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DISSERTATION

PERFORMANCE BASED PRICING MODELS IN ONLINE ADVERTISING: CLICK PER MILLE (CPM) AND COST PER CLICK (CPC)

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Performance Based Pricing Models in Online Advertising:
Click Per Mille (CPM) and Cost Per Click (CPC)

By
Mohamad Aleem Bin Mokhtar

Dissertation submitted in partial fulfillment of
the requirements for the
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(Business Information System)

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Business Information System Programme
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in partial fulfillment of the requirement for the
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Approved by,

_____

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TRONOH, PERAK
January 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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MOHAMAD ALEEM BIN MOKHTAR

ABSTRACT

The project is focusing on enhancing pricing scheme for Publishers on online advertising method thru Click Per Mille (CPM) and Cost Per Click (CPC). Both have strength and weakness that might affect profitability / revenue on the Publishers side. Dengler, Brian. (2011) state that Internet advertising revenues jumped 23 percent in the United State for the first quarter of 2011 over the same period last year, according to figures released May 27, 2011 by the Interactive Advertising Bureau (IAB) and PricewaterhouseCoopers (PwC). In the other words, online advertising is the best way to making money for the player within the industry; Publishers and Advertisers.

From the Malaysian perspectives, in order to the players in the online advertising industry is following the guidelines and code of practices, they must referring and dealing with Advertising Standards Authority Malaysia who provide Malaysian Code of Advertising Practice. The Advertising Standards Authority Malaysia (ASA) is the independent body responsible for ensuring that the self-regulatory system works in the public interest. The ASA's activities include investigating complaints and copy advice on your advertising.

The Malaysian Code of Advertising Practice has the support of the following organizations whose representatives constitute the Advertising Standards Authority Malaysia. The Malaysian Code of Advertising Practice has the support of the following organizations whose representatives constitute the Advertising Standards Authority Malaysia; Association of Accredited Advertising Agents Malaysia, Malaysian Advertisers Association, Malaysian Newspaper Publishers Association, and Media Specialists Association.

Yuan, S., Abidin, A.Z., Sloan, M., and Wang, J. (2012) state that towards this goal mathematically well grounded Computational Advertising methods are becoming necessary and will continue to develop as a fundamental tool towards the Web. As a vibrant new discipline, Internet advertising requires effort from different research domains including Information Retrieval, Machine Learning, Data Mining and Analytic, Statistics, Economics, and even Psychology to predict and understand user

behaviors. In this paper, we provide a comprehensive survey on Internet advertising, discussing and classifying the research issues, identifying the recent technologies, and suggesting its future directions.

To have a comprehensive picture, we start with a brief history, introduction, and classification of the industry and present a schematic view of the new advertising ecosystem. We then introduce four major participants, namely advertisers, online publishers, ad exchanges and web users; and through analyzing and discussing the major research problems and existing solutions from their perspectives respectively, we discover and aggregate the fundamental problems that characterize the newly formed researched and capture its potential future prospects.

Performance based advertising is a form of advertising in which the purchaser pays only when there are measurable results. Performance based advertising is becoming more common with the spread of electronic media, notably the Internet, where it is possible to measure user actions resulting from advertisement. Publishers act as the body who will appoint another body (Advertisers) to advertise their products and services to the publics. However, there still inefficiency between Click Per Mille (CPM) and Cost Per Click (CPC). This project will do research, analyze, evaluate, calculate, enhance and develop current advertising approach for a better performance based pricing models.

As the result, the new improvised pricing model where as CPM, CPC or combination of both (Hybrid) might contribute much to the small business and entrepreneurship player's in Malaysia especially to the Bumiputra's. The advanced and effective pricing model will help much to them in order to promote and increased the amount of business revenue by applying and practicing the new pricing model on online advertising. The collaboration between Publishers and Advertisers also important to make sure the direct negotiation is realized between them (No more agents) so the win - win situation could be the objective of the pricing model project.

ACKNOWLEDGEMENT

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ABBREVIATIONS AND NOMENCLATURES

ASA	Advertising Standards Authority Malaysia
Ajax	Asynchronous JavaScript and XML
CPM	Click Per Mille
CPC	Cost Per Click
eCPM	Effective Click Per Mille
HTML	HyperText Markup Language
IAB	Interactive Advertising Bureau
JS	JavaScript
JSON	JavaScript Object Notation
MySQL	My Structured Query Language
PHP	Perl Hypertext Preprocessor
PPC	Pay Per Click
ROI	Return On Investment
RAD	Rapid Application Development
WWW	World Wide Web

CHAPTER 1
INTRODUCTION

1.1 Background of Study

In today `s modern world, most of Publishers is using the online advertising method as the best business strategy to well inform the public and market their products to gain revenues. Using the Internet and the World Wide Web (WWW), users are able to express their information requests, navigate specific websites and perform e-commerce transactions. Major search engines have been continuing improving their retrieval services and users' browsing experience by providing relevant results. The Internet and the WWW are therefore a natural choice for advertisers to widen their strategy in reaching potential customers among Web users.

