

# Title: Reasons to implement PWA technology to our project

German Sanchez Edwin Alberto,

Mackintosh Mendoza Cesar Alberto,

Sales Flores Aaron Ismael,

## *Abstract—*

*Mobile applications have become integral in diverse domains, offering constant information access across internet-enabled devices. As computing shifts to accommodate various platforms and operating systems, the development of software applications faces challenges in cost and efficiency. This has led to the emergence of two main types of mobile applications: native, platform-specific developments, and cross-platform, web-based applications using standard technologies like HTML, CSS, and Javascript. Progressive Web Apps (PWAs) represent an evolution in this landscape, acting as a hybrid between traditional websites and native apps. PWAs provide a seamless user experience, allowing local installation on both mobile and desktop devices. Notable platforms such as Telegram, Twitter, and Google Maps have embraced PWAs. This approach, centered on a Mobile First philosophy, emphasizes accessibility through mobile devices and tablets, positioning PWAs as a compelling and unified solution for mobile application development, transcending traditional paradigms.*

The proposal of a platform aiming to revolutionize and modernize a sector characterized by a significant technological lag in logistics and agricultural product marketing processes is an innovative response to persistent challenges. The primary focus of this initiative is to ensure fair and equitable prices for end-users while continuously supporting farmers, breaking down any geographical barriers.

This document aims to detail the vision and strategy underpinning the platform's development. To achieve this goal, it is essential to consider existing technologies and adopt approaches that enhance efficiency and accessibility. In this context, Progressive Web Apps (PWAs) emerge as a fundamental and highly effective tool for building an agile, scalable, and user-oriented platform.

By leveraging modern web technologies, these applications can operate on both mobile devices and computers, eliminating the need to download and install specific applications.

This flexibility not only simplifies access for end-users but also streamlines processes for farmers, enabling them to manage inventories and transactions from anywhere and at any time.

Throughout this document, we will explain in detail how the strategic choice of PWAs as a development tool can boost operational efficiency, enhance the user experience, and significantly contribute to the modernization of the agricultural supply chain.

## 1. PWA? What is that?

Mobile applications are present in multiple domains, characterized by providing access to information and being available at all times from any mobile device with internet access. Most activities that were traditionally performed on a computer, such as checking email or visiting a social network, are now carried out on mobile devices. Currently, for the development of software applications, it is necessary to consider the various existing devices (desktop computers, notebooks, smartphones, tablets, wearables, etc.) and available operating systems (Android, iOS, Windows, among others). Specific development for each platform can be costly, which is why software providers seek

more economical alternatives with similar quality in the final product. There are two types of mobile applications: native and cross-platform.

Native applications are developed using specific technologies, resulting in a new development project for each platform to be covered. Mobile web applications are developed using standard web technologies such as HTML, CSS, and Javascript.

For this reason, development, distribution, and testing are relatively straightforward, making it an option to consider for a presence in the mobile device landscape. These applications do not need approval from a manufacturer for publication and are independent of the platform: only a browser and internet access are required.

In this context, Progressive Web Apps (PWAs) are an evolution of mobile web applications. To introduce the topic of Progressive Web Apps, also known as PWAs, we can say that they are a hybrid between traditional websites and native applications.

They combine the flexibility of the web with the user experience of a native application. These types of applications have the ability to be installed locally on the device, whether it is mobile or desktop. Some sites that have already implemented this technology include Telegram, Twitter, Aliexpress, Google Maps, Tinder, Pinterest, among others.

PWA employs a set of technologies that allows a web application to overcome some of the limitations inherent in the mobile web approach and gives the user the feeling of using a native application. While this approach is oriented towards mobile devices, it allows installations on desktop computers, making it a possibility to unify application development, regardless of the type of device. This feature favors PWAs over other approaches to mobile application development. PWAs are designed with a Mobile First philosophy, meaning they are created with the idea that sites should be accessed from mobile devices and tablets.

## 2. PWA? A Solution?

### 3.1 Accessibility in Rural Areas

In vast rural expanses, where connectivity and technological resources are limited, accessibility becomes a crucial challenge. PWA stands out as a solution, allowing direct access from the browser without requiring extensive downloads or high-end devices. By simplifying access, participation in the platform is

democratized, facilitating direct connection between farmers and consumers in remote communities.

### 3.2 User-Friendly and Intuitive Interface

The user interface is the gateway to the digital experience. In this context, the PWA will be designed to be a natural extension of the platform, adopting the familiarity and fluidity of native mobile applications. Meticulous attention to intuitive design not only improves the user experience but also reduces the learning curve, enabling quick adoption, even for those with limited familiarity with technology.

### 3.3 Poor Internet Conditions

Limitations in connectivity are a reality in rural areas. PWA addresses this challenge by implementing progressive loading capability. This feature allows the application to function optimally even in conditions of intermittent or limited connectivity. Adapting intelligently to network conditions, the PWA ensures a consistent user experience and avoids the frustration associated with connection loss.

### 3.4 Lightweight and Efficient Device Resources

In agricultural environments, where low-end devices are the norm, the PWA will be optimized to operate efficiently on limited resources. From memory management to data loading, every aspect will be fine-tuned to ensure smooth performance on older devices. This not only improves the user experience but also maximizes accessibility, allowing a broad spectrum of users to participate without the need to upgrade their devices.

