



The Impact of Digital Markets for the Adoption of Applications from Independent Developers

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Summary

Some students, like some individuals, have difficulty acquiring accounting software, because of high app prices. This is why we placed a new app, often kept in the drawer, on the Google Play Store to study its possibilities for adoption. The app has an educational character, is based on Ohada General Accounting, and is distributed free of charge.

From the statistics provided by Google Play Console, analyzes based on two metrics, in particular the country where the user is located and the version of Android, revealed the importance of free distribution and made it possible to understand that software can still be useful provided you have the necessary basic functionality. Therefore, it goes without saying that adoption is the ability to accept a new product that satisfies the needs of the user daily.

The acquisition and loss of users are two phenomena that have particularly caught our attention, taking place in the market and are the basis for the loyalty or adoption of applications.

The updates represent the degree of software adoption. A user can update the app only in the case of daily use and especially when he is satisfied.

The update is the result of the maintenance of the app which is the consequence of the exploitation of the opinions and recommendations obtained thanks to the use of the software.

Introduction

In the digital age, computer applications are produced not only by the giants of the software industry but also by individuals commonly called independents. The latter are discharged each year into the job market as new graduates by university institutions.

At the end of their studies, they produce applications that are often interesting but untapped because they are hampered by problems of distribution and adoption because of existing similar products that have won the trust of users and whose quality is irreproachable. These unsold items meet the concern expressed by a team of researchers (Imane, Razane, Chafik, & Mohamed, 2016) where it was found that these productions constitute a waste of time and money.

The question then arises of how to make software helpful to users.

Currently, there are digital markets where, on the one hand, independents and industries can expose their software according to well-established rules and, on the other hand, users can download it according to the planned distribution methods. As a result, distribution and acquisition hurdles no longer have a place for both producers and savvy consumers.

This is the reason that led this research by placing in Google Play Store the mobile version of the "Easy Accounting" application, the result of a university study, long kept in the drawer, with a view to analyzing the parameters that could lead its adoption to a wider audience.

Therefore, it is necessary to verify the hypothesis according to which an application will be adopted as soon as it is placed in a digital store and is distributed free of charge.

The objective of this work is therefore to seek to clearly understand the adoption process to offer them to independents as mechanisms to fight against the production of unexploited applications.

I. Literature review

I.1. Adoption process

[Mobile app adoption](#) is an ongoing, long-term loyalty process of helping customers use an app correctly and consistently and encouraging them to use additional or newer features (Gilliam Haije, 2022).

Imane and his team (Imane, Razane, Chafik, & Mohamed, 2016) have identified three moments in the process of adopting information systems, namely:

- Acceptability which predicts the potential use of a technology based on subjective representations,
- Acceptance which corresponds to the implementation of a new system in each environment and,
- The approval that corresponds to everyday use of technology.

In their study, the authors placed particular emphasis on the difficulties linked to the process, which should be summarized in these terms:

- The information system does not meet the objectives for which it was set up,
- The imposition of using a new system by the hierarchy.

According to Imane and his team (Imane, Razane, Chafik, & Mohamed, 2016), the factors that influence the adoption of new systems are:

- Age: young people will have a better chance of adapting to new systems,
- Workload: those who are less busy will have time to learn,
- Motivation,
- Added value: the new system must innovate the existing one.

For Gilliam Haije (Gilliam Haije, 2022), the following three elements are required for application adoption:

- App onboarding: The role of onboarding is to educate the user about the functions and/or benefits the app provides, get them registered, and of course, gather information that can be used to customize app content (Gilliam Haije, 2022). This is where training comes into its own. A user manual needs to be created. Using software does not always have to be intuitive. Misunderstanding is one of the causes of abandoning the use of the application immediately after installation. So, app features should be clearly spelled out.
- Knowledge of the user: for him, it is important to get to know and understand the user: his intentions, the way he uses the application and especially the difficulties he encounters. It is therefore appropriate to regularly request the opinions of users, which are posted in the repositories.
- Good presentation of features: Features should be presented through documentation, discussion forums and other documents or means.