1.2 Problem Statement

Publishers do also having several issues during selecting and implementing online advertising approaches. There are pros and cons between Cost Per Click (CPC) and Click Per Mille (CPM). Both have its own advantages and disadvantages, based on type of products, bidding, pricing scheme, target consumers etc. Most publishers (e.g. Media Prima, Proton, CNN, BBC etc) reserve some space in their website for branding ads or contextual advertising.

Inventories can be sold in the form of contracts or in real-time. The publisher is responsible for delivering a total number of impressions based on what was agreed on in the contract. In the event that the publisher is unable to deliver all guaranteed impressions, a penalty applies. Therefore a challenge for publishers is to select the optimal contract or estimate the optimal price.

1.3 Objectives of study

The objective of this project is to research, analysis, enhanced and develop new online advertising approaches based on Cost Per Click (CPC) and Click Per Mille (CPM) or combination of CPC and CPM (Hybrid). The online advertising model will have the following characteristics/ functions:

- To conduct a research on Publisher how to maximizing revenues.
- To optimizes online pricing model/ scheme of advertising.
- To recognize the best revenue models between Click Per Mille (CPM) and Cost Per Click (CPC).
- To propose and implement framework on refining the user friendly aspects of advertising.

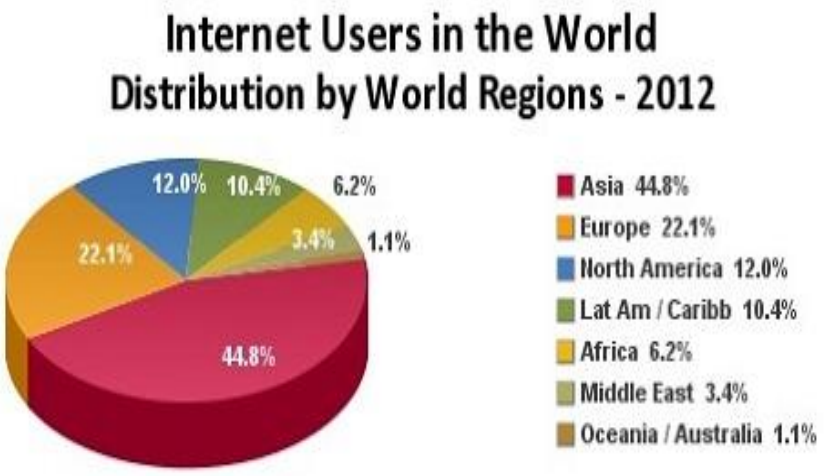
CHAPTER 2
LITERATURE REVIEW

Publishers need to publish and advertise their products or services to the potential consumers. The action might be realized by appointing any Advertiser in order to promote and advertise Publisher products to general. Publishers earn revenue thru two revenue models; Click Per Mille (CPM) and Cost Per Click (CPC). This revenue models are commonly used and practiced by Advertisers to their web pages. However, Publisher is highly required to optimize and maximizing their pricing models based on the two revenue models.

Both models acquire consumers to look forward and getting reviews the Publisher products or services but the question keep raised is which one is better to maximum profitability for Publisher/ Advertisers? The project purposes is to improve or enhance the features Click Per Mille (CPM) and Cost Per Click (CPC) as the revenue models to provide best output in term of performance based pricing in online advertising strategy. The research, analysis, survey, evaluation etc is required to produce the best models to be chosen or replacing the current/ conventional revenue models being accomplished.

Figure 1: Cost Per Click (CPC) advertising cycle.
Source: http://www.brandrich.com/images/advantages-of-pay-per-click.jpg

Andrei B. et al, (2007) state that the prevalent pricing model for textual ads is that the advertisers pay a certain amount for every click on the advertisement (Pay Per Click or PPC). There are also other models used: Pay Per Impression, where the advertisers pay for the number of exposures of an ad and Pay Per Action where the advertiser pays only if the ad leads to a sale or similar transaction.



WORLD INTERNET USAGE AND POPULATION STATISTICS 2012

World Regions	Population (2012 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2012	Users % of Table
Africa	1,037,524,058	4,514,400	139,875,242	13.5 %	2,988.4 %	6.2 %
Asia	3,879,740,877	114,304,000	1,016,799,076	26.2 %	789.6 %	44.8 %
Europe	816,426,346	105,096,093	500,723,686	61.3 %	376.4 %	22.1 %
Middle East	216,258,843	3,284,800	77,020,995	35.6 %	2,244.8 %	3.4 %
North America	347,394,870	108,096,800	273,067,546	78.6 %	152.6 %	12.0 %
Latin America / Carib.	597,283,165	18,068,919	235,819,740	39.5 %	1,205.1 %	10.4 %
Oceania / Australia	35,426,995	7,620,480	23,927,457	67.5 %	214.0 %	1.1 %
WORLD TOTAL	6,930,055,154	360,985,492	2,267,233,742	32.7 %	528.1 %	100.0 %

Figure 2: World internet usage and population statistics 2012.

