

# Integrated Student Affairs and Services Information System

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**Abstract:** Information Technology (IT) is now the backbone of today's modern world. It mostly converts conventional processes into electronic function wherein it gives more advantage, efficiency, and saves time. Normally, one of the Information Technology product is an Information System (IS). It supports a business function that uses advanced technology comprised of hardware, software, people, network, and data. As one of the information technologist practitioners, the proponents aimed to deliver an Information System to aid the target client. The conduct of the study was approved last August 2017 which marks the start of preliminary investigation and data gathering. The program was developed using web programming and the web server. Some of the modules were designed using bootstrap while others are purely conventional web programming. The system was tested and evaluated by 71 respondents with all acceptable results. The developed Information System was successfully implemented utilizing the Short Message Service (SMS) and Quick Response (QR)-code module which makes it unique to the Related Prior Arts. It was also recommended by some Information Technology Experts to make the system online, generally, allow bootstrap to every module to make it look better and merge modules that were related to a single function.

**Keywords:** Information System, Information System Modules, QRCode, SMS

## 1. Introduction

Today's modern world provides vast technologies that lead to work simplification and time-saving processes in the workplace. Currently, people cannot deny that IT plays an important role in the work environment and the success of business organizations, in particular, is dependent on IT. IT is driving a new digital economy, where advances in hardware, software, and connectivity can provide enormous benefits to businesses and individuals. In the Philippines, the survey showed that the practice of adopting

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IS has greatly increased. The survey of the Philippine Statistics Authority (PSA) showed that 97% of 2122 establishments referred to as the Information Economy (IE) in 2010, are dependent on IT resources. One of the requirements of the International Organization for Standardization (ISO) standards is documents and records control. At the University of Antique (UA), this has been implemented manually in the entire system. One of the functional units in the institution is the Office of Student Affairs and Services (OSAS). With its wide scope of services and limited manpower, the office faces many challenges such as difficulty in managing the long queue of students applying for scholarships and grants, rendering overtime jobs to process the voluminous documents in the office, difficulty in disseminating information to scholars and grantees and difficulty in documents and records control particularly data redundancy and security. Using the existing UA Integrated Information System (UAIIS), OSAS can access the database system which is limited to managing student scholarships and grants only. Varied services in OSAS need more attention aside from processing student’s scholarships and grants. Thus, some of the OSAS services need to be converted into a computer-based function by developing an information system that would primarily manage student’s scholarships and grants [1], trace documents using QRCode to improve service operations [2], and send information via SMS. It is an easier option though – using small printed codes, such as QR codes, around the library that link to resources and information appropriate to their location [3].

Based on the observation and investigations conducted, the proponents were able to create a conceptual framework to be used as the basis for the development of the information system.

