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* **Corresponding author**.

sheila.pagayonan@gmail.com

Empowerment and Reaffirmation of Paternal Abilities (ERPAT) Management Information System with SMS Support: Usability and Performance Assessment

Sheila Mae S Pagayonan[1]*

1 Faculty, Institute of Information and Computer Studies, Northern Iloilo Polytechnic State College (NIPSC), Iloilo, Philippines

Abstract

Objectives : Empowerment and Reaffirmation of Paternal Abilities or ERPAT are current trends in local government units (LGUs) in the Philippines. Thus, this study aimed to provide a new way of storing and retrieving data and status of membership of ERPAT members in a digital platform. **Methods:** This study employed a developmental-descriptive research design. There were 80 respondents for ERPAT members and 15 respondents for staff. Also, five experts as evaluators participated in the study. The data were gathered using the PSSUQ instrument for usability and a researcher-made survey questionnaire based on the ISO/EIC 9126 standards for performance efficiency. Rapid Application Development was used as a software development cycle model. **Findings:** Results show that the level of usability in terms of functional accurateness and suitability were all interpreted as "Very Good." The level of performance in terms of resource utilization and time behavior was also interpreted as "Very Good." The developed system was deemed to be efficient and effective to address the needs of the ERPAT Coordinator and the ERPAT members. This significant result implied that the respondents were quickly impressed by the system features of the developed system. Mobile phones in ERPAT are essential as a tool of communication nowadays. The study results showed SMS has a great potential for storing and retrieving data for ERPAT members. **Novelty:** The study improved the traditional way of storing and retrieving data and delivering communication using SMS technology to clients digitally. However, further studies are required to ensure the effectiveness of the innovations.

Keywords: ERPAT; DSWD; SMS; Erecords; RAD; Fathers

1 Introduction

Like a mother, the father also plays a significant role in nurturing children. There is a misconception about the mother as a caregiver, but the father only provides for the

family's basic needs. But the global economic slowdowns encourage mothers to work outside their home and become designated to rear their children [1]. With the rising number of house-bands, the Department of Social Welfare and Development (DSWD) has developed a program on teaching fathers how to be better parents. The Empowerment and Reaffirmation of Paternal Abilities (ERPAT) program aim to discuss with fathers their changing role as head of the family, raising and understanding the needs of children, and knowing the differences between men and women, among others. ERPAT foresees Filipino fathers to become responsible and effective in their paternal roles [2] [3].

For instance, preventing drug abuse at home, the Department of Social Welfare and Development spearheads the pilot implementation of the Family Drug Abuse Prevention Program (FDAPP) in two key cities, Davao and Bacolod. The fathers were trained to use the Empowerment and Reaffirmation of Paternal Abilities Manual to become advocates to prevent drug abuse in the family and the communities [4]. The ERPAT manual was improved and contained nine modules. The modules are Understanding Myself as a Person, Accepting Your Role as a Father, Becoming Your Wife's Best Friend, Fathers as Child Caregivers, and Promoting Family Spirituality [5]. Thus, cities around the country have become an advocate of innovations.

A study on FDS-ERPAT showed fathers given a chance to be capacitated on their paternal roles become empowered and reaffirms. Thus, the study formulated training designs for the ERPAT's implementation at the LGUs [6].

In this context, this paper sought to design and develop a web-based management information system that used the advancement of ICTs in records management and Short Message Service and shall be known as ERPAT Management Information System with SMS Support. It further aimed to determine the level of usability of the proposed features as perceived by the user groups and evaluate its performance in terms of resource utilization and time behavior of the information as viewed by its target users.

They developed the Human Resource Management System that aims to reduce the effort of the Administrator to keep the daily events such as attendance, projects, works, and appointments. It also maintains the records of every employee and their time spent in the company, which can be used for performance appraisal [7].

They developed a system to monitor the students who can be absent from classes for more than the permissible percentage [8]. Thus, this research aims to create a students' attendance monitoring system with Short Message Services (SMS) notification (SAMS). This system helps the AAD manage the absenteeism report from lecturers, and it automatically sends the information through SMS notification to the parents and the students themselves. The system has been developed using the Waterfall Model methodology consisting of five phases: analysis, design, implementation, testing, and documentation. The results from the usability testing show that SAMS can help lecturers monitor students' absenteeism more quickly and efficiently.