Gilliam (Gilliam Haije, 2022) qualifies all these steps as an essential strategy for driving the adoption of mobile applications. This strategy begins by listening to the user, understanding his needs and his difficulties.

I.2. Educational software and its features

I.2.1. Definition

Economy-Wiki (Économie-Wiki.com, 2021) defines an educational software as a program whose objective is to supplement the teaching during the student's schooling. This software is designed for the sole purpose of facilitating teaching and learning (Thpanorama, 2022).

Educational technology brings together technological solutions that enable applications in the field of teaching and learning. This includes both devices and software and all technical solutions that can be applied in modern learning methods (idruide, 2019).

I.2.2. Educational Software Features

All the literature supports that an educational software must have the characteristics listed below (Thpanorama, 2019):

- They can be used in any field of education,
- They use interactive tools,
- They are versatile, as they must adapt to the characteristics of different types of users,
- It should be easy to use. The most important thing is that the student can use it easily (in case it is used without the supervision of the teacher), that is, quickly understand how to install it, how to register it and how to download and how to run it without additional help,

- Depending on the type of software, the educational process can be more directive or more constructivist. The student can follow a more guided process in which answers are given or a process in which the program does not offer answers but seeks to be the student who analyzes and comes to conclusions itself.

According to DOMINIC (DOMINIC, 2015), educational software must have the following characteristics to be effective learning tools.

- **Feedback:** Feedback should be effective and relevant. According to him, an application intended to be educational should be able to comment on learner's answers, guide them and propose, if necessary, alternatives to bring them to the targeted learning.
- **Determined learning:** an educational application should not be generalist. The application must allow to learn effectively. It must bring added value.
- **Complex task, simple interface:** the software must be easy to use. Technical complexity is not very useful.

1.3. Educational general accounting Software

1.3.1. Search for acceptability for the accounting application

Since software must be easy, we have implemented a solution that we have named "Easy Accounting". As the literature has pointed out, the software automates tasks considered boring and does not solve problems that require the student's reflection and intellectual effort to promote the learning process.

In the presence of the statement of an accounting exercise, the student will first have to pass the accounting entries. Consequently, educational software should present no difficulty in grasping them.

Fred (Fred, 2019) in his article, points out that accounting entry is the fundamental subject of accounting. It is the information that registers each movement in the accounts. All flows of an economic, commercial, or financial nature are written to a file. Each accounting entry has at least two lines, each of which is broken down into several columns. An accounting entry includes at least one debit and one credit, which must balance.

1.3. 2. Basic components of the application

Fred (Fred, 2019) lists the important elements that an accounting entry must have. It is:

- date of the operation,
- nature of the operation,
- supporting document reference,
- imputed accounts,
- the amount of the transaction,
- the direction of the operation (debit if use, or credit if resource).

The important documents (Fred, 2019) that must be kept in general accounting during the financial year are:

- the newspaper
- the ledger
- the book of inventory.

At the end of the financial year (closing), the following elements must be established (Fred, 2019):

- the balance sheet,
- the income statement,
- annex

1.4. Digital markets

To reach the public targeted by the application, we thought it best to place it in a market where it will be appreciated at its true value according to the free distribution method .

A digital marketplace (juriste, 2022) is a space where individuals and businesses, regardless of their nationality and place of residence, can access and engage in online activities within a framework that ensures fair competition and a high level of consumer protection and personal data.

We retain two important elements from this definition:

- Access to activities by individuals and companies,
- Consumer and personal data protection.

By the digital market we mean a set of platforms for safeguarding and promoting computer applications.

1.5. App Rating

A metric is a quantitative measure, such as an average, ratio, percentage, etc. It is always a number and not a text. The user can thus apply mathematical operations to the metrics. *Number of events* is an example of a metric. It shows the number of times an event has been triggered in total (Aide Google Analytics, 2022).

