

**GOVERNMENT ARTS COLLEGE
CBE**

MOBILE APPLICATION DEVELOPMENT

UNIT-1

MSc COMPUTER SCIENCE

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INTRODUCTION TO MOBLIE APPLICATION

INTRODUCTION TO MOBLIE APPLICATION....

- A mobile application, also referred to as a mobile app or simply an app is a computer program software application designed to run on a mobile device such as a tablet, or watch.
- Apps were originally intended for productivity assistance such as email, calendar, and contact databases.
- But the public demand for the apps caused rapid expansion into other areas such as mobile game, factory automation, GPS and Location Based Services, order-tracking, and ticket purchases, so that there are now millions of apps available.

Continue...

- Apps are generally downloaded from application platforms which are operated by the mobile operating system, such as the **APP STORE** or **GOOGLE PLAY STORE**.
- Some apps are free, and others have a price.
- **WEB APPLICATIONS** which run in **MOBILE WEB BROWSERS** rather than directly on the mobile device.

TYPES OF MOBILE APPLICATION

- Mobile applications may be classified by numerous methods. A common scheme is to distinguish
 - ✓ Native Mobile Application
 - ✓ Hybrid Mobile Application
 - ✓ Web-Based Mobile Application

NATIVE MOBILE APPLICATION....

- All apps targeted toward a particular mobile platform are known as native apps. Therefore, an app intended for **APPLE device does not run in ANDROID devices.** As a result, most businesses develop apps for multiple platforms.
- While developing native apps, professionals incorporate best-in-class user interface modules. This accounts for better performance, consistency and good user experience.
- Users also benefit from wider access to **APPLICATION PROGRAMMING INTERFACE** and make **limitless use of** all apps from the particular device.

ADVANTAGES & DISADVANTAGES OF NATIVE APPS

- ***ADVANTAGE***

1. Native are very fast.
2. Easily distributed in Google play and apps stores.
3. More interactive and intuitive.
4. Easily interact with any feature of the phone.

- ***DISADVANTAGES***

1. Built for a single platform
2. Languages like Swift and Java used to build these types of apps are hard to learn.
3. Expensive to develop.
4. Hard to maintain.

HYBRID MOBILE APPLICATION

- The concept of the hybrid app is a mix of native and web-based apps. Apps developed using **APACHE CORDOVA, XAMARIN, REACT NATIVE, SENCHA TOUCH** and other similar technology fall into this category.
- These are made to support web and native technologies across multiple platforms. Moreover, these apps are easier and faster to develop.
- It involves use of single code base which works in multiple mobile operating systems.
- Despite such advantages, hybrid apps exhibit lower performance. Often, apps fail to bear the same look-and-feel in different mobile operating systems.

ADVANTAGES & DISADVANTAGES OF HYBRID APPS

ADVANTAGES

1. Easy to build.
2. Much cheaper than a native app.
3. Single app for all platforms.
4. No browser needed.
5. Can usually access device utilities using an API (Application Programming Interface)
6. Faster to develop than native apps.

DISADVANTAGES

1. Slower than native apps.
2. More expensive than web apps.
3. Less interactive than native apps.

WEB – BASED APP

- A web-based app is coded in **HTML5, CSS or JAVASCRIPT**. Internet access is required for proper behaviour and user-experience of this group of apps.
- These apps may capture minimum memory space in user device compared native and hybrid apps.
- Since all the personal databases are saved on the internet servers, users can fetch their desired data from any device through the internet.

ADVANTAGES & DISADVANTAGES OF WEB APPS

ADVANTAGES

1. Reduced business cost.
2. No installation needed.
3. Better reach as it can be accessed from anywhere.
4. Always up-to-date.

DISADVANTAGE

1. Dependent on Internet speed.
2. Internet not that sophisticated.
3. Take a longer time to develop.
4. Security risk.

IMPORTANCE OF MOBILE APPLICATION

BUSINESS EXPOSURE

- Smartphone users spend more time online. Research shows that smart phone users spend at least 162 minutes per day on both apps on her smart phones.
- So having an app can help increase business visibility and promote business growth.