Source: http://techod.com/wp-content/uploads/2012/05/internet-usage-statistics.jpg

Kevin L. et al (2011) highlight that display advertising is a multibillion dollar industry that is one of the largest and fastest growing sources of revenue in the online world. The money comes from advertisers who pay publishers for their online ads to be shown to users in designated slots on the publisher's web pages. Whenever a user requests one of these pages, a display opportunity is generated.

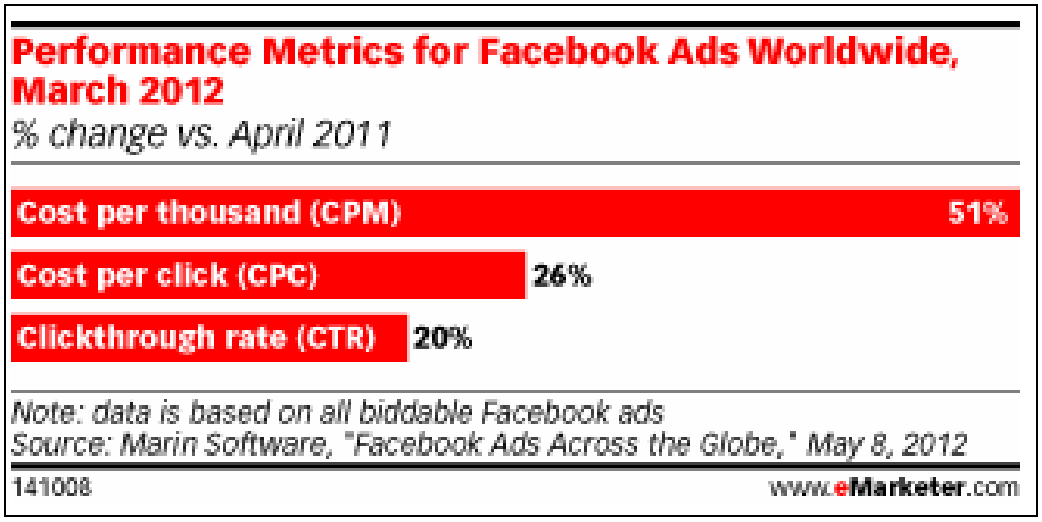


Figure 3: Facebook online advertising statistics.

Source: http://www.marketresearchworld.net/images/stories/stories21/em-facebook-advertisers-1.gif

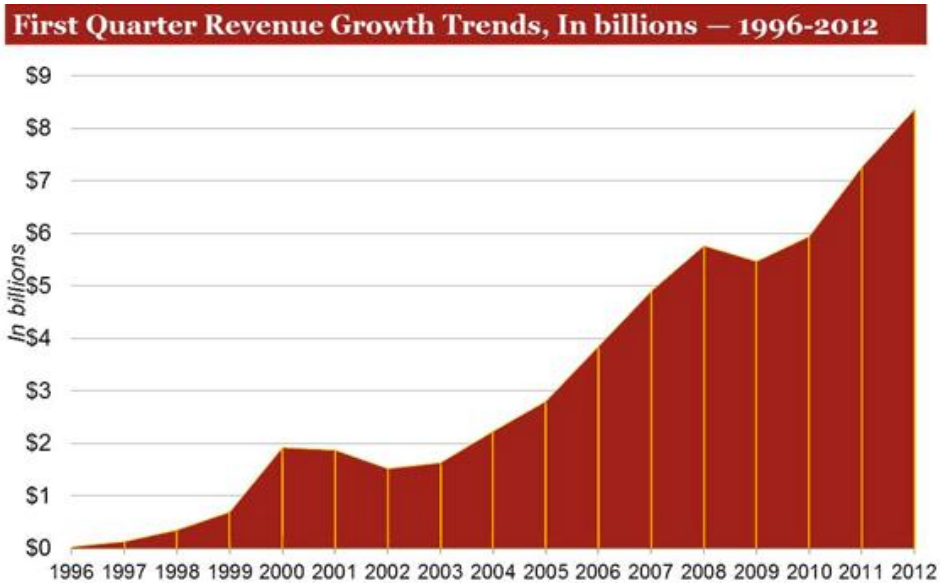


Figure 4: Online advertising growth trends.

Source: http://gaia.adage.com/images/bin/image/first-quarter-revenue-growth-chart.jpg

