APPLIED DATA ANALYTICS FOR MOBILE BASED SPORTS COMMERCE

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Abstract - This study presents the use of mobile commerce and the application of data analytics on Sports. This paper discusses how the emerging technologies such as m-commerce, business intelligence and data analytics can contribute to the social community and business progress. The objectives of this research are to: (1) design a mobile and web-based system that servesas a hub for the enrolees in aSports training camp, (2) access the system on various mobile devices and in any web browser, (3) have user-friendly design and easy to manage system, and (4) employ the data analytics to enhance business transactions. This study improves the registration process which makes the task of the owner and its clientele easier and faster. The proponent analysed the existing process of registration leading to the design and development of a web-based registration system with mobile application that employs Agile method where the development team perceived the method suitable for the system development. Based from the test conducted by the stakeholders, it was proved thatthe system requirements were able to meet and satisfy the needs of the Sports training camp.Among the attributes, the functionality got the highest mean with 4.39 which indicates that the system is fully functional and easy to manage. The study revealed that with the application of data analytics on sports training camp can enhance the business transactions and can manipulate data for future reference. This current research is deemed as a significant contribution to business and technological pedagogy since only a few studies have been conducted on sports data analytics.

Keywords - MobileCommerce (M-Commerce),Online Registration, Training Camp, Business Intelligence (BI), Data Analytics

I. INTRODUCTION

The emergence of mobile commerce (M-Commerce) intervened environments fast-tracked by its convenience and straightforward to use tools, such as handheld phones and other related devices. The intuitive and user friendly environment features drive user value and satisfaction. These features motivate mobile user in chosen activities that serve their needs, save time, complete task, entertain and link to the social media world. [1] The numerous number of mobile phones in the market enables consumers to get connected with internet at all times and hence enable for productive opportunities for all the persons involved.[2]They considered technology as a medium for easy dissemination of information to the stakeholders' and to ease the tasks of the employee pertaining to the processes of the business.[3]

One of the common implementation of technology nowadays is the online registration. It is an online platform that provides an organized way for effective and efficient delivery of services to the clienteles.[4] This can help a business to have a fast transactions of services particularly on generating different reports and data analytics for decision making. Subsequently increase consumer choice, improve efficiency and competitiveness of the business industry process. [5]

Based on the aforementioned business technological innovations, the knowledge on Business Intelligence (BI) is highly important. Itdeals with data management in organizations that make a realistic and clear information framework to achieve the business goals and objectives. It is a broad field that links people skills,technological innovations, and business processes to formulate a better strategic business decisions. [6]

From the interest of the researcher to contribute to the body of knowledge, the former found an interest to develop a system that would make the registration process of the sports training camp easy. Itconducts activities simultaneously on a scheduled period wherein the participants will learn to improve their skills on their chosen sport discipline.[7]Moreover, most of the organizations have seen the power of the data analytics and sought the increasing interest in various techniques to employ the data.[8]

It is in the light that the study look into the activities of the sports training camp. It has a numerous number of enrolees and, the proponents found out that difficulties in terms of registration, monitoring, controlling the number of enrolees per camp, consolidating data for payment fees and generating the necessary reports were foresees as a problem.

With these, the proponent was able to formulate an idea to design and develop mobile based sports commerce with applicationof data analytics that would innovate on handling the current process of registration. That particular technological advancement can generate the statistical data of enrolees which can be used for decision making and enhanced business transactions.

II. RELATED WORKS

Mobile Commerce (M-Commerce)

Meola explained the growth of m – commerce and the advantages of the latter in the industry. He stated

that it is a technological advancement that makes people to easily purchase goods and services by the use of mobile phones. According to a study conducted in U.S., the m- commerce will rise in the coming years. It will reach $284 billion, or 45% of the total U.S. e – commerce market by 2020, as compare to 11.6% of the $303 billion e-commerce market of 2014. [9]

Oreku mentioned in his study that e-Commerce and m-Commerce offered services and tools to get access to goods and services. It provides new business opportunities arising out of this convergence.[10] Likewise, Duzevic et al, studied on how the mobile commerce influenced the business activities, consumer behaviour, as well as the global markets. The findings of this research revealed that m-commerce lead to customer satisfaction and loyalty.[11]
The present study is similarly related to the ideas of Meola, Oreku, and Duzevic et al. It focused on the technological advancement of a sports training camp that offers services to its clientele by employing mobile applications. The said innovations aimed to persuade customers who have interest in sports.