CUSTOMERS LOYALTY

- Mobile apps can be used to enhance customer apps because it allows businesses to communicate directly with their customers through in-app purchases, ads, promotions, and notifications sent to consumers' phones through mobile apps.

AVAILABLE MARKETING TOOL

- Mobile apps can be used as a marketing tool to reach target customers.
- Business owners don't have to print huge brochures to reach new customers, because mobile apps can provide information, registration/booking forms, accounts, newsfeed, and other valuable marketing tools.
- Users can learn about promotional offers by using push notifications.

INCREASES ACCESS TO USERS

- With over one billion mobile smartphone users in the world, mobile apps can increase business access for potential users.
- With the app, the business owner can send discount notifications and promotional offers to all of his clients at once.

INCREASES SALES

- Mobile apps have been used to increase sales of goods and services and make greater profit.
- UK-based Domino's Pizza has increased sales by 28 percent since the launch of its mobile app. Half of the orders placed online are done on mobile apps..
- Most mobile apps are integrated with Facebook, Twitter, Instagram and other social media sites for extensive marketing coverage.

STRATEGIES

INTRODUCTION TO STRATEGIES....

- One of the key mobile app development strategies is to focus on target users and develop It accordingly. Today there are multiple devices types like iPhone, iPad, Android, Blackberry and the apps need to be developed for multiple platforms.
- Nowadays an iPhone app has become a necessary entry point for mobile apps.

STRATEGIES....

- Communication has become swift as mobile apps are fast, visually interactive and can be easily integrated other mobile features.
- Smart phones have changed the life forever. The number of consumers accessing information via smart phones, tablets and wearable has been increasing with time.
- People prefer a mobile app for storing and managing data, online shopping, socialising, navigating etc.

Continue....

- Incorporating mobile app with business requires robust strategies, Instead of hastening with app launch, enterprises, and mobile app developers should go for a thoughtful and patient strategy to achieve the best products.
- Here are five strategies on developing customer engaging and profitable mobile applications.

FIVE STRATEGIES....

- ✓ Leveraging cloud-technology for mobile app development
- ✓ Enhancing data security
- ✓ Performances of mobile app
- ✓ Monetization strategy
- ✓ Shifting focus from app download to continuous engagement

LEVERAGING CLOUD-TECHNOLOGY FOR MOBILE APP DEVELOPMENT

- Cloud based mobile development has various advantages over traditional desktop- based tools.
- Development on cloud provides benefits like standardisation, flexibility, agility and operational cost saving making the cloud model too alluring.
- Companies in the software industry are taking advantage of cloud and all its fantastic benefits: many consumer application and business application are now cloud-based such as email, CRM, etc.

CONTINUE....

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- Developers can develop from anywhere with cloud-based development tools without having to install and maintain the infrastructure.
 - From customer's perspective cloud-based mobile app development provides a smooth learning curve and a faster on-boarding process for new user.

ENHANCING DATA SECURITY

- The fact is user doesn't care about data security and privacy while using the apps, here making it vital for developers to take precaution rather than tacking actions after data leakage.
- Some of the security issues in mobile in mobile app development can be insecure data storage, weak server side controls, unintended data leakages, broken cryptography, etc.
- This kind of security is achieved by encryption and SSL (Secure Socket Layer) certificates and if we fail to use the proper SSL library user's crucial information can be at risk.

PERFORMANCES OF MOBILE APP

- Customer hate when the mobile apps crash or they slow down or hung up for few seconds.
- Mobile app crashes even causes issues like losing user's data
- Organization need to consider memory management, software lifecycle, inadequate testing, network management, error condition and development strategy.

MONETIZATION STRATEGIES

- Mobile apps are becoming huge business .
- It has been estimated by analysts that app-related revenues will reach more than \$70 billion till 2017.
- In-app purchases and in-app advertising are something that companies can strategize before launching can strategize before launching the mobile app.
- This call-to-action should show interconnected features thus provoking user to purchase the entire package ultimately

CONTINUE....