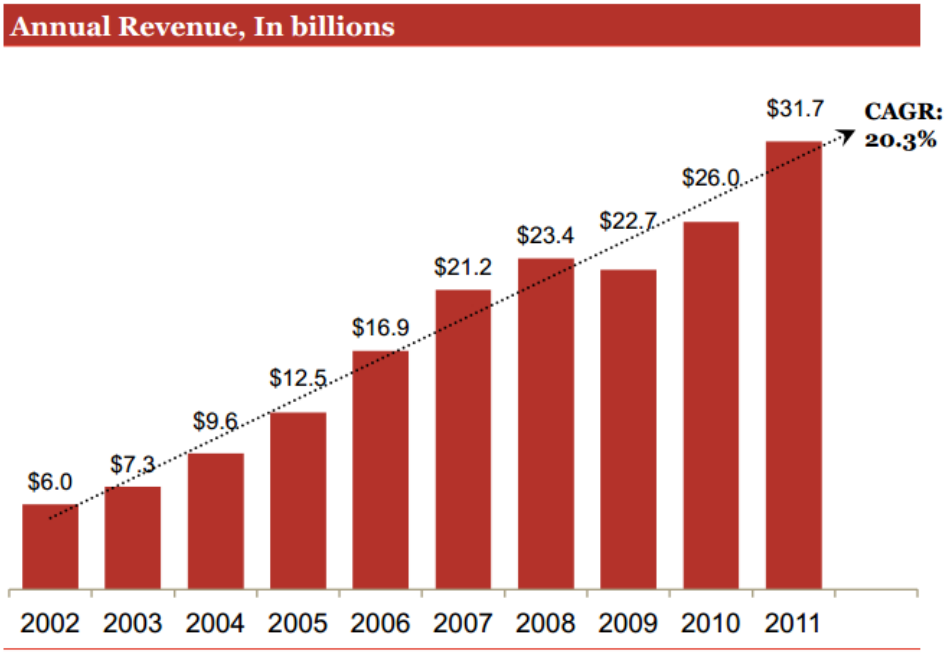


Figure 5: Online advertising revenues.

Source: http://www.geekwire.com/wp-content/uploads/iab-main1.png

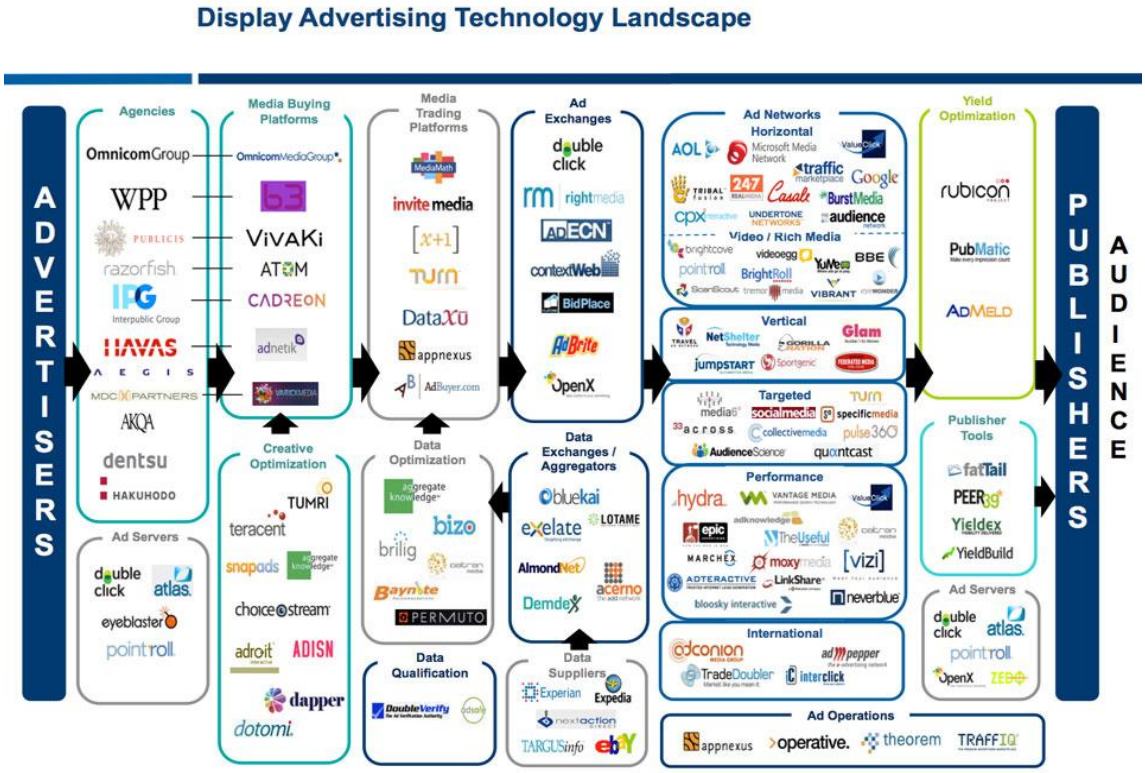


Figure 6: Online advertising landscape/ medium.

Source: http://online.wsj.com/media/OrigAdTech-Landscape_full.jpg

2.1 What is CPM?

Click Per Mille (CPM) is when Publishers/ Advertisers pay for exposure of their message to a specific audience. "Per mille" means per thousand impressions, or loads of an advertisement. However, some impressions may not be counted, such as a reload or internal user action. CPM is terms used in online advertising and marketing related to web traffic. They refer to the cost of internet marketing campaigns where advertisers pay for every time their ad is displayed, usually in the form of a banner ad on a website, but can also refer to advertisements in Email advertising.