Online Registration
Bemile et al, analysed the registration process of Methodist University College Ghana. The study found out that the students need to be present on their particular schools in order to process the registration and then payment of fees. They found an alternative solution through technological improvement through design and development of an online registration system for the students to remotely register every semester. [12]

Furthermore, Alonso et al, developed an application that improved the manual operation of shipment records management and shipment monitoring of MLRS Shipping Agency. They designed a system that helps them on the advertisement of their services and provide convenience upon reservation of their shipment and deliver accurate information and speed up transactions. [13]
Moreover, Alegre, et al found solutions to the enrolment process of DySASCenter for CPA Review, a CPA review center in Mindanao. The vulnerability to errors in bookkeeping was defined that consumed time that caused delay on enrolment process. A web based enrolment system was proposed to responds to the defined problems. With these, an enrolment system was implemented that made the enrolment process faster and increased the potential revenues of the organization. [14]
In addition, Bemile et al proposed the Online Hotel Reservation System on which they created an online reservation system that enables the customers to choose the rooms they wanted by using virtual tour. The study provided solutions by not letting the customer to be physically present to do bookings. [15 Similarly with the study of Bemile et al, the present study focused on the process of the online registration which makes the task of the owner easier to control and monitor, as well as on how the clients will register to the sports training camp system. The registrants need not to personally present on the actual venue of registration.

Business Intelligence
According Sholo, business intelligence (BI) is a broad category of technologies, applications, and processes for gathering,storing,accessing, and analysing data to help users in decision making. . On the study conducted,he found out that the use of BI output as an informational device interplay on the decision making process. [16]
Moreover, Mohammed studied the application of BI in contemporary organizations. The implementation of concept supports the organization in promoting the competitive advantage and improves particular areas and activities in the business. [6] Havingthis feature embedded on the system, the management can easily use the collected data to determine from which areas have the most number of enrolees for the training team to prioritize.

Data Analytics
The big data analytics helps an organization to analyse their data and use it to determine new opportunities thatwould results to a more competitive business, efficient service delivery, higher profits and a satisfied customers. On a research conducted in 2013 by Davenport and Dyche from SAS on Big Data Analytics Strategies for big companies it was found out that the utilization of data analytics can results to cost reduction, faster/better decision making and creation of new products and services. [17]
Likewise on the study conducted by Ularu et al it was emphasized that business data could be used to strategized the decision-making process of an organization as well as the time constraint in analysing the data.[18]
Gandomipresented the consolidated description and the analytics used for big data. He reinforced the needs to devise a new tools for predictive analytics such as text, audio, video, social media and predictive analytics. It was iterated on this study the future innovations of a analytics that includes development of statistical techniques more readily appropriate for mining big data while remaining sensitive to the unique characteristics. [19]
The results of the study conducted by Davenport and Dyche were parallel to current study that intends to utilize the data analytics in decision making process of the sports training camp.The data gathered can be used to enhance opportunities and as a basis for opening out training camps to other areas.

Agile Method

According to Flora et al, Agile model improves the mobile development and evaluated this methodology in providing tailor-fit process that suites in system design development requirements.[20]

Furthermore, Flora and Chande reviewed and analysed the mobile application development process using Agile methodologies. It was found out that researches related to mobile software confirmed that the Agile practices is the suitable for the development of mobile applications. In the system designs development process, it provides a structure for highly collaborative system design development.[21]

Synthesis

The presented related works of the different researchers provided insights on how the system development become more relevant to the business industry. The papers and insights discussed were similar to the present study since it all aims to enhance the current system of business process and provides innovative ways to make a well organize service delivery through applying the concept of m-commerce, BI and data analytics, as well as the use of Agile method.

III. METHODOLOGY

Data Collection

The interview method was used in order to obtain information from the owner of the training camp with regards to the process of theregistration .In this type of data collection, both visuals and audio cues are available to respondents in a face–to–face surveys. [22]

3.1 Analysis of the Current System

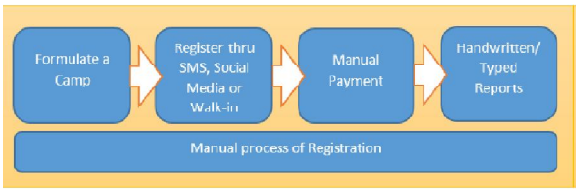


Figure 1. Existing Process of Registration

Figure 1 shows the manual process of registration of the sports training camp. The following are the procedures employ on the manual registration:

3.1.1 The owner can formulate schedule of training camp and disseminate it to the clientele by utilizing social media and thru SMS.