- Another approach complain use for making money from free mobile apps is sponsorship.
- Here the companies partner rewards for completing certain action within the app.
- Here the mobile app earns money by taking a share of revenue from redeemed rewards and also allows to incorporate ads that actually the app's ability to engage more customers.

SHIFTING FOCUS FROM APP DOWNLOAD TO CONTINUOUS ENGAGEMENT

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- The first focus of mobile app developers is achieving maximum downloads, but an app isn't successful unless it drives user engagement.
 - Developers should work with the end clients at the design phase to better understand the features that are most in demand.
 - This is possible with the inbuilt analytics of the mobile apps.
 - Some of the examples mobile application analytics are the frequency of use, retention, crash reporting, devices type, etc.

CHALLENGES

CHALLENGES

- The mobile app world has seen significant hype in the recent past. Most of the entrepreneurs have either already build mobile apps for their business or the plan is at the top of their business strategies.
- Understanding the challenges and making strategic solutions to overcome those are very important. Six biggest challenges in mobile app development are highlighted.

DEVICE COMPATIBILITY AND SCREEN SIZE

- Every business wishes to convey an impressive first impression to their end users. After all, the future of the app depends on how much end users liked it. Device compatibility is perhaps the most important factor for a mobile app. Make sure that the app provide flawless service and compatible on multiple devices.
- OS selection is very much important. Apple and Android require different development procedure, UI elements and frame works to execute, so a business owner must research well about the nature of their business and their target audience before taking a final call.

ATTENTION

- It is very important for a business to stand tall to flourish in their respective industry.
- There is a big difference between a good app and a successful app. There are many good apps, but after few months or years they vanish from the app market, but successful apps are those which remains for a long time and generate revenue.
- As a business owner, you need to have precise knowledge of app promotion. A lot of PR & media planning, social & viral marketing should involve.

FUNDING

- Another commonly faced challenge for building an application is money. It is very important to have a fair idea of the over all cost associated with mobile app. It is not a one time investment. The app needs money for any future value addition.
- User are not a technical person and extensive market research is needed before finalizing app developer. Remember, Quality matters.

CUSTOMER REVIEWS & EXPERIENCE

- While developing Business App the focus is solely on users. It is good to know all the in & out related to mobile app. The customers should never find any difficulty in navigating the app.
- It may lead negative customer reviews. It can hurt the number of downloads and also active users. To overcome this, keep UI simple. Include helpful resources in app stores including videos, images and doc files to help users. Always use icons and thumbnails which can help improve the user experience.

PERFORMANCE

- Beside developing a successful app and providing superior customer experience, most app developers face a common challenge for ensuring a world class app performance.
- The challenge includes a running application with out crashes or bugs and at the same time consumes as little space in the device with out affecting battery life. During the initial stage of the app development, the focus is on ensuring that design performs well on all the available mobile devices.
- A good performing app can provide a good number of audience. Once the hurdle of testing is crossed, an opportunity to create an excellent mobile app opens up.

SOFTWARE REQUIREMENT FOR DEVELOPING MOBILE APPLICATION

WHAT IS SOFTWARE....

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- A software is a set of programs and instructions.
 - A computer software is essentially a type of program which enable the users to perform specific task to operate their computer.
 - It essentially directs all of the peripheral devices on the entire computer system –what exactly to do and how exactly to perform a task.
 - A software plays a key role mediator between the user and the computer hardware.
 - In the absence of software computer can't perform.

SOFTWARE REQUIREMENTS

- Requirement is based on utilization and observing performance of pilot project is recommended prior to scale.
- The problems can be to automate a part of a system, to correct shortcomings of an existing system, to control a device, and so on.
- A condition or capability needed by a user to solve a problem or achieve an objective.
- A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.

TYPES OF REQUIREMENTS....

Software requirement can be of three types

- ✓ Functional requirements
- ✓ Non – functional requirements
- ✓ Domain requirements

DESKTOP SOFTWARE

- Desktop software or applications can be considered as a local version.
- Service or web applications that provide.
- The interaction option between the application processing and user without having to directly connect with the web service.