Applied to software production, a metric is an indicator of the progress or quality of software developments ¹.

Among the planned metrics, we looked at acquisition and update.

II. Easy accounting app deployment methodology

II.1. Google Play Store as a study setting

Google Play store is the market for the acquisition and distribution of digital products. It is a go-to market for Android apps.

Google Play Store is a free download center that allows you to download mobile applications, games, books, movies, and other entertainment (free or paid) on your Android smartphone or tablet (Les Numériques, 2022).

The Easy Accounting app was placed in Google Play Store on September 6, 2022, at 9:46 p.m. for free distribution in 176 countries.

It was published on September 10, 2022, by Google. The data thus collected extends until June 8, 2023, i.e., 245 days of distribution experience.

However, as its name suggests, it is an app intended more for member countries of the Ohada area. The Organization for the Harmonization of Business Law in Africa brings together 17 States with 275 million inhabitants. It has set up an accounting law imposed in all member states.

So the app, which is educational in nature, is aimed at anyone learning accounting. The app is written in French, especially since the latter is one of the working languages of OHADA apart from English, Spanish and Portuguese ².

II.2. Validation steps by Google Play

There are quality constraints to be met for an app, to be accepted. Safety and respect for the life of the user are part of this.

II.2.2. Google Play store sheet

The Google Play Store is Google's official service, games and applications are therefore regularly tested there and it is rare to come across malicious programs within the software offered for download (Les Numériques, 2022).

The Google Play store file is a small presentation as well as user comments that accompany each of the "products" (Les Numériques, 2022). It helps users to discover an application (Google, 2022) and includes the elements of the form which are:

1°) Title

- The title should be unique, easily understandable, and reflect the content of your app.
- It should not have subtle misspellings in generic terms, as users are likely to correct them when entering their search queries.

2°) Description

- It must describe the needs of users and what the application can bring them.

3°) Promotional text

- A brief one-line description of the application.

4°) Graphic assets and images

- Icons, images, and screenshots help an app stand out from others in search results, categories, and app selections.

¹ [Metric \(software\) - Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Metric_(software)) Oct 23 '22 at 1:45 PM

² <https://www.ohada.com/1-ohada/states-members-of-ohada.html>

II.2.3. Data security form

Google Data Security makes it easy for a developer to tell users what data an app collects or shares. This practice allows users to make a wise choice of the app because the information is displayed on the Play Store listing. The types of data to be disclosed are as follows:

- All required user data that is collected and/or shared,
- All user data transmitted from the user's device by the libraries or SDKs used in the app, either to the developer or to a third party.
- All user data transferred from the developer's server to a third party, or another third-party app on the same device.
- All user data collected or transferred through the WebView technology that can be opened from the app unless users are browsing the open web.

We have clarified to Google that our application does not collect any information. The data entered by the user such as the name of the company, the rccm, and others are provided for their display in the accounting statements and the financial statements: they are stored in a database which is in the memory of the device and no information is transmitted to our server.

In short ;

- The user data collected by our app is not encrypted during transfer as it remains on the user's device,
- Our app does not collect the approximate location or the exact location of the user,
- The app collects the name of the company, its physical address, its telephone number, its rccm as well as the accounting data to establish the accounting documents and the financial statements. This data can be deleted at any time and remains in the user's device.

II.3. Acquisition as an app acceptance and adoption metric

Google defines user acquisition as the number of users who installed an app and hadn't installed it on any device at that time. This includes users who activated a new device or reactivated an inactive device that had an app installed ³.

We exploited two sub-parameters of the acquisition which are the country of origin and the version of Android.

The country is the location of the user or device. This setting is detected on the still active device where the user most recently acquired the app.

Android version is the most recent version of Android running on the device where the application is installed. This is the still active device on which the user most recently installed or reactivated the app.