Furthermore, integrating the system with SMS is very useful as it can directly notify the parents regarding their children's attendance problems. And also, almost the majority of parents have cellular phones. SMS becomes a frequent part of humans' daily existence [9].

A study on secondary science and mathematics teachers utilizing SMS exposed many respondents unable to follow instructions correctly. Thus, results don't guarantee improvement on teachers. Further investigation was recommended [10]. But a short message service reminders in health care services improve delivery. Furthermore, this also provides reminders to patients on their health status and other services [11]. In addition, a study about SMS on women infected with Human papillomavirus (HPV) infections indicates effective methods to maintain women's self-efficacy [12].

A small to large companies handle multiple records every day. These organizations could use these records for historical, demographical, sociological, medical, or scientific research and serve as benchmarks to measure the organization's future activities and decisions. The Department of Social Worker and Development (DSWD) Caraga continuously generates records daily. Still, their records management system is conventional, giving them a hard time retrieving and keeping track of the record's whereabouts. With this, DSWD Caraga embarks on record digitization for its management to ensure the preservation of permanent and valuable papers, secured and accessible for future reference as required by the organization's different offices based on existing rules and regulations in records management [13]. This paper endeavors to automate records classification using the open-source Python-Tesseract (PyTesseract) library, the wrapper for Google's Tesseract-OCR Engine. The process starts by converting paper-based documents into digital format (scanning) and then recognizing and extracting the text using the PyTesseract library by integrating this library to Django and MySQL, managing records classification, indexing, and archiving. With the help of this system, record's safekeeping and retrieval bring comfort for the records officer.

The Department of Social Welfare and Development (DSWD) in the Municipality of Estancia uses a manual system to prepare for the registration and notifying upcoming events like meetings, training, and seminars. There are instances that the ERPAT members are not adequately informed as one of the program's beneficiaries. Retrieval and updating personal information are also time-consuming. Thence, the researcher was motivated to create a study related to ERPAT to enhance the system using a cellphone or tablet.

Hence, this study aimed to provide a new way of storing and retrieving data and status of membership of ERPAT members in a digital platform.

2 Materials and Method

2.1 Software Development Life Cycle Model

The study employed the Rapid Application Development (RAD) model as the software development life cycle for the software development activities. Rapid application development is a collection of methodologies that emerged in response to the weaknesses of waterfall development and its variations. RAD incorporates unique techniques and computer tools to speed up the analysis, design, and implementation phases to get some portion of the system developed quickly and into the hands of the users for evaluation and feedback [14]. It is used in rapid application development cycles and provides good software quality compared to traditional software engineering approaches. Organizations can reduce software development and maintenance costs [15]. Its application emphasizes the short planning process by focusing on the software development process consisting of development, testing, and feedback [16].

The RAD model consisted of four phases: the requirements planning phase, user design phase, rapid construction phase, and implementation phase. The researcher performs specific activities leading to the phase's deliverable at each step. Figure 1 shows the RAD model.
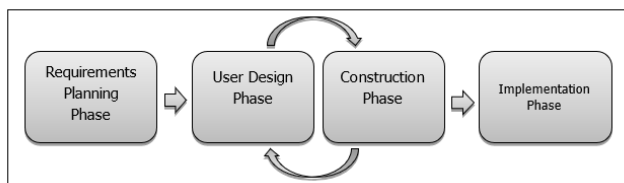

Fig 1. The Rapid Application Development Model

2.2 Application Architecture Model

The architectural application model describes the proposed layouts for the core functions. The design represented the hierarchy of vital logical components comprising the proposed system. Logical architecture recognizes the software components needed to implement a solution, showing the interrelationships among the members and distributing them among logical tiers. Tiers were concerned with the physical distribution of elements and functionality on servers, computers, networks, and remote locations.