CPM, also called cost % and Cost Per Thousand (CPT) (in Latin mille means thousand), is a commonly used measurement in advertising. Radio, television, newspaper, magazine, out-of-home advertising, and online advertising can be purchased on the basis of showing the ad to one thousand viewers. It is used in marketing as a benchmark to calculate the relative cost of an advertising campaign or an ad message in a given medium. For media without countable views, CPM reflects the cost per 1000 estimated views of the advertising. This traditional form of measuring advertising cost can also be used in tandem with performance based models such as percentage of sale, or Cost Per Acquisition (CPA).

An example of computing the CPM:

1. Total cost for running the ad is RM 15, 000.00.
2. The total estimated audience is 2, 400, 000 people.
3. CPM is calculated as: (RM 15, 000.00/ 2, 400, 000) * 1000 = RM 6.25 per thousand views

Effective Click Per Mille (eCPM) is used to measure the effectiveness of a publisher's inventory being sold (by the publisher) via a Cost Per Acquisition (CPA), Cost Per Click (CPC), or Cost Per Thousand (CPT) basis. In other words, the eCPM tells the publisher what they would have received if they sold the advertising inventory on a CPM basis (instead of a CPA, CPC, or CPT basis). This information can be used to compare revenue across channels that may have widely varying traffic by figuring the earnings per thousand.

Example:

- There are two banners: "Super Car" and "Fantastic Car".
- The publishers earn RM 1 per click.
- Both banners were published for the duration of one week.
- "Super Car" was viewed by 2, 000 visitors from which 10 clicked on it.
- "Fantastic Car" was viewed by 2, 000 visitors from which 50 clicked on it.

This shows that:

1. "Super Car" has an eCPM of RM 5 (RM 10/ 2, 000 * 1, 000)
2. "Fantastic Car" has an eCPM of RM 25 (RM 50/ 2, 000 * 1, 000)

Figure 7: Example of CPM advertising on Publisher website.

Source: http://www.mondaynote.com/wp-content/uploads/2011/03/173-03-story-in-BW.png

2.2 What is CPC?

Cost Per Click (CPC) is when Advertisers pay to Publishers each time when a user clicks on their listing and is redirected to their website (Publisher website). CPC is an Internet advertising model used to direct traffic to websites, where advertisers pay the publisher (typically a website owner) when the ad is clicked. With search engines, advertisers typically bid on keyword phrases relevant to their target market. Content sites commonly charge a fixed price per click rather than use a bidding system. CPC "display" advertisements are shown on web sites or search engine results with related content that have agreed to show ads. This approach differs from the "Pay Per Impression" methods used in television and newspaper advertising.

Pay per click (PPC) (also called Cost Per Click) is an Internet advertising model used to direct traffic to websites, where advertisers pay the publisher (typically a website owner) when the ad is clicked. With search engines, advertisers typically bid on keyword phrases relevant to their target market. Content sites commonly charge a fixed price per click rather than use a bidding system. PPC "display" advertisements are shown on web sites or search engine results with related content that have agreed to show ads. This approach differs from the "pay per impression" methods used in television and newspaper advertising. The PPC advertising model is open to abuse through click fraud, although Google and others have implemented automated systems to guard against abusive clicks by competitors or corrupt web developers.

There are two primary models for determining cost per click: flat-rate and bid-based. In both cases the advertiser must consider the potential value of a click from a given source. This value is based on the type of individual the advertiser is expecting to receive as a visitor to his or her website, and what the advertiser can gain from that visit, usually revenue, both in the short term as well as in the long term. As with other forms of advertising targeting is key, and factors that often play into CPC campaigns include the target's interest (often defined by a search term they have entered into a search engine, or the content of a page that they are browsing), intent (e.g., to purchase or not), location (for geo targeting), and the day and time that they are browsing.

Google Adwords made this model popular. Generally search and text advertising is sold by CPC model. In this kind of advertising model you just pay for number of clicks you get on your ads irrespective of number of impressions it takes to generate those clicks. For example, if the CPC is RM 1.00 and your ad is shown 12, 000 times but gets no clicks then you pay nothing. If you get 10 clicks on your ad then you pay RM 1.00 x 10 = RM 10.00.

CPC formula:

