

Review Article

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Mobile Application for Plant Quarantine Regulations to Import in India

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ABSTRACT

India is a very large country where 69% of total population depends on Agriculture. Agriculture has a great role in Indian economy because it contributes significantly about 14.8% in 2013-14 to the Gross Domestic Product. The percentage share of import and export of plant commodities have been of the order 3.22% and 13.79% of national import and export in 2013-14. There has always been the possibility of moving exotic insect pests, diseases and weeds from other country to India. Exotic pests and diseases introduced into India cause a huge damage to Indian agricultural trade. For these reasons to prevent the introduction of various exotic pests, diseases and weeds from other countries or within states of country, legal restrictions are enforced which is commonly known as Plant Quarantine. Plant Quarantine regulations at national level are known as Domestic Quarantine as well as at international level known as Foreign Quarantine. The implementation of the quarantine measures is assisted by legal approval, called quarantine laws. It acts as an important technique or procedure to exclude exotic pests from the crop. Efficient implementation of quarantine is extremely emphasized to manage pests, consequently which helps in sustaining the productivity of crops. Now mobile phones are very much preferable by the common men. Information can easily be shared through the mobile application. At present Plant Quarantine import regulations are presented in pdf form hence it is a tedious process for the users to find their specific requirement. It is very hard for an importer to know at any situation about these regulations whether any plant commodity is prohibited or allowed to import in India. Thus the need arises to provide the information in searchable manner. Import regulations are enlisted in four schedules with justification, condition, additional declaration on the basis of Commodity, Country of origin of the commodity, Category of the Commodity, Plant Part of the Commodity. This paper presents the requirement analysis, design, development and testing of an android based mobile application with different features which provide information about import regulations related to Commodity, Country Of Origin, Category, Plant Part which is promulgated by the Directorate of Plant Protection, Quarantine & Storage, Department of Agriculture, Cooperation & Farmer Welfare, Ministry of Agriculture and Farmer Welfare, Government of India to prevent the entry and spread of dangerous pests and pathogens.

Keywords

Mobile application,
Plant quarantine
regulations

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Introduction

“Prevention is better than cure” it is the golden rule to be followed for easier and more effective measure to ward off pest invasion or disease infection by suitable preventive methods than to sure it once it has gained a foothold on the crop. “Plant quarantine” is one of the important schemes to prevent part invasion. It can be defined “as a legal restriction on the movement of Agricultural commodities for the purpose of exclusion, prevention or delay in the spread of plant pests and diseases in uninfected areas”.

In India the enforcement of plant quarantine regulations is carried out by the technical officers of the Directorate of Plant protection, Quarantine and Storage under the Department of Agricultural and Corporation, Ministry of Agriculture and Farmers welfare, Government of India, under the supervision of Plant Protection Advisor. In our country, an importer intending to import agricultural commodities has to apply in advance for the issue of import permit in respect of the commodities listed in Schedule V and IV of PQ order, 2003[1] in prescribed form.

The information in these schedules contains special conditions (In addition to prohibited conditions in Schedule IV and general conditions in Schedule VIII) to allow import based on commodity/ species, category and part of plant and country of origin. Plant quarantine is one of the services being provided by Directorate of Plant protection, Quarantine and Storage under the Department of Agricultural and Corporation, Ministry of Agriculture. PQIS (Plant Quarantine information System) is website developed by NIC (National Informatics Centre) aiming to provide an efficient and effective service, that fully satisfies importers, exporters, individuals and the Government.

Emerging mobile applications communication technology for development approach is creating new perceptions about governments and governance and holds significant potential for advancing agricultural development. This helps in pushing the relevant information in time to farming community and service providers. With easy and affordable availability of smart mobiles, rapid expansion of mobile network and recent developments in software technology, there has been explosion of mobile applications in the areas of providing access to information and services besides gaming, learning and other areas.

E-Governance initiatives of the government of India have led to implementation of various applications in the agriculture sector to strengthen delivery of services to farming community. Similarly there have been many systems implemented in National Agricultural Research & Education System to strengthen research, education and extension services.

Why this mobile application?