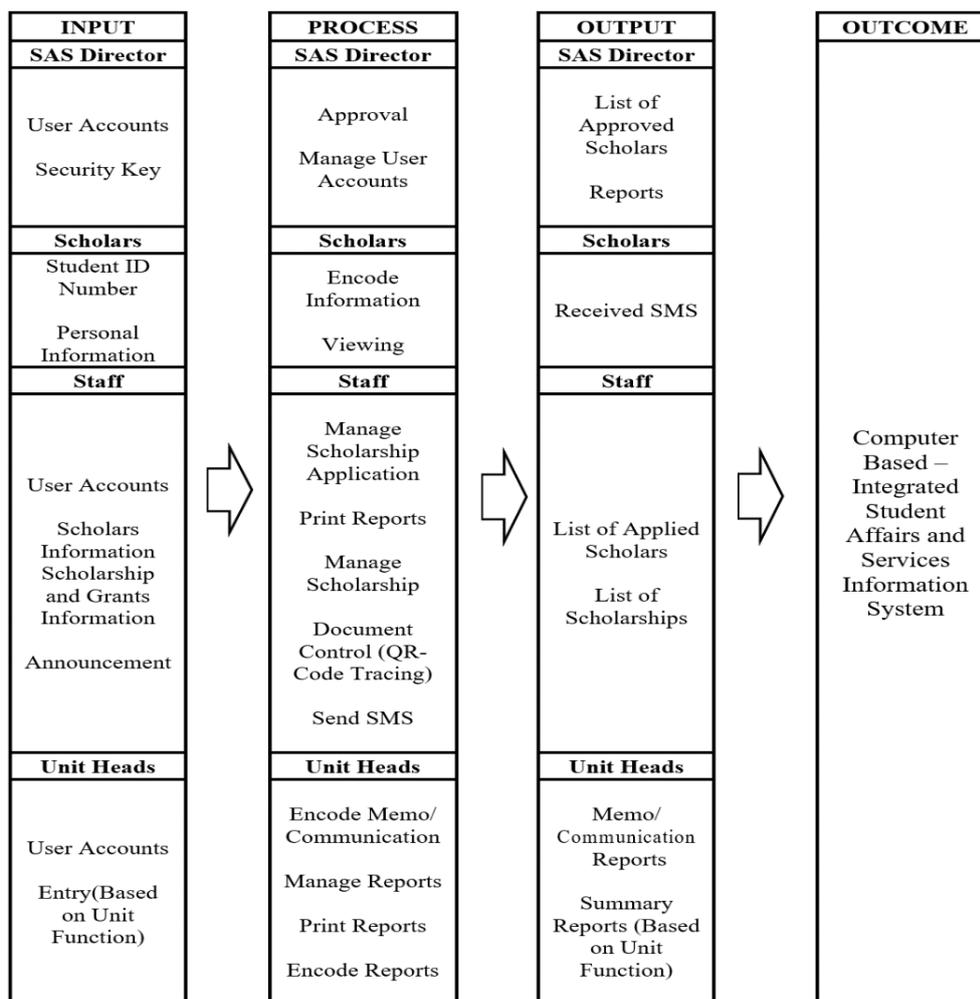


Figure 1. The Conceptual Framework of the Study

Figure 1 depicts the conceptual framework using the input-process-output model. The diagram breaks down the data, activities, and responsible units according to their functionality. It narrows down a cycle when the system receives inputs, performs the necessary processes, and generates the output.

At this point, the study was geared to develop an Integrated Information System based on the conceptual framework for the UA OSAS that will efficiently manage the necessary transactions and functions concerning the support services for the students. Specifically, a normalized database system was designed to secure and support the data of the office. A scholarship and document control modules were created to enable the registration process, scholarship applications, report generation, SMS, and QR-Code features. The system was then tested and evaluated using the McCall's Software Questionnaire and ISO/IEC 25010:2011 instrument to determine its effectiveness and efficiency of the system.

## 2. Methodology

### 2.1 Instruments Used

This study is a combination of software development and descriptive-survey. The system determines the average of effectiveness and acceptability. The study was tested and deployed at the University of Antique Main Campus and undergone an initial (Alpha) test. The researcher has chosen purposive and random sampling. Purposive sampling for the SAS director, unit heads, and staff. Random sampling for the scholars because the university has seven colleges and each of them has at least seven students to test the software.

The questionnaire instrument used was the McCall's Software Quality Model instrument and ISO 25010 standard questionnaires for Software Quality to describe information quality and acceptability of the system. The McCall's questionnaire was used by the IT Experts for evaluation that focuses on the following criteria: Correctness, Reliability, Efficiency, Integrity, Usability, Maintainability, Testability, Flexibility, Portability, Reusability and Interoperability. The ISO questionnaire was used by the non-technical respondents and comprised of the following criteria: Functionality, Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. Using a five-point rating scale, where 5 as Very High and 1 as Very Low [4]. Tables 1 and 2 describe the rating scales used in this study.

**Table 1.** ISO 25010 Rating Scale

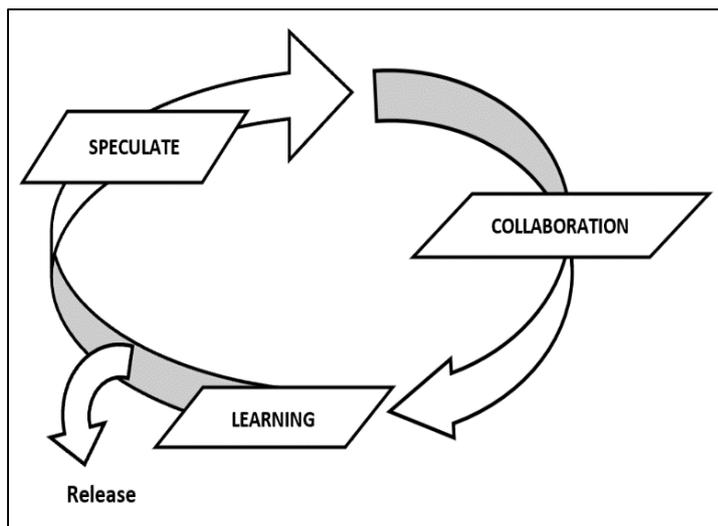
Rating	Description
5	Very High
4	High
3	Moderate
2	Low
1	Very Low