CPC = Flat rate per month / Total number of clicks

= RM 1, 000/ 3, 700

= RM 0.27/ click

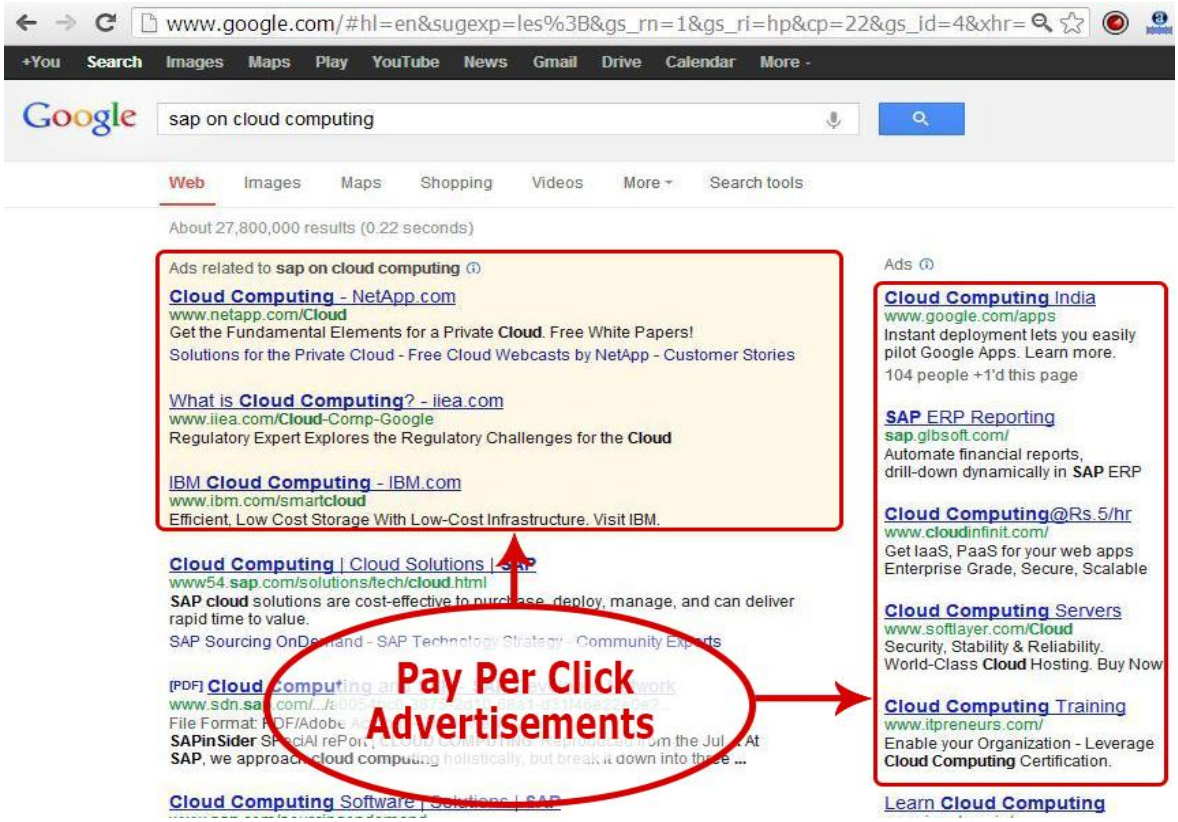


Figure 8: Example of CPC @ PPC advertisement on Publisher website.

Source: http://www.rainmaker-india.com/images/PPC%20example_new.jpg

2.3 Comparing CPM to CPC and vice versa

The goal of advertising using one model versus the other is really dependent on what you are trying to achieve. If your objective is to generate Brand awareness then you might engage in display advertising which will most likely be sold in CPM model. While search ads on Google or text or display advertising on Google Ad Network are sold in CPC model. Often you will end up comparing two models to figure out where and how to spend your money effectively. To do direct cost comparison you will need to convert CPM to CPC or CPC to CPM pricing.

2.4 Advantages of CPM and CPC

CPM	CPC
- Exactly how many times the banner will be shown and his daily / total costs are known to the advertiser. - When buying media against a specific site/ advertisement spot/ URL, it is a common model. - Since the publisher knows exactly what the expected credit per impression is, it is prioritized first by advertisement networks. - Gives good impression of your website even without people visiting your website, this is passive branding and is good for big site launches. - CPM is best suit to promote banner.	- Your audience is more targeted. - Your ad appears only when a person is looking for your products. - You decide on your PPC budget. - You only pay when someone clicks on your advertisement. - It is fully measurable. - More accurate in targeting your prospects. - Gives you the opportunity to connect with your online customers. - Provides you with instant traffic to your website. - CPC is best suit to promote ad text.

Table 1: Advantages of CPM and CPC.

CHAPTER 3
METHODOLOGY

3.1 Performance based advertising

Performance based advertising is a form of advertising in which the purchaser pays only when there are measurable results. Performance based advertising is becoming more common with the spread of electronic media, notably the Internet, where it is possible to measure user actions resulting from advertisement. Publishers ultimately decide what offers to accept from advertisers. A publisher faces advertising demand from advertisers with different characteristics and preferences. For this reason, the online advertising medium evolved such that several publishers offer different pricing models that use separate parts of a Web page and different formats (e.g., CPC for text ads, CPM for display ads). This strategy reflects a need to satisfy advertisers' needs. For example, publishers with websites associated with high uncertainty effect without past performance history or with volatile results are more likely to offer performance based deals.

Figure 9: Online advertising process.