OPERATING SYSTEM	TECHNICAL REQUIREMENT
window	Windows 7, 8.1, and 10
Mac	Mac OS 10.12+
Linux	Ubuntu LTS releases 18.04 or later

MOBILE APP

- A mobile application, most commonly referred to as an app, is a type of application software.
- It designed to run on a mobile device, such as a smart phone or tablet computer.

OPERATING SYSTEM	TECHNICAL REQUIREMENT
iOS	iPhone 5s devices and later with iOS 11+
Android	Android devices with Android 7+

MOBILE WEB

- The mobile web refers to the use of the internet through handheld mobile devices.
- Increasingly, smart phones and other devices with wireless access the same "full" internet traditionally accessed on desktop or laptop computers.

OPERATING SYSTEM	TECHNICAL REQUIREMENT
iOS	iOS 11+ with Safari 12+ or Chrome 77+
Android	Android 7+ with chrome 77+

EMAIL CLIENTS

- Email client is a desktop application.
- That enables configuring one or more email addresses to receive, read, compose and send emails from that email address(s) through the desktop interface.
- Three types of Email client.
 - 1. Desktop Clients**
 - 2. Web based clients**
 - 3. Mobile Clients**

DESKTOP CLIENTS

- A desktop client is an application running in a desktop or laptop computer.
- This term is often used to contrast the desktop version with its mobile counterpart, both of which are commonly offered for the same function in today's world.

Desktop Clients -Apple mail version 7+

WEB BASED CLIENTS

- Client-side components are typically computer applications running on a user's computer and connect to a server.
- These components perform client-side operations as they might need access to information available only on the client side.
- user input, or because the server lacks the processing power necessary in such operations.

Web based clients—office 365,Gmail,Yahoo

MOBILE CLIENTS

- On the client device, the mobile client facilitates the transfer of data to and from the client database.

Mobile clients–iOS mail App (iOS7+), Gmail mobile app (andriod, iOS)

HARDWARE REQUIREMENT FOR DEVELOPING MOBILE APPLICATION

HARDWARE REQUIREMENTS

- The hardware Requirements are the requirements of a hardware device. most hardware Only has operating Systems requirements Or compatibility.
- For example , a printer may be compatible With window XP but not compatible with newer versions of windows of like windows10, Linux, or the Apple Mac OS.
- Recommended operating system :
 - Windows : 7 or new
 - Mac : OSX v 10.7 or higher
 - Linux : Ubuntu

HARDWARE REQUIREMENTS

- **Processor:** Minimum 1GHz; Recommended 2GHz or more.
- **Ethernet connection:** (LAN) or a wireless adapter (wifi).
- **Hardware Drive:** Minimum 32GB; Recommended 4GB or more.
- **Memory (RAM):** Minimum 1GB; Recommended 4GB or above.
- **Sound card W /Speakers**
- **Some classes require a camera and microphone.**

TYPES OF REQUIREMENTS

They are four types of requirements

- ✓ Functional Requirement
- ✓ Performance Requirement
- ✓ System Technical Requirement
- ✓ Specification Requirement

PURPOSE OF HARDWARE

- Hardware is the physical components that a computer system requires to function.
- It encompasses everything with a circuit board that operates within a PC or laptop including the motherboard, graphics card, CPU (central processing unit), ventilation fans, webcam.

BASIC HARDWARE NEEDS

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- The primary hardware needed is a modem. The type of Internet access chosen will determine the type of modem needed.
 - Dial-up access uses a telephone modem , DSL service uses a service modem. Cable access uses a Cable modem, and satellite service uses a satellite adapter.

TYPES OF MOBILE APPLICATION

SOURCE OF DATA AND INFORMATION

- Businesses can use mobile apps for information about consumer preferences and behaviour to make important decisions based on the data collected.
- It has the foresight of increasing sales and improving the customer's experience.

COMMUNICATION APPS....

