

# COMPARATIVE STUDY OF TOOLS ORIENTED DEVELOPMENT OF MOBILE APPLICATIONS WITH THE APPLICATION: SYSTEM MANAGEMENT STOCK OF PRODUCTS OF CONSUMER GOODS.

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**Abstract.** *The use of mobile technology increases rapidly, leading to increasingly depend more on mobile devices, becoming a must for every element. The efficacy of the mobile devices makes them suitable for running multiple applications. The development of these mobile applications can be in constant progress in relation to communications and information systems.*

*The company has proposed the development and implementation of a mobile application for registration web Stock consumer products for better handling and faster customer service. Prior to a comparative study of technologies PhoneGap, Dojo Mobile, Titanium Appcelerator and jQueryMobile; the same that helped elect jQueryMobile as the suitable framework for mobile application.*

*With the execution of the application new knowledge, theoretical and practical experience was acquired, several tools as were used: a text editor called Sublime Text that helps organize your code quickly, the XAMPP local server that facilitates creating a BDD where information of the application is stored, it can be executed easily and emulator test to visualize the application for mobile devices.*

## Keywords

Technology mobile, efficiency, applications, implementation.

## 1. Introduction

The progressive evolution of technology-oriented application development in recent years has led to a growing market and throughout history influences both economic activity and social and cultural aspects.

Mobile devices are part of daily life and are becoming more sophisticated, it has created new challenges for developers, since these applications has its own characteristics, constraints and unique needs for each user.

At present, the company has problems related to the sales management and stock control of goods, information is handled inadequate exposed to easy manipulation or loss thereof, ie product inventory is carried only in leaves printed, which at the end of the day are systematized in an Excel; creating problems in the immediate delivery of products to customers.

Because of the problems that have been created it is necessary to implement the mobile system to expedite care sales, can store data online and keep abreast with current information, generate reports, saving time and money.

For the speed, course and flow of current business has seen the need to carry out a comparative study of the following tools: PhoneGap, DojoMobile, Titanium Appcelerator and jQuery Mobile that serve the mobile application development; this information will have a more competitive approach in efficiency, portability, scalability; allowing you to choose companies and users the application that conforms to address their needs.

New technologies designed for developing applications for mobile devices, providing services digital, fast and secure communication and raising the importance of investigating new herramientasar your needs.

### 1.1 General Objective

Determined by a comparative study mobile tool that best suits the application requirements, and develop a Management System stock of consumer products.

## 1.2 Specific Objectives

- Conduct a study of the current situation of the company.
- Determine metrics comparison.
- Conduct a comparative analysis of the characteristics, advantages and disadvantages of mobile tools.
- Investigate the types of mobile applications and determine its use.
- Set the tool best suited for the development of application design.
- Develop Management System stock of consumer products for the company.
- Perform impact analysis tool.

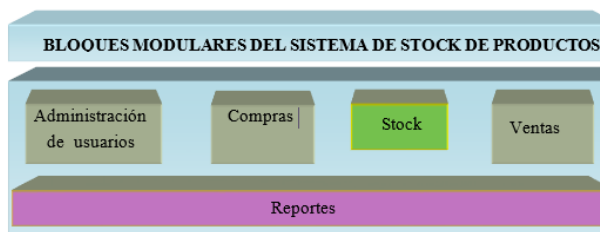
## 1.3 Scope

The comparative study of mobile tools is framed under the need to provide developers interested in creating mobile applications, a guide to facilitate them to choose a tool that fits your needs, thus contributing in the process of implementation and development faster and easier project intending to carry out.

To apply the knowledge gained management system Stock consumer products will be developed and subsequently an analysis of impacts of the use of the tool in web-mobile applications will be made.

The system will have the capacity:

- Manage registered users who have access to the system.
- Take control of stock of products.
- Give better customer service with the required product.
- The application will be available for both mobile and PC platforms.



Shape 1. System modules product stock

**User Management:** This module contains a database of registered persons who may use the system.

**Shopping:** Keep a record of outstanding and made purchases.

**Stock:** Keep a record of stock of products.

**Sales:** Keep a record of daily sales

**Reports:** This module contains the report delivered products daily, biweekly and monthly customer.

## 1.4 Justification

The comparative study of mobile tools allow provide sufficient documentation to serve as a study guide for students and professionals in the field of information technology that will expand their knowledge for new applications of quality.

