise, as part of the compliance in the Seal of Good Local Governance (SGLG), many offices such as Rural Health Units, MP, barangays, Department of Social Welfare and Development regional Offices, Department of Interior and Local Government and non-government organizations will also be needing documents from MSWDO.

II. OBJECTIVES OF THE STUDY

The study aims to achieve the following objectives:
- To evaluate the current needs of Municipal Social Welfare Development Office of Placer, Surigao del Norte.
- To propose an Integrated Information System for Municipal Social Welfare Development Office using Data Mining Methods.
- To formulate recommendations for the improvement of the provision of social protection programs.

III. RELATED LITERATURE

3.1 The Importance of Social Welfare Development Programs

Social welfare development programs encompass a diverse range of government and non-profit initiatives designed to address the social and economic challenges faced by individuals, families, and communities. These programs serve a primary function in promoting societal well-being and stability. A critical objective of social welfare programs is to alleviate poverty and enhance economic security for disadvantaged groups. Furthermore, there are various ways in which social welfare development programs contribute to a stronger and more inclusive society.

The effectiveness of programs that provide financial assistance, such as temporary aid or conditional cash transfers can help families meet basic needs and invest in their future, potentially breaking the cycle of poverty [3]. Moreover, social welfare programs can promote economic security by offering employment training and job placement services. This empowers individuals to develop skills and gain access to better-paying jobs, leading to increased financial stability [1]. Additionally, social safety net programs, such as unemployment insurance, can provide temporary financial support during periods of job loss, mitigating economic hardship. Social welfare programs play a crucial role in fostering social inclusion by guaranteeing equal opportunities and participation for all citizens in various spheres of life. This includes access to education, healthcare, and political processes.

According to the authors, Prodhan, F. C., & Faruque, O, these programs address issues of discrimination and marginalization faced by specific groups, such as people with disabilities or ethnic minorities [2]. Social welfare programs also act as a safety net for vulnerable populations, offering protection from exploitation, neglect, and abuse. Programs that provide child protection services, support for the elderly, and assistance for victims of domestic violence fall under this category [1]. The significance of social welfare development programs is particularly amplified in developing nations. These programs can address critical issues like widespread poverty, malnutrition, and limited access to healthcare [4]. By providing necessities, promoting education, and fostering economic development, social welfare programs contribute to a more stable and prosperous society.

Social welfare development programs are fundamental to building a society that prioritizes the well-being of all its citizens. They contribute significantly to poverty reduction, economic security, social inclusion, and the protection of vulnerable populations. By continuously evaluating and improving these programs, we can ensure they continue to play a vital role in fostering a more just and equitable world, particularly in developing nations.

3.2 The Issues and Challenges of Social Welfare Development Programs

The prevalent issues like complex eligibility criteria, cumbersome application processes, and inadequate infrastructure can hinder program accessibility [7]. Additionally, ineffective monitoring and evaluation mechanisms can lead to unintended consequences [6]. Targeting the right beneficiaries is another challenge. There are also difficulties in accurately identifying those most in need. Leakage, where benefits reach unintended recipients, and exclusion errors, where eligible individuals are left out, can reduce program efficiency and waste resources [4]. Social welfare programs

require significant financial resources, which can be a major constraint, particularly in developing nations. According to Singh. A. [8], welfare program encompasses how economic downturns or competing government priorities can lead to budget cuts, hindering program effectiveness. Additionally, ensuring the long-term sustainability of social welfare programs requires careful financial planning and resource allocation.

Social welfare programs can be also susceptible to political influence. The changes in government or political agendas can lead to program modifications or even cancellations, creating uncertainty and instability for beneficiaries [6]. Social welfare development programs play a vital role in society, but they face numerous challenges. Issues like program design, targeting, resource constraints, and political influence can impede their effectiveness. Continued research and evaluation are crucial to develop well-designed, well-targeted programs that utilize resources efficiently and remain resilient to political fluctuations. By addressing these challenges, we can ensure that social welfare programs continue to deliver on their promise of a more just and equitable society.