In this study, the client-server architecture was employed. A Client-server is a system that performs both the client and server functions to promote sharing information between them. It allows many users to access the same database simultaneously, and the database will store many details [17]. It consists of four layers: the presentation layer, the application, and logic layers, also known as the business layer, the data manipulation layer, and the database layer. The presentation or graphical user interface (GUI) layer component implemented the functionalities required to allow the user to interact with the system. The server version of ERPAT Management Information System with SMS Support provides the presentation layer executed at the web browser through local hosting. SMS interface allows messages to be sent by the beneficiaries for inquiry, clarification, and updates. The application logic tiers were composed of the Main Module and SMS Manager. The SMS Manager is responsible for managing the SMS messages to and from the beneficiaries. The data manipulation layer implemented the processes involving the management of records used by the system. This was executed using the MySQL database server, which handles the database, tables, and forms. Figure 2 shows the application architecture model of the system.
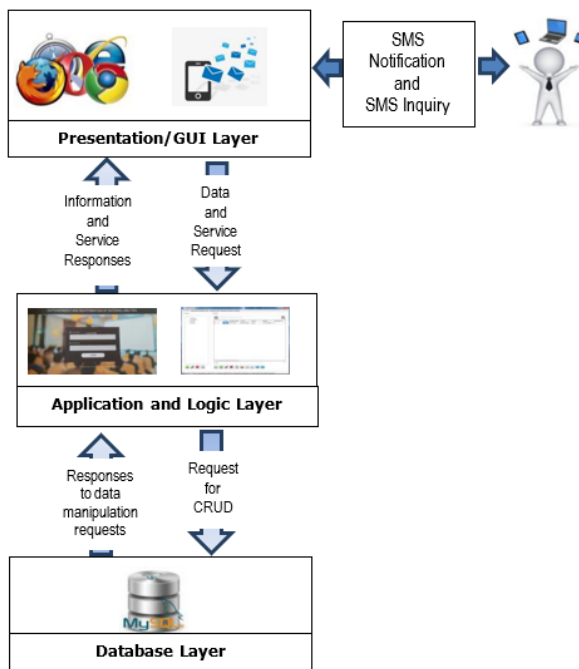
Fig 2. The Application Architectural Design of the System

2.3 Construction of the System Prototype

The construction of the system prototype was based on standard web development techniques for efficient user interface design. The system prototype consisted of multiple files were written using HTML, CSS, Javascript, and PHP scripting language. Hence, to achieve this, XAMPP was also downloaded and installed. Microsoft Visual Studio 2010 was also downloaded and installed for the SMS module. Font colors, styles, sizes, backgrounds, and even whitespaces were configured while considering the users' profiles.

2.3.1 Login Page

The Log-in page requires a username and password to access the system. The user logs in as an administrator. After entering the data, the system would check whether the inputted data were correct. If the data matches, the user can now use the system. Figure 3 shows the Log-in Page of the system.
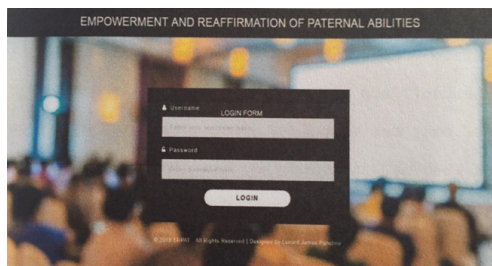

Fig 3. The ERPAT Management Information System with SMS Support Login Page.

2.3.2 Main User Interface

The main interface for the system operators in the registration of new members, processing of records of the existing members in a digital format, and SMS options for notifications of upcoming events, training, seminars, and so on. Figure 4 shows the

ERPAT Management Information System with SMS Support main interface.

Fig 4. The ERPAT Management Information System with SMS Support Main Interface.

2.3.3 Members Page
This page shows the registered members of the ERPAT. It also shows their last name, first name, middle name, age, sex, contact number, and address of all the members upon registration. Moreover, it also displays the status of all active members in the organization. Figure 5 shows the Members Page.

Fig 5. The ERPAT Management Information System with SMS SupportMembers Page.