The emergence of the smart phones & tablets has changed the definition of the mobile phones. The applications, simply the ‘Apps’ integrated with these smart phones & tablets, provides a more affordable way to the people to access the internet & retrieve information related to any field. The mobile apps are becoming popular in agriculture sector too with the potential of further advancement in any aspect of farm management. With these advantage the sharing of information, knowledge & service delivery to the importers and exporter can be done efficiently by using a mobile app. Thus the Mobile application could provide the information on their phone for their work from any place through online. So the access of available information can be provided though mobile applications to the importers and related

stakeholders at their ease and anytime as per the need to import any plant or plant material.

Plant Quarantine Mobile app has been developed on android platform to provide information 24*7 about the Plant Quarantine import conditions for users which will be help full for the importers to India to import any commodity with conditions and regulations. On the basis of the information importers can apply for import. It will be helpful for government officials those who inspect the importing commodity at different places or ports across the India.

Materials and Methods

Application Architecture

Developing a mobile application on plant quarantine import condition requires knowledge on Schedule No, Conditions, Additional details, PQ days on the basis of commodity, category of commodity, plant part of commodity and country of origin of the commodity. This application stores information of users or importers for login purpose. From this mobile application user can know which commodity is prohibited with justification or permitted with special conditions, additional details, phytosanitary certificate and PQ days. Following are various layers of the architecture in Figure-1.

Client Side Interface Layer (CSIL)

The mobile application itself will be the client side interface layer which will run on android platform. This interface will be implemented by the Java programming language, eXtensible Markup Language (XML), and Styles of Android. The XML will provide the layout of the Application, the Styles of Android will specify the look and format for the view of the application and Java programming language will implement the

actual activities and the logics of the application.

Web Service Layer

The web service layer will act as an intermediate layer between the Mobile application and Plant Quarantine import condition databases shown in Figure 2. This layer will be implemented by Java programming language. Several web methods will be developed to expose the functionalities of the databases of the Plant Quarantine import conditions. The web methods will make available over the internet using the HTTP protocol. The web service will enable a program to program interaction with other systems/ applications. It will allow the Mobile application to fetch information from the databases of Plant Quarantine import conditions by consuming the web service.

Database Layer (DBL)

This layer is implemented by using of MS SQL Server 2008. This contains the authorised information about users which will come from users and information about country, commodity, category, plant category and plant quarantine import condition information.

Server Side Application Layer (SSAL)

There will be a Server side Application layer which will be implemented using Java Programing language. It will have the core classes that will provide the some functionality such as database connecting, interaction with different layers etc.

Tools and Technologies

Several tools and technologies which are used to develop the entire mobile application have been discussed here in detail.

Android Studio: - Android Studio has been used to develop mobile application.

Java Programming Language: - Java has been used to implement actual activities and logic of the application.

XML (EXtensible Markup Language):- XML provide the layout of the application.

GlassFish Server:-The application is hosted on web server GlassFish 4.1.

SOAP (Simple Object Access Protocol)

Web service:-This has been used for to access the database in application through internet.

Microsoft SQL server:- Microsoft SQL server 2008 has been used to store databases.

NetBeans IDE:- NetBeans IDE 8.1 has been used to database connection and queries using JAVA.

Requirement Analysis for developing Mobile Application

PQIS (Plant Quarantine information System), developed by NIC (National Informatics Centre) makes use of conditions (Import regulations) database to provide an efficient and effective delivery of plant quarantine services to importers, government organisations and other stakeholders. PQ Order 2003 was studied in-depth and requirement analysis was carried out to provide searchable information about import regulations. Four entities namely Commodity, Category, Plant Part and country were identified to retrieve import conditions uniquely. Import Conditions are presented under four schedules:-

Schedule-IV:- List of plants/planting materials and countries from where import is prohibited along with justification

Schedule-V:-List of plants and materials imports of which are restricted and permissible only by authorized institutions with additional declarations and subject to

special conditions

Schedule-VI:-List of plants/plant materials permitted import with additional declarations and special conditions

Schedule-VII:-List of plants/planting materials where imports are permissible on the basis of phytosanitary certificate issued by the exporting country.

In existing system by NIC import conditions are checked with Commodity, Country, Category and Plant Part. After checking Commodity, Country, Category and Plant Part if import condition is found on the basis of these four criteria either it will under Schedule-IV or under Schedule-V or under Schedule- VI or under Schedule-VII. After Requirement analysis it has been seen that the conditions in two schedules (Schedule-IV and Schedule-VI) are specific to country and in other two Schedules (Schedule-V and Schedule-VII) are applicable for all the countries. Accordingly the following rule has been used shown in Figure 3.