III. Presentation of the results

The data presented below are the results obtained after 245 days of observation.

There are three types of result presented in the following lines, namely:

- The acquisition of the application by country,
- Acquisition by version of Android,
- Updates.

III.1. Acquisition table by country

The table below shows the acquisition of the app worldwide, in the Ohada area, from September 10, 2022, to June 8, 2023

| Member countries of Ohada | | | | | | | | | | | | | | | | | Other countries |
|---------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|
| CD | CI | CM | CG | GN | ML | TD | NE | BF | TG | SN | BJ | GA | CF | KM | GQ | GW | |
| 1064 | 98 | 98 | 72 | 68 | 54 | 50 | 49 | 46 | 38 | 35 | 35 | 28 | 15 | 11 | 6 | 2 | 106 |

Table 1: Source (Google Play Console)

³This detail is only available from a Google Play Congole account

Legend

| | | | | | |
|----|--------------|----|-------------------|----|---------------|
| BJ | Benign | GA | Gabon | SN | Senegal |
| BF | Burkina Faso | GN | Guinea | TD | Chad |
| CM | Cameroon | GQ | Equatorial Guinea | TG | Togo |
| CG | Congo | GW | Guinea-Bissau | CF | RCA |
| KM | Comoros | ML | Mali | CD | D.R, of Congo |
| CI | Ivory Coast | NE | Niger | | |

Source : (OHADA, 2023)

III.2. Acquisition chart by country

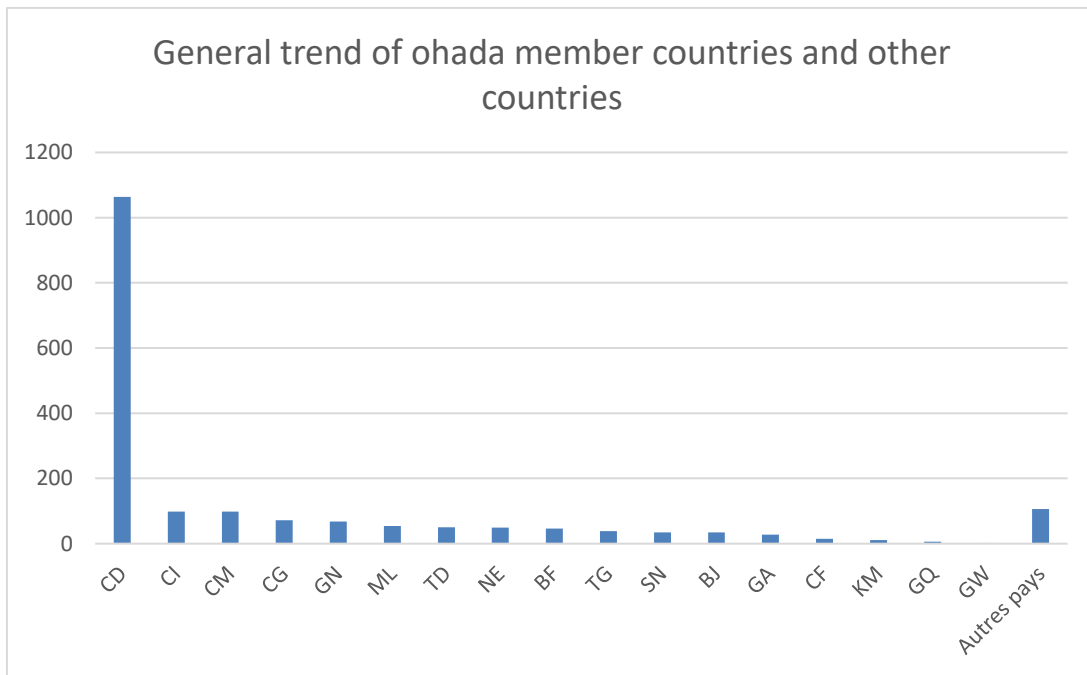


Chart 1: Source: Ourselves.