3.3 The Integration of Information System

In today's data-driven world, organizations rely on a multitude of information systems to manage various functions. However, isolated systems can hinder information flow and create data silos. Information system (IS) integration emerges as a solution, facilitating communication and data exchange between these systems. Several studies highlight the significant benefits of IS integration. Lalonde, S., & Malhotra, Y., [9] emphasizes improved data accuracy and consistency as a key advantage. By eliminating data silos and ensuring everyone has access to the same information, integration minimizes errors and inconsistencies. Additionally, Rockart, J. F. [10] underscores how integration enhances efficiency by automating data exchange between systems, streamlining workflows, and saving time and effort. Furthermore, integrated systems provide a holistic view of organizational data, fostering better decision-making. Oliveira, D., & Roth, A. D. [11] highlight this aspect, emphasizing how integration empowers organizations to make informed decisions across departments. Ultimately, these benefits can lead to increased productivity as employees can focus on higher-value activities with simplified tasks and reduced manual data entry

Despite its advantages, IS integration is not without challenges. Technical complexity is a major hurdle, as highlighted by Madni, A. M., & Sievers, M. [12] that integrating disparate systems can be difficult due to varying data formats, communication protocols, and security considerations. Additionally, the cost of integration can be significant, encompassing investment in hardware, software, and skilled personnel for implementation and maintenance [13]. Furthermore, establishing clear data ownership, access control, and quality standards is crucial for successful integration. Data governance practices are essential to address these concerns [14]. Finally, implementing system integration can disrupt existing workflows, requiring effective change management strategies to ensure user adoption and minimize resistance [15].

3.4 The Application of Data Mining Methods for Decision Making

In today's data-driven world, organizations generate massive amounts of data from various sources. Data mining techniques emerge as powerful tools to uncover hidden patterns and relationships within this data. By leveraging these insights, organizations can make more informed and data-driven decisions across various domains. This review examines the existing literature to shed light on the application of data mining methods for effective decision making.

3.4.1 Data Mining Techniques for Decision Making

- **Classification:** This technique categorizes data points into predefined classes. It is valuable for tasks like customer segmentation, credit risk assessment, and fraud detection [16].
- **Clustering:** This technique groups data points with similar characteristics, allowing for customer segmentation, market research, and anomaly detection [17].
- **Association Rule Learning:** This technique identifies relationships between variables, useful for targeted marketing campaigns, product recommendation systems, and market basket analysis [18].

IV. METHODOLOGY

4.1 Research Approach

Mixed-method approach was used for this study, incorporating both qualitative and quantitative techniques. This method enables a thorough investigation to be conducted in order to evaluate the existing system of Social Protection Program at the Municipal Social Welfare and Development Office of the Local Government Unit of Placer. The study also endeavors to offer an in-depth comprehension of the obstacles facing the current delivery of social protection programs within the MSWDO. The quantitative component provides statistical data to support results while the qualitative component offers insights into the current system and the focal personnel's perceptions for the sectors they are handling. The data analysis techniques facilitate a comprehensive interpretation of the results, paving the way for actionable solutions aimed at enhancing the office's current provision strategies.

4.2 Research Design

This research utilizes the explanatory sequential design, incorporating the gathering and evaluating quantitative data and qualitative data. Moreover, this helps the researcher a better understanding the difficulties that the Local Government Unit of Placer is currently facing in providing social protection programs for vulnerable sectors.

4.3 Population, Sample, and Sampling

The population of this study consists of only six (6) focal person of each Vulnerable Sectors of Municipal Social Welfare and Development office who are handling each respective sector. These respondents were selected using purposive sampling technique.

4.4 Research Instrument

The questionnaire utilized in this study served as a structured tool for gathering data from respondents regarding their perspectives on the current provision of services by the Municipal Social Welfare and Development Office. It consists of a series of closed-ended and Likert scale questions aimed at quantifying respondents' views on various aspects of the office. These questions are designed to assess the challenges faced by stakeholders, their preferences for improvements, and their perceptions of the proposed web-based databank system. Additionally, the questionnaire includes open-ended questions to allow respondents to provide detailed insights and suggestions. Six respondents, who are the focal personnel managing services at the Municipal Social Welfare and Development Office received and answered the questionnaire, accordingly.