It will also provide motivation to software developers getting new tools for the development of their systems causing increased production of applications with innovative design patterns in the market.

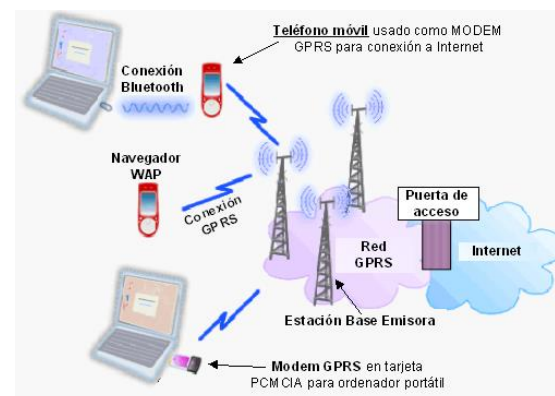
It will encourage students to continue to undertake research on new methodology and application development tools not only websites but also moving and adjusting to the needs of each user.

## 2. Conceptual Framework

In this section useful definitions are conceptualized for project implementation.

### 2.1 Mobile Technology

This technology is based on communication medium used to access and use the network services mobile electronic wireless devices; the medium for transmission is air and the message is sent through electromagnetic waves, consists of two main parts: a communications network and another terminal which accesses the network.



Shape 2. Connectivity of mobile devices

### 2.1.1 Mobile Operating System

The mobile operating system that system that controls a mobile device just as happens with PCs running Linux Android or Windows among others.

Mobile operating systems in a way are simpler are oriented connectivity.

They consist of different layers:

**Kernel.**- It is one of the most important layers in an operating system, through this layer software allows us access to the hardware elements that make our mobile device.

**Middleware.**- It is a layer of software that works on the local operating system, connects software components or applications so you can exchange data between them.

**Application execution environment.**- This layer provides the necessary elements for the creation and development of software among the main services provided highlights an application manager and several programmable open interfaces (APIs).

**User interface.**- is the element that is used to interact with the phone, this layer like the above is important because if this could not use the mobile device. It includes graphic elements that facilitate the handling of the device.

Among the most prominent mobile operating systems include the following:

**Android.**- Today the Android operating system is the market leader, is based on Linux, it was originally designed for professional cameras and then modified it to be used in devices tablets, has evolved so much that is in development to be used netbooks and PCs.

**iOS.**- This operating system is Apple, it is widely used by iPhones and iPad, has excellent performance and easy operation. His latest release was announced on 23 September 2015. The interface of this system is fluid and is based on direct manipulation, the control elements are buttons, sliders and switches, responses are immediate.

### 2.1.2 Application programming interface (API)

It is the set of functions and methods used in object-oriented programming that allows the programmer to access the hardware of a device.

Open APIs different types of dialogues with the supplier either to update or obtain information on the same.

### 2.1.3 Platform

It is a base system used to run hardware modules (hardware architecture) and software (software platform environments including applications) that are compatible.

In defining platforms should establish an all compatible operating system, types of architecture, user interface or programming language with each other.

### 2.1.4 Applications

An application is a software, also called apps them; one application avoids timeouts achieving more efficient navigation between content.

**Natives:** Are those applications that are developed under a language and development environment offered by each operating system, allowing its operation is smooth and stable for which it was created.

**Web:** These applications are easily used on different platforms without having to develop a different code for specific cases, this option is the most simple and inexpensive to create as development costs are reduced.

**Hybrids:** The development process for hybrid applications is more complicated, once you create the code is compiled to an executable, like Web applications in HTML, CSS and JavaScript which runs in a browser code is generated. Both codes are compiled to be uploaded through a distributable package to the app store.

## 3. Conceptual Framework

### 3.1.1 Analysis and situation of the Company

The Company or Omnilife Group is a company that is dedicated to the production, development and distribution of multivitamin products, food supplements and beauty products; These products are distributed nationally and internationally and finding them in 19 countries.

The Company is managed by a multi-level network and is at this point where entrepreneurs must find a tool to help them manage their business well in terms of distribution to meet the needs of its customers; and likewise take a good organization of tasks within the same.

### 3.1.2 Mobile software tools

Today we feature a myriad of options regarding the choice of tools, languages and environments to develop mobile applications that better suit the needs of each user.

With these applications you can keep in touch with employees and customers effectively, increasingly becoming an integral part of our lives and especially our daily work.