**Table 2.** McCall's Rating Scale

Rating Range	Description
4.21 – 5.00	Very Good (5)
3.61 – 4.20	Good (4)
2.61 – 3.60	Average (3)
1.81 – 2.60	Fair (2)
1.00 – 1.80	Poor (1)

## 2.2 Software Development Model

An agile method was used as the basis for the development of the software. This enabled the proponents to make a series of revisions based on the requirements set by the end-users. The said method gained a higher edge on traditional software development by accommodating frequently changing requirements in a high tight schedule. It also promises higher customer satisfaction, low effect rates, higher usability, and a solution to higher changing requirements. Under the ASDLC method, the researcher chooses the process development of the Adaptive Software Development (ASD) Model to be the guide in creating an effective software system. Figure 2 illustrates the iterative processes of the ASD Model [5].



**Figure 2.** The Adaptive Software Development Model

The initialization of the project documentation starts with the speculation phase. The word speculates refers to the paradox of planning, it is more likely to assume that all stakeholders are comparably wrong for certain aspects of the project's mission while trying to define it. Based on the system, the researcher thinks of what will be the goal of the system and what scope and limitations it will be having depending on the client's needs. Also, the researcher gathers the basic information in order what to have a basis during the development of the system. The proponents speculate that managing scholarship and grants is one of the main problems with the OSAS office [6].

Collaboration refers to the efforts for balancing the work based on predictable parts of the environment (planning and guiding them) and adapting to the uncertain surrounding mix of changes. The researcher studied and analyzed the basic information taken from the Speculation Phase and starts to gather complex information needed like what applications to be used, what methods to be applied, and what programming language will be implemented in coding the system [7]. This phase also aided in designing and normalizing the database that increased compliance and measures business growth [8]. Figure 3 describes the use case which summarizes the system process flow which involves four (4) main actors and their corresponding responsibility with the designed system.

In the Learning Phase, the system was designed, coded, and tested. The learning cycles are based on short iterations with design, build, and testing. During these iterations the knowledge is gathered by making small mistakes based on false assumptions and correcting those mistakes, thus leading to greater experience and eventually mastery in the problem domain. The following work iterations led to a solution that was an automated inventory system using Quick Response (QR) Code and Barcode technology and this system is a Graphical User Interface (GUI) based application that uses a webcam as

a tool for scanning item codes instead of using laser scanners. The design project was able to become a possible solution to address problems in managing inventories as it provides convenience and lessening errors [9].



**Figure 3.** The Adaptive Software Development Model

### 3. Results and Discussion

The study was tested at the University of Antique, Office of Student Affairs and Services. The testing was organized last August 2019 on the OSAS. The program was deployed in a separate server in the Management Information System (MIS) server room for better simulation then it was accessed by the client's account using the schools own existing network. Moreover, each college had a computer for the students to use when they simulated application.

The system went through a series of debugging before it was scheduled for system evaluation. The first evaluation was conducted using the McCall's Software Evaluation tool among 10 identified IT experts. Table 3 describes the result of the evaluation using the said instrument.

Based on the results, experts strongly recommend that the system must be able to simplify some operations of the modules and provide some minor documentation on the scripts written in the program. The experts found that the system was very efficient in terms of system execution, its generality, and reusability in the code. Thus, the general mean gathered from the IT Experts was 4.24 and interpreted as "Very Good".