3.2 Metrics

Various types of measurable action may be used in charging for performance-based advertising:

- Many Internet sites charge for advertising on a "CPM" (Click Per Mille) or Cost Per Impression (CPI) basis. That is, the advertiser pays only when a consumer sees their advertisement. Some would argue that this is not performance-based advertising since there is no measurement of the user response.
- Internet sites often also offer advertising on a "PPC" (Pay Per Click) basis. Google's AdWords product and equivalent products from Yahoo!, Microsoft and others support PPC advertising plans.
- A small but growing number of sites are starting to offer plans on a "Pay per call" basis. The user can click a button to place a VoIP call, or to request a call from the advertiser. If the user requests a call, presumably they are highly likely to make a purchase.
- Finally, there is considerable research into methods of linking the user's actions to the eventual purchase: the ideal form of performance measurement.

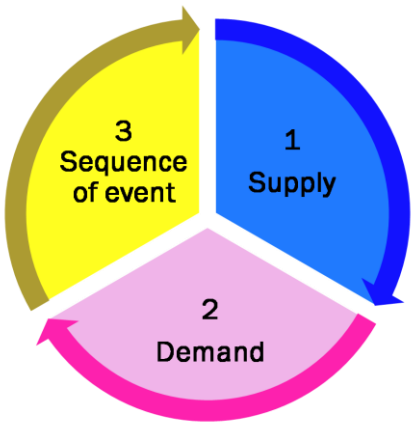


Figure 10: Advertising Life Cycle.

3.3 Pricing

A publisher may charge defined prices for performance based advertising, so much per click or call, but it is common for prices to be set through some form of "bidding" or auction arrangement. The advertiser states how much they are willing to pay for a user action, and the publisher provides feedback on how much other advertisers have offered. The actual amount paid may be lower than the amount bid, for example 1 cent more than the next highest bidder.

A "bidding" plan does not guarantee that the highest bidder will always be presented in the most prominent advertising slot, or will gain the most user actions. The publisher will want to earn the maximum revenue from each advertising slot, and may decide (based on actual results) that a lower bidder is likely to bring more revenue than a higher bidder - they will pay less but be selected more often.

In a competitive market, with many advertisers and many publications, defined prices and bid-based prices are likely to converge on the generally accepted value of an advertising action. This presumably reflects the expected sale value and the profit that will result from the sale. An item like a hotel room or airplane seat that loses all value if not sold may be priced at a higher ratio of sale value than an item like a bag of sand or box of nails that will retain its value over time. A number of companies provide products or services to help optimize the bidding process; including deciding which keywords the advertiser should bid on and which sites will give best performance.

3.4 Model – Expected supply

Advertising impressions are uniquely characterized by combination of page and banner location, delivery time, and viewer type. For instance, an ad impression could be "a top banner on the website homepage during the first week of the second quarter, viewed by an 18 - 40 old male originating from Malaysia." Let P be the set of potential pages and banner locations on the website and U be the set of viewer types. For simplicity, we consider discrete time periods and define T as the set of delivery time windows. As a result, the set of possible types of ad impressions can be defined as the cross-product set, i.e., $W = P \times U \times T$.

Formula, W = P X U X T

- ✖ W is Set of possible types of ad impressions
- ✖ P is Set of potential pages & banner locations on website
- ✖ U is Set of viewer types
- ✖ T is Set of delivery Windows

Figure 11: CPM advertising standard size.

3.5 Model - Demand

Advertisers submit their advertising requests to the publisher either directly or through the inter- mediary of an advertising agency. Let C denote the potential set of contracts. Each contract i ∈ C requests a number of impressions ni (in thousands) to be delivered on a particular set of pages to a particular set of viewers in a particular time window (also known as flight), denoted by Wi ⊆ W. Each ad impression generates a unit revenue ri (also known as Cost-per-Thousand, or CPM) to the publisher. If the advertising contract specifies a Cost Per Click (CPC) or Cost Per Action (CPA), instead of a cost per impression, ri is the expected revenue per impression, obtained by multi plying the CPC or the CPA by the probability that a user will click or take the specified action.

From Demand site, Advertisers who have budget, they want to buy certain impression on Publishers website. Publishers must carefully manage Demand needs based on its availability. Factors being considered:

- Page
- Features
- How many impressions
- Spacing/ Position
- Cost of advertisement
- Etc