The tools chosen for the study are as follows:

**PhoneGap:** It is a framework of free and open source development, currently belongs to Adobe Systems, this framework allows you to create mobile applications using standard web APIs, the latest stable version is 3.5.0.

It supports frameworks like: jQueryMobile, Sencha Touch, DojoMobile, jQTouch, SproutCore, GloveBox, XUI, iScroll, among others, as well as using CSS themes to copy the style of iOS applications, Android or BlackBerry.

**Dojo Mobile:** It is an open source framework for creating web applications easily with any compatible mobile device; is a collection of classes, created with an architecture to be lightweight, flexible and extensible. His last stable version is 1.9. This framework contains APIs and widgets (controls) that facilitate the development of Web applications using AJAX technology.

**Titanium Appcelerator:** It is an open source framework for creating mobile applications on the following platforms: Android, iOS and Windows Phone, BlackBerry and Tizen, from a single JavaScript code base that is developed by Appcelerator. Its stable version is 5.1.1.GA since November 25, 2015.

This framework allows you to create native applications running on most mobile devices without having to create different versions and not much programming knowledge is needed; offering a comprehensive service that includes various features, services and tools.

**jQuery Mobile:** It is a framework used to create web applications for mobile, uses HTML5 and CSS3 technology, its latest stable version is 1.4, is compatible with all major mobile devices, tablets, electronic readers and platforms desk. - iOS, Android, Blackberry, Palm WebOS, Nokia / Symbian, Windows Phone 7, MeeGo, Opera Mobile / Mini, Firefox Mobile, Kindle, Nook, and all browsers.

### 3.1.3 Technologies

The technologies most commonly used today are:

**HTML:** (HyperText Markup Language) is a programming language used to develop Web pages. HTML or Markup Language Hypertext is open format that comes from SGML (Standard Generalized Markup Language) or "Standard Language Generalized Markup" tags allowing sort and label various documents within a list, for your organization does not exist rules by which is called as an open format systems.

**CSS:** Language is a cascading style sheet that describes the presentation of an HTML (or XML) document, detailing how the elements should be rendered on the screen, on paper or other media.

**PHP:** It is a scripting language that can run on a server, the language used to make dynamic and interactive web pages.

## 4. Comparative Study Tools

PhoneGap, Dojo, JQuery Mobile Appcelerator Titanium and are among the most stable and complete systems for mobile application development frameworks.

What differentiates one from another is the technique used to create your application, the programming language, the platforms it supports, the development environment, technical support, the ease with which to develop, gratuity or license purchase, among other qualities.

With this comparative study attempts to choose the best framework or tool that will help create mobile applications in an easy way and that fits any device, thereby decreasing costs and development time way.

For the study of the tools is taken into account a rating scale consisting of evaluating several categories or characteristics and issue a result, indicating the degree of difficulty of each. This scale will help determine the framework that is suitable for development.

### 4.1.1 Parameters, evaluation metrics and analysis of results.

Each parameter or aspect under evaluation is important because it will help you choose the best development framework.

For this the following parameters are taken into account:

- **Support:** There are several frameworks that develop a unique code that is supported by various mobile platforms, thus the developer gets some extensions created application that can be loaded on different operating systems are compatible, without making any changes to the code base.
- **Programming language:** An important development for mobile applications the aspect is used programming language.

Codes, command and libraries to develop, manage and customize the mobile application are used depending on the choice of framework,. The programming language or development is key to choose an option, depending on your knowledge developer and thus inclined to the framework that fits your development tool.

- **Development Environment:** The development environment is a software that supports various elements and facilities to develop applications, in this case "Android". Several frameworks have an own environment to make application development, but others need to use another vendor environment.

You can highlight the possibility of the user interface without having to write code, have the option to

customize the application and other facilities that make the unique and interesting application.

- **Level of development:** Each framework has an official site explaining the operation of the tool and how to use the API to program the application, but only some provide technical support, examples, tutorials, forums and other support needed by the programmer to make the application of a easy way.
- **Economy:** At present various kinds and versions of frameworks used to develop mobile applications and are mostly free leading to have a manipulation of their API freely, more however others need a license or a subscription to use or allow to test for a limited time.

There are cases in which some frameworks are free but do not allow to generate an executable file, ie the APK, which is required to use the application.

#### 4.1.2 Determination results

Once the different analyzes a table where the results are presented with their respective score obtained according to the evaluated characteristics were taken into account to determine the best framework that suits the requirements of the application is obtained.