4.4.1 Survey Questionnaire

A survey questionnaire was created to collect the numerical data regarding the current provision of the Municipal Social and Welfare and Development office, as well as the obstacles, assessment, and suggestions for the suggested web-based integrated system. In order to obtain a thorough grasp of respondents' opinions, the questionnaire contained both closed-ended and open-ended questions. Six (6) respondents, who are Focal personnelmanaging services at the Municipal Social Welfare and Development Office, were selected and were given the opportunity to answer the questionnaire.

4.4.2 Interviews

To collect qualitative data, the respondents were being interviewed. These interviews discovered in deeper sense the issues raised by focal personnel regarding the current provision Municipal Social Welfare and Development Office's Social Protection program for Vulnerable Sectors, as well as the possible advantages and benefits of an Integrated Web-Based Application System and the obstacles preventing its implementation. The Municipal Mayor and focal personnel have given their agreement for these interviews to be conducted in-person. In order to provide a more comprehensive understanding of the topics being studied, the qualitative data gathered from the interviews will supplement the quantitative data from the surveys.

4.5 Data Collection

To directly capture the viewpoints and experiences of focal personnel at the Municipal Social Welfare and Development Office regarding the current delivery of social programs for vulnerable sectors in the Municipality of Placer. This study primarily use the collection of primary data through surveys.

4.6 Data Analysis

In this section, the researchers described the methods used to analyze both the quantitative and qualitative data collected in the study. The analysis aims to provide a comprehensive understanding of the challenges in healthcare services at Surigao del Norte State University (SNSU) and the potential benefits of implementing a web-based patient information management system.

The quantitative data in this study project were thoroughly analyzed using statistical techniques such as frequency distribution, weighted mean, and standard deviation. Descriptive statistics was utilized to provide a concise summary of the sample's demographic makeup and the survey results. Table 1.0 presents the interpretation of range of the weighted mean which helps to determine the level of agreement among the different users involved in the study base of the proposed system.

Table 1: The Interpretation of Range of the Weighted Mean

Range of the Weighted Mean	Interpretation
4.51 – 5.00	Strongly Agree (for the questions asked)
3.51 – 4.50	Agree (for the questions asked)
2.51 – 3.50	Moderately Agree (for the questions asked)
1.51 – 2.50	Disagree (for the questions asked)
1.50 and below	Strongly Disagree (for the questions asked)

The gathered qualitative data will be subjected to theme analysis. In particular, the data collected through interviewing will be carefully classified and examined, with an emphasis on the difficulties that arise in the current Municipal Social and Welfare Development Office framework for Social Protection Programs for Vulnerable Sectors and the proposed Integrated Web-Based Application.

V. RESULTS AND DISCUSSION

This chapter presents the findings of the research and discusses the implications. It further explains the data the collected and what it reveals to address the research objectives. The interpretation of results was contextualized within the study's objectives and providing actionable insights to improve document management practices and enhance the accreditation process at the institution.

5.1 Demographic Profile of the Respondents

Table 2.0 Profile of the Respondents in terms of Gender

Gender	Frequency	Percentage
Male	1	16.7
Female	5	83.3
TOTAL:	**6**	**100**

Table 2.0 presents the profile of the respondents out of 6 respondents 1(16.7%) is male and 5(83.3%) are female handing the different sectors.

Table 3.0 Profile of the Respondents in terms of Classification

CLASSIFICATION	FREQUENCY	PERCENTAGE %
Senior Citizen Focal	1	16.7
Solo Parent Focal	1	16.7
Person with Disabilities Focal	1	16.7
Violence Against Children Focal	1	16.7

Crisis Intervention Focal	1	16.7
Information Management Technician	1	16.7
TOTAL:	**6**	**100**

Table 3.0 displays the classification of respondents and each sector is handled by one person. Information Management System Technician classification is the one will handle the system in the future.