Design of the Mobile Application

The user interface developed using layout of extensible Markup Language, JAVA styles of Android has a Home Screen which is shown in Fig. 4. The Home Screen has four items Login, Registration, Contact us and User guide/About App. When a new user wants to access this application, he/she has to first fill-up and submit Registration form on Sign Up Screen by clicking Registration on Home Screen as shown in Fig. 5. If user does not fill any field in Registration form a toast message will be displayed to user that is “Fields are empty, Please fill” in Sign Up screen.

After registration user can login to the mobile application through user name password same as in the registration form as shown in Fig. 6. If user does not fill two fields of this screen, a toast message “ Both fields are empty” will be

shown to user and if any one of these is not filled by user then a toast message “Username is empty” or “Password is empty” will be shown to user in LogIn screen. From this LogIn screen user can also go to Sign Up screen by on click on the Register button.

After login search screen shown in Fig. 7 will

be displayed where user can search information about plant quarantine information on basis of user criteria from drop down list. This search screen requires “Commodity” to be imported in India, “Category” and “Plant Part” of the commodity and “Country of origin” of import.

Fig.1 Application architecture

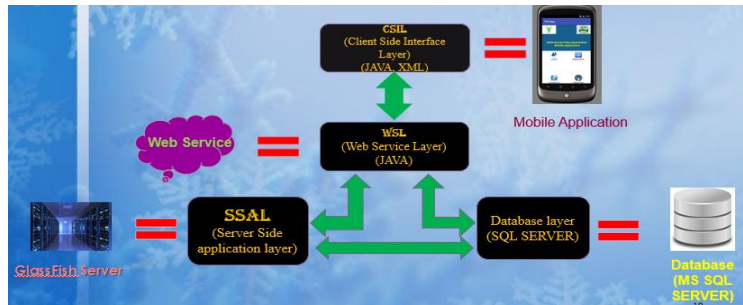


Fig.2 Web service between android application and the PQIS system

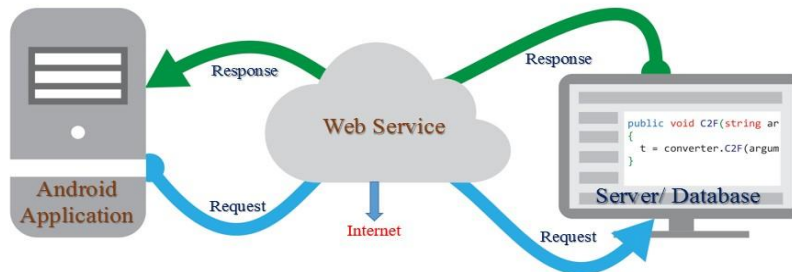


Fig.3 Flow diagram of the application methodology

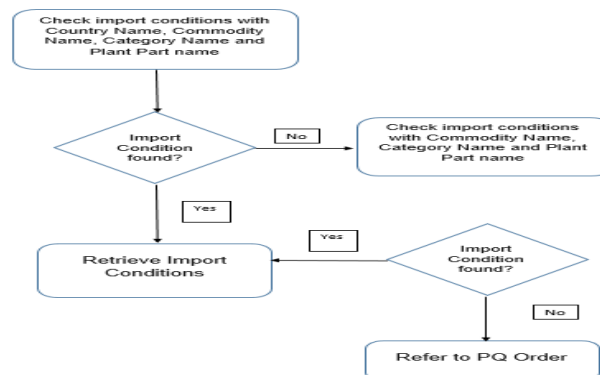


Fig.4 Home screen of the PQ Mobile App



Fig.5 Registration Form for user



Fig.6 User LogIn Screen Fig.7 User Import Criteria in Search screen



Fig.8 Commodity selection 33



Fig.9 Category selection



Fig.10 Plant part selection



Fig.11 Country of origin selection



Fig.12 Different quarantine information in Information Screen



Fig.13 No information in information screen



Fig.14 Contact screen



Fig.15 About Mobile application screen



Fig.16 Splash Screen Fig.17 Alert message for exit from Home Screen

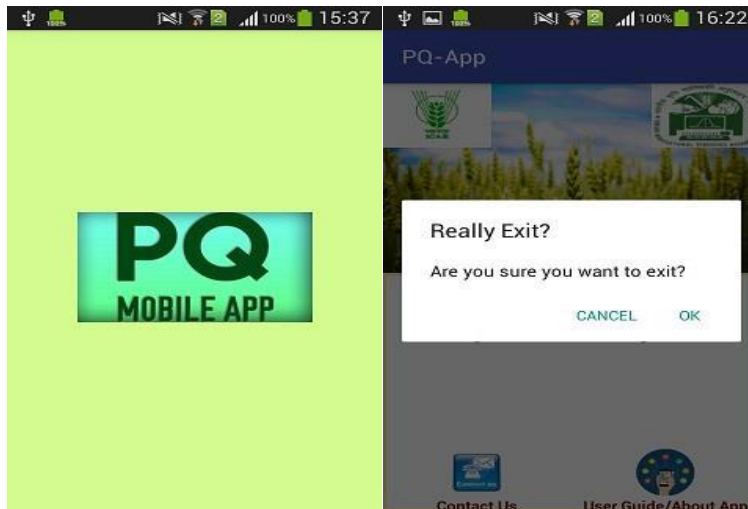


Fig.18 Icon or Logo of PQ Mobile App



The search criteria will be entered by user to the mobile application through the drop down list as shown in Fig.8. First user will select commodity name from the commodity list like Coffee, Kalmia, Juniper berries etc., then select Category of the Commodity such as Medicinal Herbs, Seeds, Grafts, Tissue Culture etc. to be imported in India through dropdown menu as shown in Fig.9. After category selection the next phase is selection of Plant part name from drop down menu that is which Plant Part like Grafts, Dried Seeds, Grafts etc. of commodity user want to import to India shown in Fig.10. Lastly user has to select Country of origin of the commodity or from which country user wants to import to India like Afghanistan, Australia, Argentina etc. from drop down menu in Fig.11. If user forgot to select any of these four criteria for import then there will a toast message displayed “Please select all criteria” on this search screen.

After all selection by the user, by clicking on show button the main information screen will be displayed to the user. The information screen provides quarantine information about Commodity Name, Scientific Name of the Commodity, Country of Origin, Schedule No, Justification, Condition, Additional Details, Authorized Institution and PQ Days as shown in Fig. 12 on the basis of the user selection or criteria.