3.1.2 The clients can register thru SMS, Social Media, or thru personal appearance on the camp.

3.1.3 The owner can validate the payment by checking the deposit slip sent by the client thru SMS, social media, email or by presenting the receipt personally to the camp.

3.1.4 The owner can generate reports, by typing manually the list of enrolees.

3.2 The System

Based from the interview conducted with the owner of the training camp, the following information was obtained about the registration process. The data gathered was a great help in order to determine the persons responsible on the different phases of the process. Figure 2 shows the use case diagram of the proposed system.

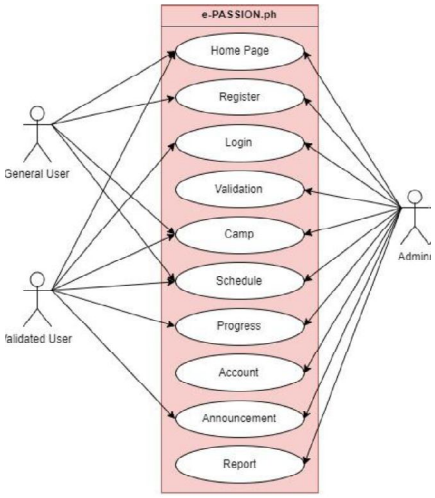


Figure 2. Use Case Diagram of the Proposed System

The figure shows how the different users interact with the different modules of the sports training camp system.

Data Flow Diagram

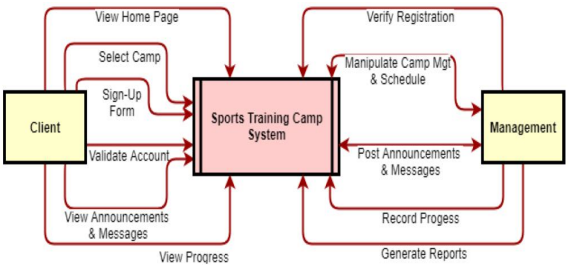


Figure 3 – DFD Context Diagram

The DFD shows the different operations of the sports training camp system that can be performed and the relationship of the entities with the system. This also shows the flow of the data for each entity and operations of the system. This begins with accessing the home page of the system by the client. The client can register for new accounts or login for an existing account. Upon registration, the client can select for the available camps and schedule and wait for the validation.On the other hand, the accountscan be viewed and be validated by the admin. The admin can also create camps and schedule, post announcements, records progress and generate reports from the various clients' data.

3.3. Structure of the System

The succeeding figure (Figure 4) describes the basic processesof the mobile based registration for the training camp.



Figure 4. Process of the System

The mobile/ web-based system can provide competitive advantages on the process of registration of the sportstraining camp system.

The following are some of the advantages of mobile/ web-based applications:

- The system can provide a database that would serve as a hub for the enrolees in the sports training camp.
- The system can be easily accessed by the users using any web browsers on various platforms and devices
- The system is user friendly and easy to manage
- The mobile/ web-based system can gather data and capable of displaying statistical data.

3.3.1. The sports training camp systemis comprised of the following modules:

3.3.1.1 Landing/ Home Page Module

This is the main page of the system where the basic information about the training camp can be viewed.

3.3.1.2Announcements and Messaging Module

This provides the different announcements to the enrolled trainee in the camp.

3.3.1.3 Registration Module

This is the main interface for the clients in online registration. This contains the backend users of the system. This enables the users to login and register.

3.3.1.4 Signing In Module

This serves as the module for the new clients to create an online account .This is where the basic necessary information about the registrant is placed.

3.3.1.5 Administrative Module

This module is intended for the administrative user of the system. This was consist of the following sub modules:

3.3.1.5.1Camp & Schedule Module

This is where the adminenter the camp name and the training schedules. The admin can also create several schedules according to the camp created.

3.3.1.5.2 Validation Module

The admin performs the validation based on the proof of payment sent by the registrant. The admin can also view the uploaded image to verify the payment.

3.3.1.5.3 Reports Module

This contains the generation ofvarious reports needed for the training camp. This includes the list of camps, schedules per camp, the validated registrant per camp and schedule and list of not validated account.

The system can also display the statistical data of the validated enrolees and unsuccessful registrations which can be used for decision making employing data analytics method.