Table 4.0 Profile of the Respondents in terms of Age

Age-Group	FREQUENCY	PERCENTAGE %
Below 25 Years old	1	16.7
26-36 Years old	2	33.3
37-47 Years old	2	33.3
47+ Years old	1	16.7
TOTAL:	6	100

Table 4.0 presents the age group of frequency distribution. It shows that two respondents are between 26 years old and 36 years old and another group of two respondents are between the age of 37 years old to 47 years old.

5.2 Evaluation on the Current Needs of the Municipal Social Welfare Development Office of Placer, Surigao del Norte.

Table 5.0 presents the weighted mean results of the current needs of the staff of Municipal Social Welfare Development Office of Placer, Surigao del Norte. It shows that majority of the respondents have a high level agreement in terms of Cash Assistance Budget Monitoring and Sectoral Records Digitalization, both with Category Values of 4.78. This is followed by the Reports Generation (WM = 4.75) and VAWC Cases Intervention (WM = 4.67), respectively.

Table 5.0 Weighted Mean Result for each Provision

Provisions	Statements	WM	Category Value	Description
VAWC Cases Intervention	I would like to monitor the cases of each baranggay of entire municipality for reference in making interventions.	4.83	4.67	Strongly Agree
	I would like to automate the reporting of VAWC Cases by brgy, yearly and each type of cases.	4.5		
Cash Assistance Budget Monitoring	I would like to monitor the budget that is being disbursed for a certain period or based on my data needs.	4.83	4.78	Strongly Agree
	I would like that the system will categorize the client type such as Solo Parent, Person with Disabilities	4.83		
	I would like to monitor the budget that is being disbursed by program yearly.	4.67		
Sectoral Records Digitalization	I would like to Digitalize the sector that I am handling.	4.83	4.78	Strongly Agree
	I would like to automate the generation of ID's.	4.83		
	I would like to have a graph representation of the sector that I am handling.	4.67		
Reports Generation	I would like to have an automated reports generator based on my data needs, such as Sex Aggregated, list by sector and figures reports for each sector.	4.83	4.75	Strongly Agree

I would like to have graphs representation for sector.	4.67	
Average Weighted Mean	**4.75**	**Strongly Agree**

Table 7.0 Respondents Attitude toward the current System

Which of the following best characterizes your attitude toward the current system?	FREQUENCY	PERCENTAGE %
I find the current system so hassle-free.	1	16.7
I find either very hassle or very time consuming toward reports generation by sector.	2	33.3
I find current system is very frustrating and giving me more workload.	3	50
TOTAL:	**6**	**100**

As can be seen in Table 7.0, the results of the respondents' attitude the current system indicate that 3 out of 6 respondents find the current system very frustrating because of their workload (50%) and the generation of the reports by sector is hassle and time consuming (33.33%). This implies that there is a need for an automated information to keep their works manageable and achievable.

Table 8.0 Respondents' Overall Rating of the Current System

Overall, how would you rate the existing system of the office?	FREQUENCY	PERCENTAGE %
highly effective	0	0
moderately effective	3	50
slightly effective	1	16.7
highly ineffective	2	33.3
moderately ineffective	0	0
slightly ineffective	0	0
TOTAL	**6**	**100**

Table 8 shows the rating of the respondent to the current system. Based on the data above 3(50%) respondent responded that it is **moderately effective**, Only one respondent (16.7%) assessed that it is **slightly effective** and two respondents (33.3%) rated the current system with **highly ineffective**.

5.3 The Proposed Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods using Data Mining Methods

Table 9.0 presents the result of the responses of the respondents towards the enumerated features and functionalities of the proposed system. Based on the data shown in the table, all features that are mentioned in the survey are considered very important by respondents with their collective response. This implies that the respondents want that certain feature mentioned will be included in the proposed system.