II I.3. Acquisition table by Android version

The table below shows the total number of installs for each version of Android.

| | A13 | A12 | A12L | A11 | A10 | A9 | A8.1 | A8.0 | A7.1 | A7.0 | A6.0 | A5.1 | A5.0 |
|-----------|-------|-----|------|-----|-----|-----|------|------|------|------|------|------|------|
| June 2023 | 8,105 | 375 | 4 | 668 | 393 | 151 | 89 | 29 | 12 | 26 | 15 | 7 | 1 |

Table 2: Source: Google Play Console

III.4. Acquisition chart by Android version

The graph below represents the data processed in Table 2.

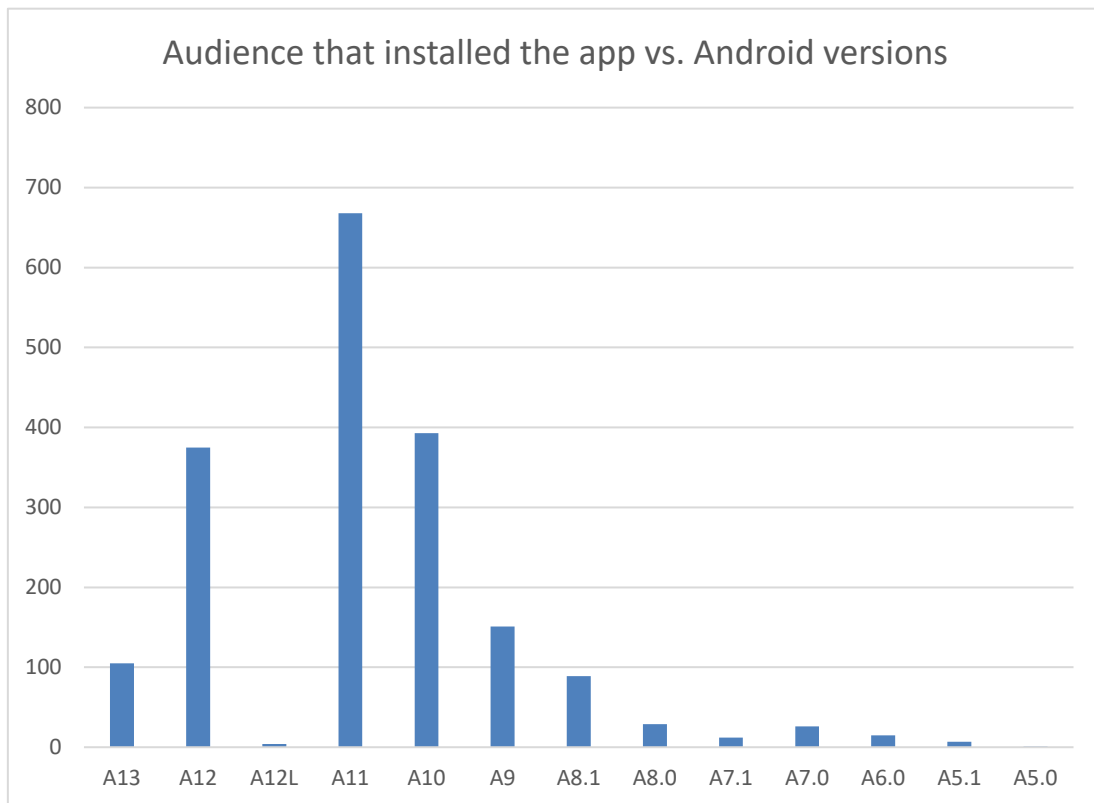
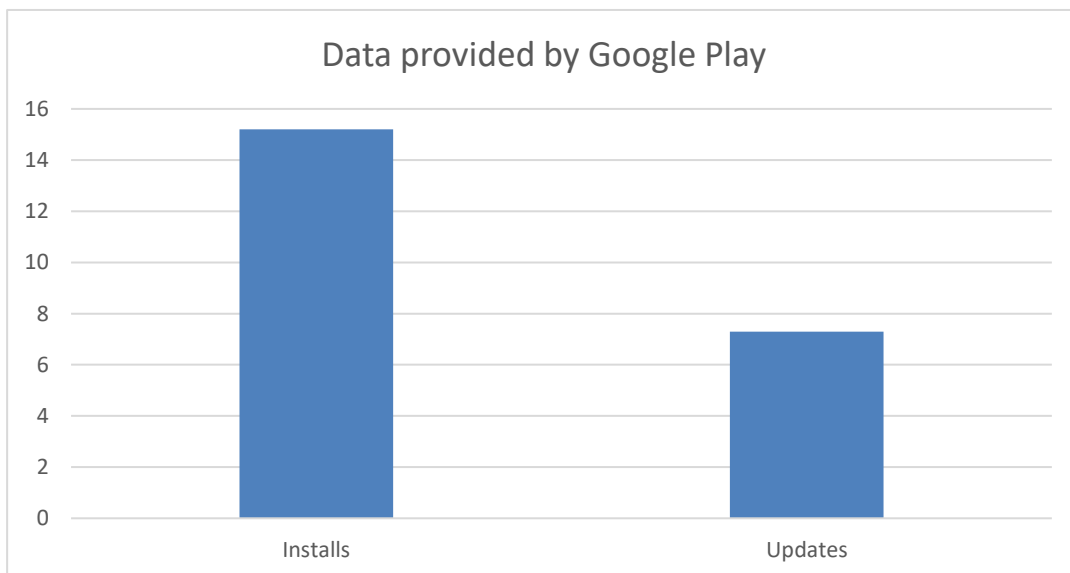