3.2. Development Approach

The following phases was performed based on the specified system requirements. The figure below shows the Work Breakdown Structure of the different activities in developing the system. Work breakdown structure (WBS) summarizes the different project works by decomposing the work activities into a smaller and more detailed level of tasks. [23]

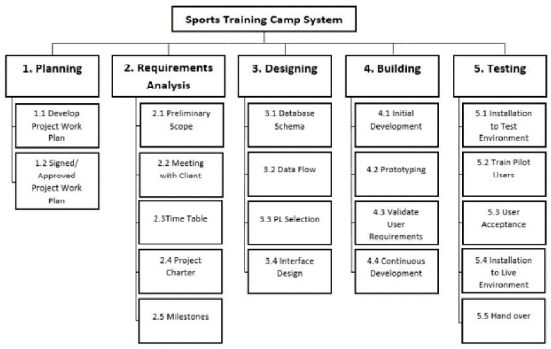


Figure 5. Work Breakdown Structure

3.4 System Development

The Agile method was used on designing the different features of the system since it is considered as a best tool for mobile system development as supported by the study of Flora and Chande. [21]Various tools were selected and used in the system development.The system was designed and created using PHP web programming language along with AngularJS framework.

Pre-processor Hypertext (PHP) can be easily integrated with the Hypertext Mark-up Language (HTML) tags to create dynamic pages and the combination of client side and server side scripting makes the interactivity features of the system more user-friendly and efficient. [24] PHP is capable of handling various types of data thru the implementation of Relational Database Management System (RDBMS) such as MariaDB or formerly known as mySQL and the PHP can be easily connected to the database.[25] This two main core tools are available from XAMPP, a free and open source cross-platform web server solution stack package development tool.[26]The design of the database includes all the repositories of data that will be stored within the system. The AngularJSconcepts gave the programmer an easy way to integrate the processes in developing dynamic web applications, works to simplify the coding procedures, create

single page web apps, and support the Model View Controller (MVC) programming structure. The Model is responsible for maintaining the data, View is responsible for displaying the data to the user and the Controller controls the interactions between the Model and View. [27]

The jQueryis a JavaScript library. It manages tools like HTML document traversal and manipulation, event handling, animation. It was used to design the mobile interface of the application. [28]

Thru the concepts of bootstrap, the development team was able to produce webpages that supports responsive and flexible to different sizes of the web browser. Subsequently, the design of the pages was also compatible and can be accessed even in any kinds of mobile devices.[29] The development team was able to compile the system and produce an Android-based applicationusing an online site tool.

3.5 Results & Discussion

Testing and evaluation was conducted to verify the significance and the validity of the output of the sports training camp system.

3.5.1 System Testing

The development team conducted unit and system testing which was adopted on ISO 9126 (Software Quality Characteristics) [30] that consist of the following:

3.5.1.1 Functionality –the system is fully functional and easy to manage.

3.5.1.2 Reliability – itassures that system software is capable to perform the process and sustain its ability to continue its service for a long period of time.

3.5.1.3 Portability –the system adopt to the different settings, particularly running the software into the different operating system without requiring major rework.

3.5.2 Evaluation

Upon testing the system, evaluation of the various modules from the entire system hasbeen made and easily identified the strengths prior to the various system attributes. The table below shows the result of the evaluation from 68 respondents.

System Attributes	Average
• **Functionality**	**4.39**
• **Reliability**	**4.35**
• **Portability**	**4.38**
Average	**4.37**

Table 1. Evaluation Results

Likert scale was used to evaluate the attributes of the system. The respondents select the desired value from the range of scores from 1 to 5 where 1 – Strongly Disagree; 2 – Disagree, 3 – Neutral; 4 – Agree and 5 –Strongly Agree. It was clearly revealed on the evaluation conducted that the functionality attribute garnered the highest average score among others which has a weighted mean of 4.39.

CONCLUSIONS

The implementation of the Applied Data Analytics for Mobile based Sports Commerce was a great help on the sports training camp. The online process eases the tasks of the owner and the registrants of the training camp as supported by the study of Alonso, et al [12]. They can easily monitor the training camp that is being conducted on the different areas of the country. The participants can register through use of their mobile phones and they can easily know the announcement pertaining to the activities of the camp.

The study shown that the use of data analytics on sports training camp can enhance the business transactions and manipulate the data to be used for future references. Based from the test conducted by the stakeholders, it was proved that the system requirements were able to meet and satisfy the needs of the sports training camp. Among the attributes, the functionality gained the highest weighted mean with 4.39 which indicates that the system is fully functional and easy to manage. It was followed by portability with 4.38 weighted mean, and reliability as evidenced by 4.35 weighted mean. This means that the stakeholders agreed that the system meets the specified requirements. The application of the m-commerce can create a highly interactive web application that could support business processes and can be a tool for the business advertisement. The utilization of the mobile technology increased market productivity and venue for technological advancement as cited on the studies of Young et al and Alegre et al. [1][3]

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