**Table 3.** McCall’s Rating Scale

Criteria	mean	Description
Auditability	4.20	Good
Accuracy	4.00	Good
Completeness	4.00	Good
Communication Commonality	4.00	Good
Conciseness	4.10	Good
Consistency	3.80	Good
Observability	4.40	Very Good
Operability	3.90	Good
Security	4.00	Good
Self-Documentation	3.70	Good
Simplicity	3.70	Good
Software System Independence	4.10	Good
Traceability	4.20	Good
Training	4.30	Good
Controllability	4.40	Very Good
Data Commonality	4.20	Good
Decomposability	4.70	Very Good
Error Tolerance	4.60	Very Good
Execution Efficiency	4.70	Very Good
Expandability	4.40	Very Good
Generality	4.70	Very Good
Hardware Independence	4.60	Very Good
Instrumentation	4.60	Very Good
Modularity	4.40	Very Good
<i>Over-all</i>	4.24	Very Good

The next evaluation was conducted using the ISO/IEC Evaluation tool. Tables 4 to 7 describe the summary of the evaluation result per group of respondents.

**Table 4.** Summary of Rating by Scholars (Students)

Characteristics	mean	Description
Functional suitability	4.08	High
Performance Efficiency	3.86	High
Compatibility	4.16	High
Usability	4.61	Very High
Reliability	4.51	Very High
Maintainability	4.45	High
Portability	4.55	Very High
<i>Grand Mean</i>	4.32	High

Table 4 shows the evaluation result among seven groups of 49 random scholars. The scholars were able to rate the system with a general mean of 4.32 which describes it as “High”.

**Table 5.** Summary of Rating by Staff

Characteristics	mean	Description
Functional suitability	3.80	High
Performance Efficiency	4.40	High
Compatibility	3.40	Moderate
Usability	4.20	High
Reliability	4.40	High
Maintainability	4.60	Very High
Portability	4.40	High
<i>Grand Mean</i>	4.17	High

Table 5 was the evaluation result of the OSAS Staffs and they rated the system as “High” with an average rating of 4.17.

**Table 6.** Summary of Rating by Unit Heads

Characteristics	mean	Description
Functional suitability	4.50	Very High
Performance Efficiency	4.00	High
Compatibility	4.00	High
Usability	3.00	Moderate
Reliability	4.50	Very High
Maintainability	4.00	High
Portability	5.00	Very High
<i>Grand Mean</i>	4.14	High

Table 6 depicts the evaluation result made by two (2) identified unit heads particularly the college deans rated the system “High” as they gave a mean score of 4.14.

**Table 7.** Summary of Rating by the OSAS Director

Characteristics	mean	Description
Functional suitability	5.00	Very High
Performance Efficiency	5.00	Very High
Compatibility	5.00	Very High
Usability	5.00	Very High
Reliability	5.00	Very High
Maintainability	5.00	Very High
Portability	5.00	Very High
<i>Grand Mean</i>	5.00	Very High

As the process owner of the student services, the director for the Student Affairs and Services was able to evaluate the system. Table 7 revealed that the system was “Very High” as interpreted with the mean score of 5.00.

**Table 8.** Over-all rating evaluated by the group of respondents using the ISO/IEC Evaluation Questionnaire

	Mean	Verbal Interpretation
Evaluation of the four groups of respondents	4.41	High

The conducted evaluation from the client’s perspective resulted in the grand mean of 4.41 and described as “High”.

#### 4. Conclusion and Recommendations

The designed and integrated database was successful and the design was fitted to holds more data for the system. The technologically advanced scholarship module was accepted and efficient. The Scholarship Application Form that was based on the form used in the said office was commended by the tester. Students using a dedicated computer for application resulted in a lesser time of application. Application approval and notifying students through SMS was efficient and faster. The Document Control module with QR-Code Technology provided a quicker response to document tracing.

Using the McCalls’ Software Questionnaire, IT Experts rated the system “Good”, while the ISO/IEC 25010 Software Evaluation used by the non-technical respondents or the clients gained “High”. Therefore, with the positive responses from the tester, the researcher generally concluded that the developed system was accepted and efficient. For future studies that would include the development of E-learning System, it is recommended that need to include an SMS features capability for notifying the students and parents regarding the status of their children.

The study is in its initial phase wherein, only the scholarship was focused, so it may be recommended that the system’s function must be expanded because OSAS is one of the units which has a wider scope of functions. But, the researcher highly recommends the study to be used by the OSAS which will greatly improve their processing of scholarship applications and scholarship/grants management.

IT Experts highly recommend that this study may be made online so that the scholars can apply anywhere rather than using a single computer for each college. Another suggestion is to have a generic design and an uploading module for the requirements. The generic design is helpful when the other university will try to acquire/purchase the system. The researcher recommends the study for future researchers to be improved and guide them. Much appreciation is welcome for the improvement.

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