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- In terms of communication, *Indian app developers* have developed apps such as Skype, Telegram, Wechat, Facetime, WhatsApp, and Facebook Messenger for easy and better communication with families and loved ones.
 - Prior to the emergence of these mobile apps, the dependence totally was on computers and laptops for Skype calls and exuberant charges for calls involving long-distances.



Skype

Facetime

Wechat



Telegram

Whatsapp

Facebook Messenger

Apps for Communication!

EDUCATIONAL APPS....

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- Various leading app development companies and developers have designed *educational apps* that have profoundly impacted lives across the globe.
 - E-Books, E-library, education videos, education games etc. are all available today and provide easy access to quality educational materials that ordinarily would be possible to access in a library.

Education Apps



BANKING APPS....

- In the banking sectors as well as financial transaction, efforts have been made to ease monetary transaction. In the banking sector, use of mobile banking is on the rise.
- Customers necessarily need to walk into the bank to make bill payments, transfers or withdrawals. All could be done through the *mobile app for online banking solution*
- In terms of financial transaction, there are mobile apps where one can easily make payments for goods and services without heading to the bank.



Banking Apps



ENTERTAINMENT APPS....

- Today, the emergence and availability of such apps such as video apps, games apps, and music apps to phone users have proven that mobile apps are not just relevant for communication and business but also for human relaxation.
- There are many video app which are convenient for users and they access such when necessary.
- For music lovers, there is also *music apps were users can listen to live music or play downloaded music*. There are also reading apps that enable users to read their favourite, academic and other types of books on their mobile phone because it is deemed easier than going everywhere with heavy books.

Entertainment Apps



BENEFITS OF CREATING MOBILE APPLICATION

BENEFITS OF MOBILE APPLICATION....

- Mobile applications have taken over in almost every category:
- Utilities, gaming, lifestyle, news, social media, etc.
- They allow users to have all the required information, make purchases and whatnot at their fingertips using relevant and reliable mobile applications. Benefits of developing mobile application for businesses are listed below.

INCREASES VISIBILITY

- Developing a mobile application will improve the visibility of your business and expose it to numerous users. Mobile application makes it possible for the users to browse through it while sitting in their offices, waiting at the bus stop, riding to and from work and even watching TV.
- Mobile application enables your potential customers to get more opportunities to reach you and improve your Return on Investment.

EASY TO USE

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- The best thing about mobile applications is that they are simple to use. Users just have to download, launch and use them whenever they want.
 - They do not need to learn something very difficult or it does not require any niche or expertise to access the application. Users can start using the application the moment it is downloaded.

NO MORE WAITING

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- Mobile applications are much faster than web browsing. For the website, the user needs to launch the browser, type the URL and then wait for the website to load.
 - The mobile applications, on the other hand, are quick and load in a few seconds. Applications can also be used offline as most of the information is stored in mobile phones itself.

EASE OF SENDING NOTIFICATIONS

- The ability to send instant, non-intrusive notifications to users is so desired that it is one of the major reasons why many businesses want to have a mobile app in the first place.
- They both are exciting alternatives for communicating with app users in a less intrusive manner.



MAKING USE OF MOBILE DEVICE FEATURES

- Mobile apps have the advantage of utilizing features of a mobile device like camera, contact list, GPS, phone calls, accelerometer, compass, etc.
- The device features can significantly shorten the time users take to perform a certain task in an app, and can even boost conversions.