Table 9.0 The Features and Functionalities of the Proposed System

The Features and Functionalities of the Proposed System	Frequency	Percentage	Rank
User-friendly and easy to navigate.	6	11.11	1
Easy to understand and not complicated.	6	11.11	2
display reports by sector in tabular and graphs forms.	6	11.11	3
Provide relevant information to facilitate decision making.	6	11.11	4
Provide the Crisis Intervention budget monitoring for each program the disbursed and remaining budget that is allocated for each program.	6	11.11	5
Generate IDs for sectors such Person with Disabilities, Solo-Parent and Senior Citizens	6	11.11	6
Manage records for VAWC-Cases and reports for early	6	11.11	7

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Intervention.			
Generate Sex Aggregated Reports, by Barangay and entire municipality.	6	11.11	8
secure data from any authorized person.	6	11.11	9
TOTAL:	54	100	

Table 10.0 Respondents' Overall Assessment of the Proposed System

Do you think that Proposed System will improve the operations and provisions of the Municipal Social Welfare and Development Programs?	FREQUENCY	PERCENTAGE %
YES	6	100
NO	0	0
TOTAL:	**6**	**100**

Table 10 shows that all of the respondents (100%) believed that the integration of information system will help improve the Municipal Social Welfare and Development Programs.

5.4 Conceptual Framework of the Proposed Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods
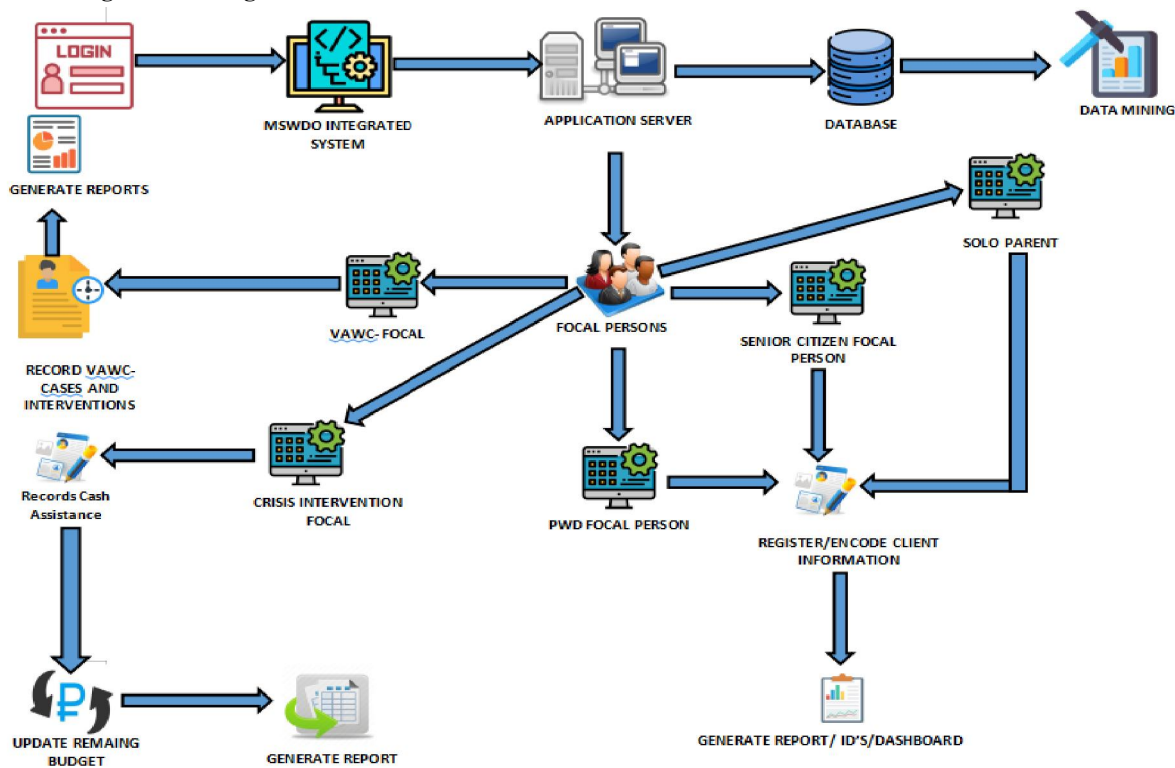

Figure 1: Conceptual Framework of the Proposed Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods

The diagram in Figure 1.0 depicts the data mining process for a government social service agency. It starts with logging into a central server, likely to access a database of client information. Extracted data is then processed to generate reports on specific demographics, such as Violence Against Women and Children (VAWC) cases, people with disabilities, and senior citizens. These reports are likely used to inform different entities, potentially including the

Department of Social Welfare and Development (MSWDO) and program managers (Focal Persons), with the ultimate goal of improving services like cash assistance.