Chart 1. Determination results

Determinación de Resultados				
Características	PhoneGap	Dojo	jQuery Mobile	Appcelerator Titanium
Soporte	5	5	5	5
Lenguaje de Desarrollo	5	5	5	5
Entorno de desarrollo	2	2	2	3
Facilidad de Desarrollo	2	2	4	3
Economía	2	1	4	2
<b>TOTAL</b>	<b>16</b>	<b>15</b>	<b>20</b>	<b>18</b>

The results obtained can be induced that frameworks are in quite similar conditions, highlighting the jQuery Mobile framework with favorable characteristics for use.

It is recommended to use jQuery Mobile to build information applications and data interaction with the

network, it does not require use internal elements of the device such as sensors and camera.

It also has a graphical interface made in CSS getting an application with a user interface easy to handle.

However looking at the results in the table above may be mentioned that PhoneGap and Appcelerator Titanium would be a second alternative because the API This framework provides a fairly wide range of utilities that help you access internal elements of the device such as camera sensors, internal memory, contacts, etc.

## 5. System Implementation

After reviewing the basic concepts and the different technologies used for the proposed application, it will be explained how the application was developed.

The information obtained was also organized and structured so that the user management is provided, for this simple and intuitive navigation visual aspect is used.

### 5.1.1 Methodology

For the W3C system development methodology, a process that regularly apply a set of best practices for teamwork, and get the best possible outcome of a project will be used.



Shape 3. W3C Methodology

The methodology it can be carried out either by an evaluator individually and by a review team. The methodology is quite flexible and can be applied in different situations and contexts: self-assessment, third party assessment, evaluation during development, periodic evaluations, etc.

Some of the steps can be performed in parallel, taking into account all guarantee a reliable assessment and should clearly document each step.

#### Step 1.- Define the scope of the evaluation

In this step an agreement jointly with the evaluators ensuring common expectations are realized. It is important

to document particular aspects such as services developed externally:

- Define the scope of the site (application)
- Define the scope of accessibility
- Define additional evaluation requirements

**Step 2.- Explore the Web site**

This phase should be inspected management application operation, as an administrator and as a user, coming to have conclusions state that the application is in terms of its functionality.

**Step 3.- Select a representative sample**

This phase is very important as it will help assess implementation, ensure the results of the evaluation and to provide accessibility to all site users reliably; this sample is the need to take random.

**Step 4. - Audit the selected sample**

When auditing the sample selected must meet the compliance requirements of users in terms of ease of use and operation, data entry, notifications, interaction with forms, reports, etc. should not generate errors throughout any process.

**Step 5.- Register evaluation results**

The results are presented at the end of the process, but must register during the evaluation. It is very important to provide documentation ie technical and user manual for easy use and have no mishaps in the process.

**5.1.2 Application Structure**

To develop the application properly take into account your organization and user needs to facilitate their use.

The home page (index.php) by two buttons and a navigation menu is formed. On this page the different promotions offered by the company during the month are also presented.



*Shape 4. Navigation menu*

**The Start button,** will serve to return to the home page from any menu item that is.

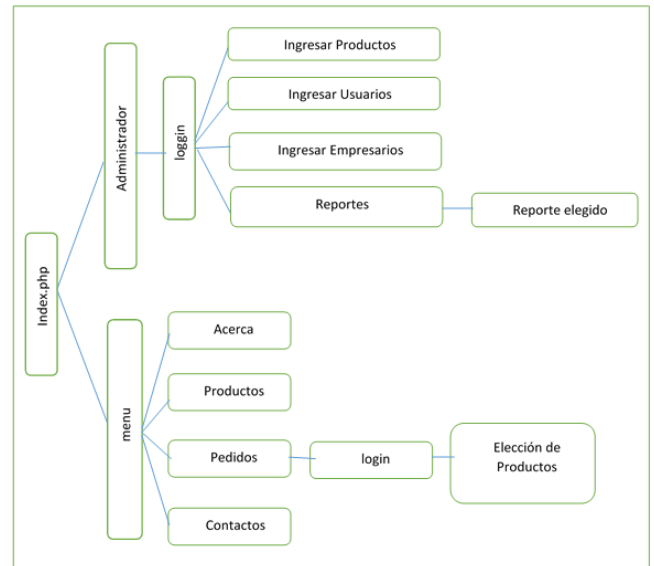
**Manager button,** will serve to access the system administration is to enter products, users, entrepreneurs and view reports through a page (login.php).