### 3.5 Ease of Installation and Update

Simplicity is the key to mass adoption, especially in communities with little familiarity with technology. The PWA will allow direct installation from the browser, eliminating the barrier of complex downloads and configurations. Additionally, automatic updates will ensure that users always have access to the latest improvements, without requiring manual actions. This ease of installation and update reduces resistance to change and encourages continuous participation.

### 3.6 Reduced Development and Maintenance Costs

Economic sustainability is essential for long-term success. Choosing a PWA not only improves efficiency in development but also shares a codebase with the web platform, reducing maintenance costs. This benefits not only developers but also ensures that the solution is economically viable and sustainable, allowing constant evolution of the platform.

Together, these aspects of the PWA form the backbone of an initiative that seeks to transcend geographical and technological limitations, bringing digital transformation to agriculture in an inclusive and sustainable manner.

### 3. Advantages

A fundamental aspect to consider when it comes to Progressive Web Apps (PWAs) is the detailed evaluation of their advantages, as this information is essential for informed decision-making. The variety of benefits these applications offer not only redefines the user experience but also represents a critical criterion when determining the most suitable tool to address the specific needs of a project.

Here are some of the most significant advantages of PWAs, providing a comprehensive insight to support the selection of this technology in the development of digital platforms:

- **Multiplatform Accessibility:** The ability to seamlessly operate across various browsers and operating systems provides broader coverage, allowing users to access the platform without restrictions related to the choice of devices or platforms.
- **User Experience Optimization:** Dynamic adaptation to the user's browser, loading speed comparable to native apps, and intuitive navigation contribute to an optimized user experience, increasing user retention and satisfaction.
- **Proactive Push Notifications:** The capability to send proactive push notifications facilitates interaction and ongoing engagement with users, keeping them informed about updates, offers, or any relevant changes.
- **Efficient Space Usage:** The elimination of the need for traditional downloads and the consequent use of space on the user's mobile device provide relief for those who value storage efficiency.
- **Offline Functionality with Service Worker Technology:** The ability to function offline through Service Worker technology ensures that users can continue using the platform even in environments with intermittent or limited connectivity.
- **Automatic and Transparent Updates:** The ability to perform automatic updates without causing inconvenience to the user ensures they are always using the latest version of the application, enhancing security and stability.
- **Responsive and Adaptable Design:** The capability to adapt to any device and screen size ensures a consistent user experience, regardless of the device users are utilizing. Despite the multiple inherent advantages of Progressive Web Apps (PWAs), it is crucial to address the analysis considering potential disadvantages as well. While these drawbacks are minimal com-

pared to the benefits, a thorough understanding is essential for informed decision-making when choosing the right technology. By exploring limitations, one can more accurately weigh whether PWAs are the optimal choice to meet the specific requirements of a project.

### 4. Why choose a PWA for development?

Within the broad spectrum of information gathered about Progressive Web Apps (PWAs), when analyzing and presenting this data, solid conclusions emerge that strongly support the choice of PWAs as the preferred option for development. One of the decisive factors that clearly stands out is the consideration of market share, as revealed by StatCounter GlobalStats, where a significant 57.87 percent of mobile users make up this segment. Ignoring this impressive market share would undoubtedly be a strategic mistake, as not orienting towards this audience could result in serious limitations in our reach and potential impact.


The importance of this data lies in the fact that mobile users represent a significant portion of the digital audience, and by not directing our efforts towards this segment, we would be overlooking a considerable portion of the potential market. PWAs stand out as the ideal solution to address this challenge, as they offer a seamless and high-quality user experience across a variety of devices, from smartphones to tablets. By adopting PWAs, we ensure an effective presence in the mobile environment, providing users with a smooth experience, regardless of the device they use.

This focus on the market share of mobile users is not only a reach strategy but also a direct response to changing consumer preferences, increasingly opting for mobility and flexibility. PWAs, being cross-platform and accessible from any browser and operating system, position themselves as a strategic tool to maximize our impact on this crucial market segment.

Another essential facet that highlights the superiority of Progressive Web Apps (PWAs) is the significant difference in terms of weight compared to native Android and iOS applications. This aspect not only has technical implications but also translates into a more attractive and efficient experience for users.

In our graphical representation, it is evident how the weight of a PWA is significantly lower compared to its native counterparts. This reduced weight translates into several crucial advantages that contribute to user attraction:

- 1) **Faster Downloads:** Since the weight of a PWA



is minimal, the download and installation are completed much faster compared to native applications, enhancing the onboarding experience for users.

- 2) **Device Space Savings:** The lightweight nature of PWAs means they take up less space on users' devices. This is especially valuable in environments where storage is limited, as users can enjoy a functional application without compromising their device capacity.
- 3) **Reduced Data Consumption:** The efficiency in the size of PWAs also results in lower data consumption during installation and updates. This is especially beneficial for users with data plan restrictions or those looking to minimize mobile data usage.
- 4) **Quick and Efficient Access:** The lightness of PWAs allows quick and efficient access, eliminating the need to wait for extended periods during download and installation. This contributes to a smoother and more appealing user experience.
- 5) The graphical representation highlights how choosing a PWA can mean not only an effective technological solution but also a more enjoyable and accessible user experience. By minimizing the entry barrier associated with the application's weight, PWAs position themselves as an attractive option that meets the expectations of modern users who value efficiency and speed in their digital interactions.