ABILITY TO WORK OFFLINE

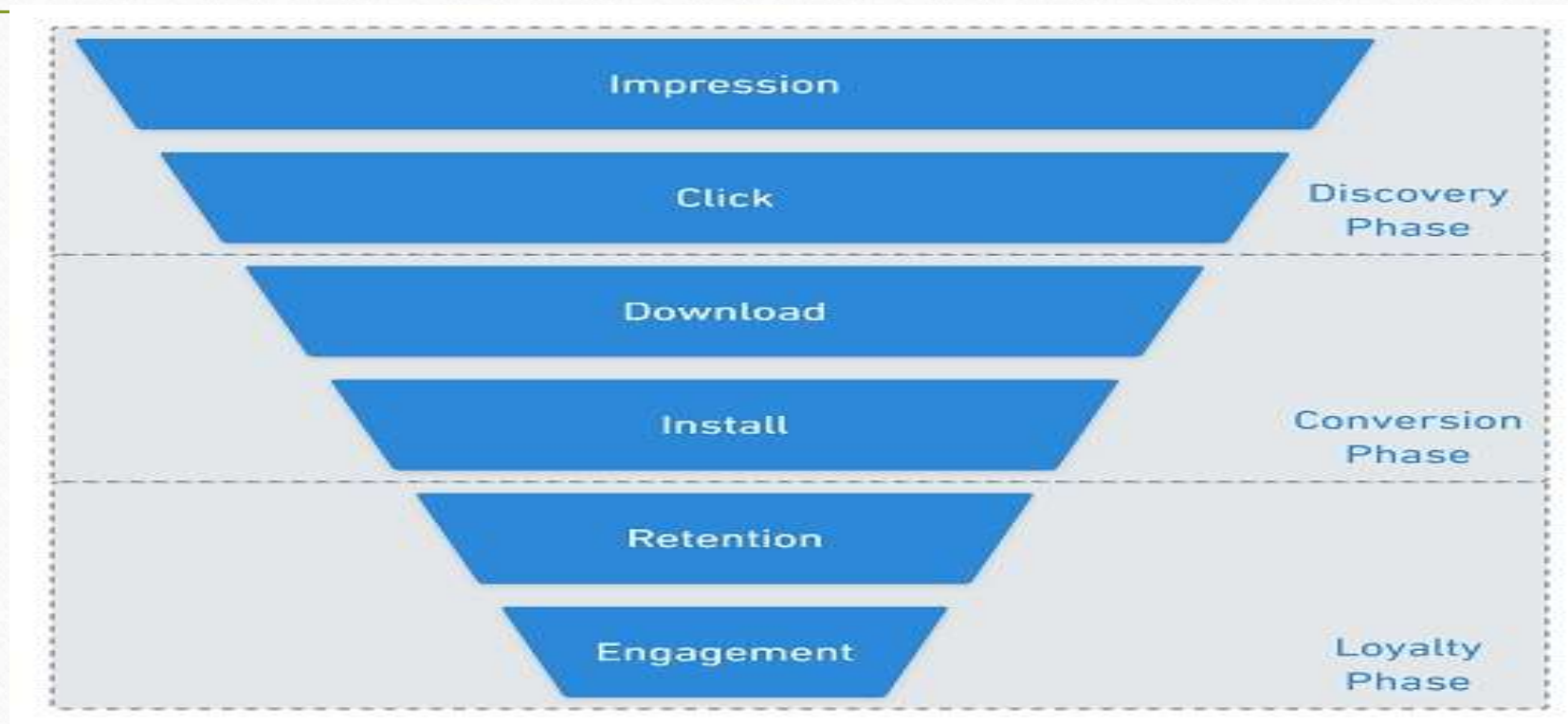
-
- Although apps too might require internet connectivity to perform most of their tasks, they can still offer basic content and functionality to users in offline mode.

MARKETING MOBILE APPLICATION

MOBILE MARKETING....

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- Mobile Marketing is a next generation trend of marketing products and services.
 - Today, the strategy of mobile marketing is being practiced by most of the traders and businessmen across the globe through which they communicate or engage with their potential audiences or engage with their potential audiences/customers in an interactive and relevant manner.
 - The companies create short, but interactive messages (to promote their business) specifically to deliver on mobile services.

MOBILE APP MARKETING FUNNEL



BENEFITS OF MOBILE APPS

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- The most powerful aspect of a mobile application is the idea of personalization.
 - The whole process of sales is turned on its head and company develops an intimate relationship with in app purchases, and also popularizing the name of brand via word of mouth.

HOW DOES A MOBILE APPS WORKING FOR MARKETING ?

- A mobile application can create wonders for business. If user always keep the customers in focus.
- For instance, if customers are primarily business professional who use a blackberry phone, then a gaming application might not appeal to them.
- The bottom – line is that developer have to carefully examine customers' users/interests before designing a mobile application a mobile application.