2.3.4 Create New SMS Page
On this page, the Coordinator can create a message to be sent to the members. The Administrator can set the place, date, and time for upcoming events, training, and meetings then send it to the members. Figure 6 shows the Create New SMS Page.
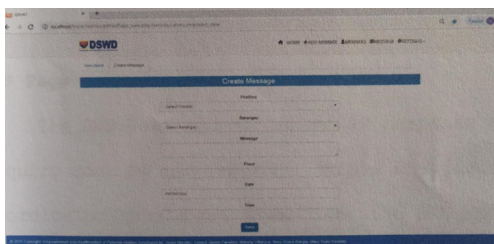

Fig 6. The ERPAT Management Information System with SMS Support CreateNew SMS Page.

2.3.5 SMS Page
The SMS Page has an automatic response to the SMS inquiry sent by the members. Before any investigation, the Coordinator should first activate the SMS module by connecting the device to its port. Once connected, the SMS module can start monitoring activities about inquiries. Therefore, the members can now inquire through a mobile phone using appropriate keywords. The system will process the query and generate an automatic SMS reply sent back to the member. Figure 7 shows the SMS Page.
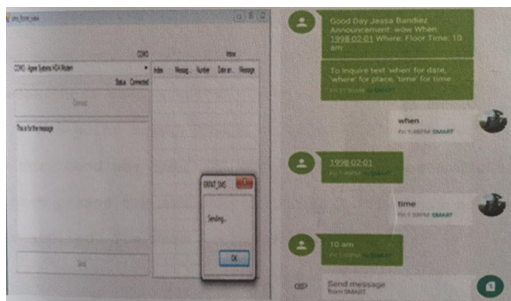
Fig 7. The ERPAT Management Information System with SMS SupportSMS Page.

2.4 Physical Network Topology

The physical network topology visualized the communication schemes of biological networks and their arrangement. It showed the configuration of cables, computers, and other devices. Web-based, it can run on one or more computers in a network and be accessed via a web browser using an assigned Internet Protocol (IP) address of the server where the program and manipulation of data were stored. Since this system was implemented through SMS technology, it would be developed to make use of the existing infrastructure of the telecommunication companies as the carrier of the SMS. A GSM-capable modem was attached to the server computer to facilitate receiving SMS inquiries and SMS notifications to the clients. The beneficiaries who were the system's clients only need GSM-capable cellphones to inquire and receive SMS notifications. Figure 8 shows the physical network topology of the system.

Fig 8. Physical Network Topology of the System

2.5 Respondents of the Study

The study respondents were handily selected among the target users of the system. There were 80respondents for ERPAT members and 15 respondents for office staff who evaluated the usability features of the system. Five (5) respondents that were considered expert evaluators evaluated the performance efficiency of the system product. They were considered experts because they are practitioners in the field of IT. Table 1 shows the actual distribution of respondents.

Table 1. Actual distribution of respondents

Respondents	No. of Respondents
a. ERPAT Members	80
b. Office Staff	15
c. Expert Evaluators	5
Total	100

2.6 Data Gathering Procedures

In gathering data, the researcher sought the DSWD to cooperate with their ERPAT Coordinator in the Municipality of Estancia to conduct a system presentation to its target clientele. The researcher also discussed how to inquire or ask for an update, upcoming activity, and status of membership using SMS messaging. The researcher also requested the respondents to answer a simple survey instrument as to their perception of the usability of the system product. For the level of usability, the Post-Study System Usability Questionnaire (PSSUQ) developed at the IBM Design Center in 1992 was employed. The PSSUQ is a 7-point Likert divided into three sub-characteristics, namely system quality (items 1 to 6), information quality (items 7 to 12), and interface quality (items 13 to 16), where one is "strongly agree" and seven is "strongly disagree"[18]. Subsequently, the researcher presented the system product to the expert evaluators and requested them to check its performance. After which, the researcher invited them to evaluate the system product of its performance efficiency. The researcher adopted specific criteria lifted from the ISO 9126 standard using a 5-point Likert Scale where one is "very poor," and five is "excellent." Mean was employed to determine whether the developed system passed the evaluation criteria. The results of the computation would then be interpreted as "very good" (M=4.21-5.00), "good" (M=3.41-4.20), "average" (M=2.61-3.40), "fair" (M=1.81-2.60), and "poor" (M=1.00-1.80) while inferential statistics was set at 0.05 level of acceptance.