Chart 2: Source: Ourselves.

III.5. Table of the relationship between Installs and Updates

Google identified during the period studied, the following data:

- 15.2 Gigabytes of installations
- 7.29 Giga bytes of updates



Source: Google Play Console (Nduda Luamba, 2023)

I V. Discussion

The discussion is based on the three tables presented in the presentation of the results. It is :

- Acquisition by country
- Acquisition by version of Android
- The relationship between installs and updates

IV.1. Based on results in Table 1

This table shows all the installations made during the period observed by our study where we notice a very high number of installations in the Democratic Republic of Congo, i.e., 1064, followed by Cameroon and Ivory Coast where everyone succeeded in installing the app. 98 times.

Our discussion will be focused on the extreme cases according to the tables below:

First category: countries with more installations

| | |
|-------------|------|
| DR Congo | 1064 |
| Cameroon | 98 |
| Ivory Coast | 98 |

What influenced the massive use of the app in the DRC?

The developer of the app is a teacher of Congolese nationality from DR Congo. As a teacher, he recommended students to use the app in their accounting class.

He had to organize professional practice for students enrolled in accounting at the Higher Institute of Commerce in Kinshasa on two occasions where they were able to manipulate the app. He also shared the installation link in several WhatsApp groups.

These different actions have positively influenced the acquisition of the app.

Second category: countries with fewer installations

| | |
|-------------------|----|
| Comoros | 11 |
| Equatorial Guinea | 6 |
| Guinea-Bissau | 2 |

Guinea Bissau uses Portuguese as its official language. Only about ten percent of the population speak it fluently ⁴.

Equatorial Guinea uses Spanish as its official language. It was only in 1998 that French became its second official language and Portuguese its third ⁵.

The Comoros use the languages of the Comorian group and French. French is the administrative language while Arabic is the religious language ⁶.

The Easy Accounting app is completely written in French. It is true that it is impossible for it to be adopted in these three regions.