DIFFERENT WAYS TO MARKET MOBILE APPLICATION

- There are a number of ways to market mobile application. The first one that comes to mind is of course the Apple App store. There is also Android Marketplace. These stores are some of the best places to showcase mobile apps.

SOME OF THE MOBILE PLATFORMS

iPhone/iPad



Windows Phone



Android



BlackBerry



J2ME



ADVANTAGES OF MOBILE MARKETING

- The personal nature of mobile phone makes SMS marketing a very powerful tool.
- Most people take their mobile phones everywhere – meaning they can be effective for time sensitive messages.
- People tend read virtually every text they get – unlike junk, mail, spam or adverts which can be ignored.

POTENTIAL DISADVANTAGES OF MOBILE MARKETING

- User message has to be short – user do not have much space to get your message across in detail.
- People respond negatively to unwanted texts. Make sure to get permission to send texts to others and ensure SMS marketing complies with privacy and data protection rules.
- People are wary of responding to SMS message due to an increase in fraudulent messages.

ADVERTISING MOBILE APPLICATION

WHAT IS MOBILE ADVERTISING....

- The term mobile advertising refers to any form of advertising that appears on mobile devices such as smart phones and tablets using wireless connections. Companies advertise on these devices through text ads via SMS or through banner advertisements that appear embedded on a mobile web site.
- In app advertising is an effective monetization strategy for mobile publishers, in which app developers paid to server advertisements within their mobile app.

HOW IN APP ADVERTISING WORKS FOR APP MONETIZATION

1. Choosing an ad network.

- Audience to reach
- Audience Location
- Set advertising goals

2. Select the right in-app ad format

- Banner
- Video

HOW IN APP ADVERTISING WORKS FOR APP MONETIZATION

3. Choose an ad pricing model.

- cost per mille(CPM)
- cost per click(CPC)
- cost per action(CPA)

TYPES OF MOBILE APP ADVERTISING

- ✓ Banner ads
- ✓ Native ads
- ✓ Interstitial ads
- ✓ Video ads
- ✓ Playable ads

BANNER AND NATIVE ADS

BANNER ADS

- Banner ads , also called display advertising.
- Most familiar to use
- Type: text or images displayed at the top or bottom , along the app
- content.
- Ex: Mobile game app.

BANNER AND NATIVE ADS

NATIVE ADS

- Native ads are typically the least intrusive ad format
- Type: Target customer interest.
- For example: Instagram ad

OTHER TYPES OF ADS

INTERSTITIAL ADS

- Sometimes called full screen ads
- Type: Images or videos shown during transitions in the app.
- For example: Between levels of the game.

VIDEO ADS

- Strong click _ through rates(users like watching videos).
- Ex: Instagram app.

OTHER TYPES OF ADS

PLAYABLE ADS

- Shown during Game transitions
- Ex: Trivia crack

CHANNELS THAT OFFER MOBILE APP INSTALL ADS

FACEBOOK APP

- Register mobile app with Facebook.
- Select objectives.
- Target audiences
- Create exceptional Facebook ads for mobile app.

FACEBOOK APP

Boost post

1. Objectives
2. Preview
3. Audience
4. Detail target.
5. Total budget
6. Click through ad

GOOGLE APP

1. Create app ad

➤ Helps to create ad from your app information plus . User can add images and videos.

2. Choose your budget

➤ Set target cost per install and max daily budget, and adjust it anytime.

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GOOGLE APP

3. Tell us your goals

- Decide what action user should take and get ad in front of the right people.

ADVANTAGES AND DISADVANTAGES OF MOBILE ADVERTISING

ADVANTAGES	DISADVANTAGES
A larger audience	lesser mobile sites.
Lower click rate.	Slow data transfer.
Cost –effectiveness	Not user-friendly
Anytime , Anywhere service	Privacy issues.
Get instant response	Not so easy navigation
Better relationship with customers	Different standards of devices.

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