3 Results and Discussion

3.1 Level of Usability of the System Product

Table 2 shows the result of the respondent's feedback on the usability of the system product in terms of functional accurateness and suitability. On the extent of designing the system product to end-users, the functional accurateness (M=4.76) and suitability (M=4.77) were described as "Very Good."

These findings suggested that with the system product, when implemented, the registration of new members, the recording and retrieving of members' data, and the SMS features to target end-users had a high level of suitability. The recording and retrieving of records in electronic format were provided fast and efficiently. As needed by the users, the system product should enhance the day-to-day transactions being provided to the clientele. This requirement was employed in a sequence of handy components. The ERPAT Coordinator also stated that his works became organized through this system, which caters to his daily activities.

Table 2. Respondents' feedbacks on the usability of the system product.

Implementation Indicators	Mean	Verbal Interpretation
a. functional accurateness	4.76	Very Good
b. suitability	4.77	Very Good

4.21-5.00 (Very Good); 3.41-4.20 (Good); 2.61-3.40 (Average); 1.81- 2.60 (Fair); 1.00-1.80 (Poor)

The study on the usability evaluation on learning management systems showed an implication of a guideline for LMS software developers to improve the system's basic features and quality of user interface in terms of usability[19]. One study analyses related concerns and consequences of the System Usability Scale (SUS), and semi-structured interviews found out several considerations and suggestions. All reflections are focused on rethinking and pursuing usability in training[20]. Thus, all participants on these innovations must attend orientation and training to enhance knowledge and skills on the technology suggested.

Also, the use of text messaging, as smartphones are accessible to all and many

3.2 Performance Evaluation of the System Product

Performance is the capability of the system product to provide total effectiveness in utilizing resources. The system's performance was evaluated in terms of resource utilization and time behavior. The results showed that the performance of the system product in terms of resource utilization (M=4.52) and time behavior (M=4.40) were all interpreted as "Very Good."

Findings revealed that the system product, upon evaluation, managed registration and recording of members' data and SMS features in the day-to-day transactions of the ERPAT Coordinator. The respondents believed that the throughput procedure and response time were outstanding. The system product was able to deliver actual results and assist in the day-to-day transactions of the office. The most critical transactions are registration of new ERPAT members, updating records and monitoring, and rendering updates to registered members primarily catered to the daily activities of the ERPAT Coordinator. Table 3 shows the

performance evaluation of the system product.

Table 3. The performance evaluation of the system product.

Implementation Indicators	Mean	Verbal Interpretation
a. resource utilization	4.52	Very Good
b. time behavior	4.40	Very Good

4.21-5.00 (Very Good); 3.41-4.20 (Good); 2.61-3.40 (Average); 1.81- 2.60 (Fair); 1.00-1.80 (Poor)

Text messaging was found to be feasible in health workers [21]. Even in medical institutions, text messaging and smartphone-based intervention are gaining popularity. Furthermore, mobile-based interventions were introduced due to the shortage of medical workers, specifically mental health disorders [22]. The interventions improve the medication process and health outcomes [23]. However, research on text messaging needs further studies for its validity, for instance, longitudinal and experimental intervention [24]. Thus, text messaging has great potential as a tool in ERPAT. This innovation has contributed significantly to implementing the DSWD program, which helped many fathers function their duties and responsibilities to their family and community.

4 Conclusions

The system was able to respond to members' inquiries in digital form; the registration and updating of a personal record of members were done quickly and conveniently. It was able to deliver a high level of usability due to its simple design and features that are accurate and suitable to the needs of the respondents. The system's performance in terms of resource utilization and time behavior of the information provided to clienteles met the expectations of the ERPAT Coordinator and the members of ERPAT in the Municipality of Estancia, Province Iloilo. The registration and recording of members' data and SMS features were made simple and convenient for the ERPAT Coordinator. The information regarding their seminars, training, and upcoming events with SMS technology and updating their records was made readily and quickly available for the person in need, which was a good practice in an organization, but long.

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