IV.2. Based on results in Table 2

We have subdivided this result into three parts, namely:

| | | |
|--------------------------|--|------------|
| State-of-the-art devices | Android 13 | Category 1 |
| Sophisticated device | Android 12L | Category 2 |
| Devices in mode | Android 12, 11 and 10 | Category 3 |
| Mode-resistant devices | Android 9 and 8.1 | Category 4 |
| Disappearing devices | Android 8.0, 7.1, 7.0, 6.0, 5.1. and 5.0 | Category 5 |

Category 1

⁴<http://hrlibrary.umn.edu/africa/french/fgbissau.htm#:~:text=Although%20that%20the%20official%20language,languages%20africans%20of%20Guin%C3%A9e%20Bissau.>

⁵https://fr.wikipedia.org/wiki/Langues_en_Guin%C3%A9e_%C3%A9quatoriale

⁶https://fr.wikipedia.org/wiki/Langues_aux_Comores

This category is crowded with fewer users, perhaps, because this version of Android has even fewer users.

Category 2

The Android 12L was designed for devices with large screens, including foldable smartphones, tablets and laptops running Chrome OS. Given its characteristics, we realize that this version of Android can only show a deficiency in the acquisition of the app.

Category 3

Many users have this version of Android. Therefore, the application must turn more towards this category of devices.

Category 4

These devices are used less and less.

Category 5

These devices are gradually disappearing. It is normal that the application is not present in these devices.

IV.3. Based on results in Table 3

In relation to installations, we can say that updates represent 47.96%. This percentage was calculated as follows:

If 15.2 Giga is 100%

We can deduce that 1 Giga = $100 / 15.2$

Therefore the 7.29 Giga of updates = $100 * 7.29 / 15.2$, which gives 47.96% as of June 8, 2023. This percentage represents the level of adoption of the app.

Adoption is a process of building user loyalty. This loyalty must above all go through user satisfaction, which is based more on the expected functionalities.

IV.4. About the shipping

We are often asked the question of what we gain by distributing the app for free. In our opinion, money does not buy happiness. Our pleasure is to see only that our work is exploited by users. Maybe we'll think about marketing it, but for now the concern was to make sure the app was used and adopted.

It should be remembered that not a day goes by without the app being installed somewhere in the world.

Conclusion

The 'Easy Accounting' app was released in Google Play Store on September 10, 2022.

It has had strong moments when users have had to download it, but also weak times that correspond to the various losses of users who have abandoned it following the constraints imposed by Google's regulations. It is difficult to determine precisely other reasons for its abandonment. However, one of the reasons that can be cited is the restriction imposed by Android in its versions 11 to 13 which requires users to allow applications to write and read from internal media. The development software used did not grant the possibility of inserting such an instruction. The consequence was very unfortunate: users could not use the app correctly because it would have to save and retrieve data in the mass memory on the one hand and print documents and financial statements on the other hand by opening other apps like pdf reader. Hence, the app was useless for all Android 11 to 13.

In other words, the adoption takes place in two phases:

- Installing the application for the first time,
- The installation of the various updates which correspond to the corrections undergone by the app following the opinions and recommendations of the users.

From the date of publication to June 8, 2023, the app has been installed on 1875 devices worldwide, an equivalence of 15.2 Giga bytes and it has experienced during the same period 7.29 Giga bytes of updates.

Therefore, the app is adopted at 47.96% as of June 8, 2023. This represents a very favorable score given that the app has become very useful in the eyes of users around the world.

Referring to Imane's theory on the adoption process, and according to the second moment of the process, it should be confirmed that the app has been accepted regarding the number of downloads. From the third moment of this process, we can say that the different updates sufficiently show the approval of the app by the users.

There is a saying that tastes and colors don't argue. Therefore, developers are asked not to underestimate their products, to share them according to the distribution method that seems user-friendly to them. There will not miss a person on the other end of the world who can be interested in it.

Therefore, we confirm the hypothesis according to which an application placed in a digital market and distributed free of charge will be adopted if it satisfies user's needs.

Our scientific contribution is that we have succeeded in marketing an app produced by an independent company which relieves a lot of users.

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