**The navigation menu** It consists of four options:

- **Option About,** where mission, vision, values and a video of the company is.
- **Option Products,** where all products offered by the company are presented.
- **Option Orders,** this option leads to a login entrepreneur and serves to make a purchase or order.
- **Option Contacts,** contacts on this page where they can make or get close to place your order or ask any concern shown.

**5.1.3 Organizational structure of the application**

With this scheme can better visualize the organization and functionality of the application, as it is organized.



*Shape 5. Application organizational scheme*

**5.1.4 Visual Appearance**

Using HTML is possible to obtain the shape of the application, style sheets using CSS.

jQuery Mobile provides style sheets to develop the mobile application and also provides a tool called ThemeRoller, it creates several issues that simply adjusting changes such as color buttons, links etc., which benefit the look of our application. The size of the images is re scalable, also includes icons on the buttons and menus. It has also defined a single fund for all pages and no user eyestrain.

**5.1.5 Selection requirements**

To make the application takes into account the following requirements:

**Local Server:** A local server is a computer that contains multiple installed applications used to use a test server and to correct errors and make changes to the application.

There are several types of local servers for this case the XAMPP server is chosen because this software package contains a programming language PHP, a MySQL data are the necessary elements for the realization of the mobile application.

**Framework jQueryMobile:** jQuery Mobile is a development framework that serves to make a visible app either desktop or mobile device.

**Create an account in Gmail:** By creating this account have access to Google drive easily, this platform serves to save application files and to have a backup in case of data loss for any reason.

**Installing a text editor:** Text editors are quite useful applications for handling any application source code, there are several but in this case the Sublime Text editor, using this editor is open source and its use is very interesting.

**Emulator:** It is a software that allows you to run an application on a different platform to which it was originally created, because this serves to model accurately in a device in which it is desired that really works.

In order to display the Ripple emulator application which is an extension that is available in Chrome and very friendly to the chosen framework is used.

### 5.1.6 Features

Once the structure and layout of the application is analyzed on to explain its functionality.

**Navigation menu:** Through these menus can show how you can use some resources that provides jQuery Mobile with the help of HTML and CSS.

**Forms:** Through the forms you can enter information users, business and products to the database of the mobile application and can view, download and print reports.

To develop these forms PHP and local Xampp server it was used. The data forms are sent through the "Post" method is defined in a "Form" tag

**Multimedia:** Is a jQuery Mobile option that allows us to present multimedia information for better understanding of information, videos can be submitted directly through Youtube or download them to an internal folder of our application.

### 5.1.7 Tests

At this stage fault identification is performed and proceeds to debug logic interface, validations and proper functioning of all processes will be verified, details will be

refined finally ensuring that the application meets the objectives proposed.

## 6. Conclusions y Recommendations

### 6.1 Conclusions

- Each of the tools or frameworks mentioned herein, contribute to the development of mobile applications, which today are the most used especially for the Android system.
- The study of the selected frameworks is achieved by comparing the constraints and the large scope that has each to develop an application for different mobile devices.
- When jQuery Mobile open source tool, allows an optimization of financial resources and achieve a quality application without investing a lot of money.
- With the implementation of this system is able to maintain control input and output products and better information management, which generated customer satisfaction and better organization to the company.

### 6.2 Recommendations

- Set correctly the requirements for the development of the system as it is fundamental to develop the smooth implementation step.
- Conduct periodic maintenance of the application to always keep the user updated regarding the information presented therein.
- Take backups of all the information necessary from time to time.

## Gratitude

**GOD** for being my creator for his infinite goodness and love, for giving me the strength to not give up in adversity and day to day to succeed achieving each objective.

**My mother** for their support at all times for advice, values, motivation and love that enabled me to be a good person.

**My father** for instilling in me the example of constant struggle and perseverance to achieve objectives and to get ahead, along with all his love for my daughters and husband.

**My husband and daughters** to be the engine that lifts and encourages me every day to keep fighting shoulder to shoulder for a better future for the family.

**My Tutor Ing. Omar Lara** share me their knowledge, always have the best disposition and patience to prepare this work.

**To my teachers** for their knowledge and ultimately instill eternal gratitude to this prestigious University for opening their doors and prepare for a competitive future and make me a good person.

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