5.5 System Development Process of the Proposed Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods

The picture in Figure 2.0 shows the system development process for a Municipal Welfare Development Office (MWDO). It uses data mining techniques to build an integrated information system. Data is acquired first, most likely from a database, and then translated into an analysis-ready format. Data mining techniques, particularly a classification method, are then used to extract knowledge and patterns from the data. This extracted data is used to create the system through a step-by-step Waterfall Methodology. Finally, the completed system, known as MSWDO's Integrated Information System, is implemented. The whole process demonstrates a data-driven approach to developing a system that has the potential to improve efficiency and decision-making inside the MSWDO.
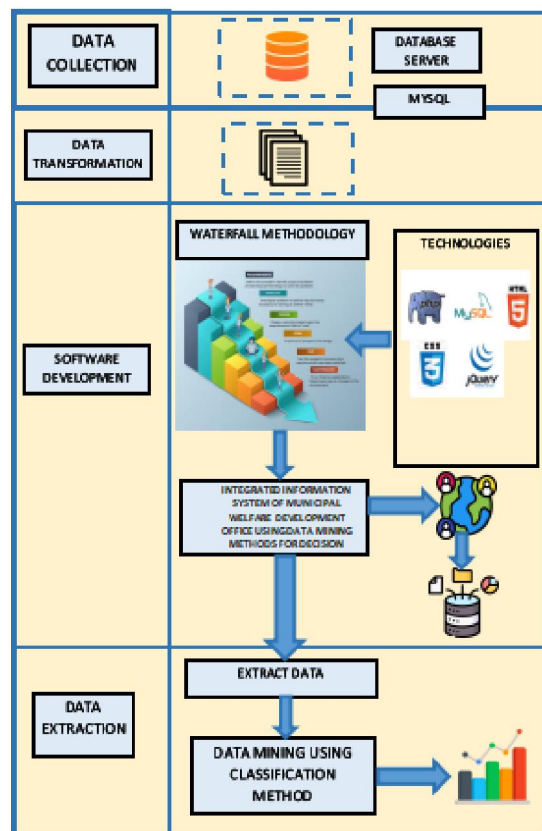

Figure 2: System Development Process of the Proposed Integrated Information System of Municipal Welfare Development Office Using Data Mining Methods

VI. CONCLUSIONS AND RECOMMENDATIONS

The evaluation of the current provision of social welfare and development programs by the Municipal Social Welfare Development Office (MSWDO) reveals both strengths and areas for improvement. It provides valuable insights into the effectiveness and efficiency of existing programs, aiding in informed decision-making and resource allocation. Additionally, unanimous agreement among respondents emphasizes the importance of digitalization, highlighting the need for the adoption of digital solutions such as the proposed Integrated Monitoring System to enhance program effectiveness. To enhance the effectiveness and impact of its programs, the Municipal Social Welfare Development Office (MSWDO) should prioritize several key recommendations. First and foremost, investing in staff training and

capacity building is essential. By providing adequate training, staff members will be better equipped to implement digital solutions effectively, enabling them to harness the full potential of new technologies. Additionally, enhancing communication and outreach efforts through various channels such as social media and community events is crucial to ensure that beneficiaries are well-informed about available programs and how to access them. Moreover, establishing regular evaluation mechanisms will enable the MSWDO to gather valuable feedback from beneficiaries and stakeholders, facilitating continuous improvement and refinement of program delivery. Lastly, tailoring programs to address local needs by conducting needs assessments and collaborating with local stakeholders will ensure that programs are responsive to specific challenges and vulnerabilities within the community. By diligently implementing these recommendations, the MSWDO can significantly enhance the efficiency, responsiveness, and impact of its programs, ultimately better meeting the diverse needs of the community and maximizing the welfare of its residents.

VI. ACKNOWLEDGEMENT

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