If there is no information on the basis of inputs from drop-down menu, user will be given information as there is no information in Information screen in Fig. 13 and give message to user to check their queries from Plant Quarantine Order and try with refined criteria in search screen.

Contact us screen in Fig. 14 will be opened when user will click on the Contact us image in the home screen. Contact us screen provides different important Names involved

in development of this mobile application and about their other information like Designation, Contact No. and Email id for user help.

There is an another user interface named About Mobile Application shown in Fig.15 to provide brief details about the mobile app and describes how to use this mobile application step by step. This screen will come by on click on User Guide / About App in Home Screen.

Before home screen comes to user a splash screen for few seconds will appear with icon of the mobile application. Splash screen will come first to user shown in Fig.16 Home screen will automatically come from Splash screen. When user presses back button in Home screen, then an alert message will be displayed to user whether he / she wants to really exit from this PQ Mobile App as shown in Fig.17. After press ok the user will exit from this mobile application. For this mobile application an icon picture or logo has been set which will appear in menu screen with this logo or icon shown in Fig.18.

In conclusion, india there are different mobile application for dissemination of information and services in different areas of agriculture. Plant Quarantine Information System (PQIS) has developed the database of import regulations or conditions for use in approval process of Import Permit applications. This system is developed by NIC and implemented by the Directorate of Plant Protection, Quarantine and Storage, Department of Agriculture & Cooperation, Ministry of Agriculture and Farmers Welfare, GOI and fully operational to provide an efficient and effective delivery of plant quarantine services to importers, exporters, and other stakeholders. PQ Order regulations are integrated in the application to process the applications for issuance of Import Permit and

Release Order. In this research work regulations have been studied in detail for structuring the information and development of the mobile app to provide information in advance.

When an importer, government official or any user wants to know about plant quarantine import regulations they can easily know by this mobile application. It is in this context, the present PQ Mobile app has been developed. This mobile application requires to be installed in phones. Hardware requirement for this mobile application is that user has to use an android phone. This mobile application can be extended with another import condition which is Purpose of Import like Consumption or Propagation. This application just uses the import conditions only. This mobile application can be extended to report Pest Interception information as well as for export conditions to export from India. This mobile application can also be extended for different users like Administrator who can update this information and other users who can only read the information.

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