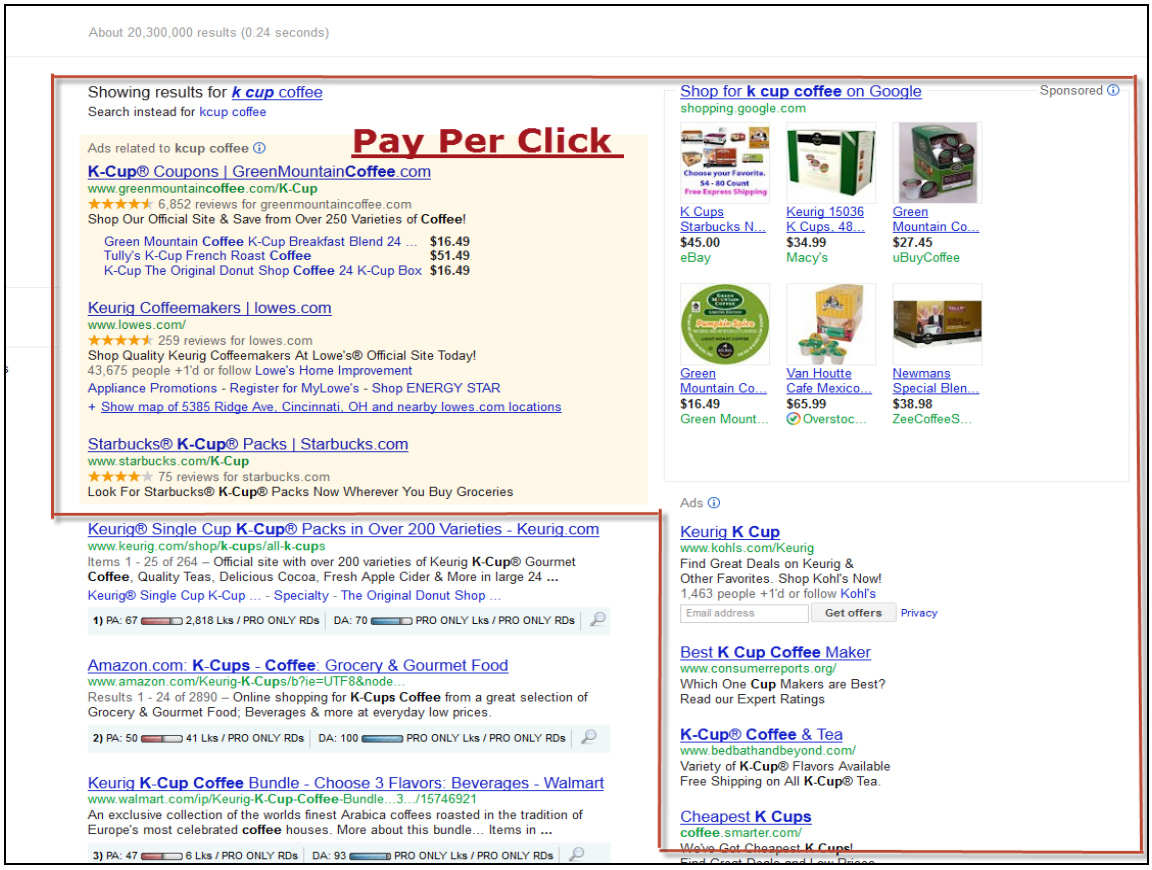


Figure 12: CPC @ PPC advertising on Publisher website.

3.6 Model – Sequence of event

In contrast to broadcast networks, online publishers can observe their traffic in real time and dynamically adjust their advertisement delivery strategy. To model this flexibility in a discrete-time framework, we make the following assumption.

In each time period, T, Publishers face 2 decisions:

- To determine which advertisement requests to accept, to balance high CPMs against under delivery penalties.
- To decide which advertisement impressions to deliver on its website, to balance revenues against future profits.
- E.g. Publishers have balance 300 impressions, but another Advertiser want to pay for new advertisement.

3.7 Main functions of Publishers webpage

1. Drive top line revenue and maximize the yield of individual impressions. Sell inventory in real time auctions using:

a) Real-Time Bidding (RTB) – To allow Publisher supply to be bidded on by buyers outside of Right Media's exchange.

b) Reserve Pricing – To establish appropriate pricing by channel by setting buyer-specific reserve prices.

2. Serve ads that won't diminish user engagement on webpages. Uphold your site's integrity by controlling the type of ad content you run, with:

a) Targeting – To control the types of ads you allow linked partners to serve on your sites.

b) Creative Tester – To rest easy knowing Right Media is testing creative for potential malicious attributes.

c) Advertiser Blocking – To exclude any advertiser in the exchange from serving on your site.

3. Protect your sites, audience data and users. Rely on protections and controls designed for publishers and their site visitors, such as:

a) Creative Filtering – To control which ads are displayed on your sites by offer type or creative specification.

b) Visibility Controls – To mask/ hide channels, URLs, publisher IDs, and certain other key identifiers of your ad call.

c) User Controls – To enable site visitors express their preference for how their data can be used through industry self-regulatory mechanisms.

4. Cultivate relationships that complement your sales channel strategies. Determine who you want to work with and how, using:

a) Linking – To find and "link to" advertisers, agencies, networks, and technology providers on the exchange.

b) Targeting – To set controls for the scope and type of targeting you'll allow linked partners to perform on your sites.

5. Sell media across leading connected device types and ad formats:

a) Devices – To access buyers looking to serve ads on browsers across desktops, smart phones, and tablet computers.

b) Ad Formats – To rely on Right Media to help your sites serve creative across standard graphical and rich media formats.

6. Gain deep insight into audience segments and site performance:

a) Audience Definition – To create audience segments in Yahoo! Web Analytics based on your site's audience that can be targeted in buyers' campaigns or used with Audience Sharing.

b) Audience Sharing – To create incremental revenue opportunity by sharing your audience segments with media buyers.

c) Audience Reports – To uncover critical information on segment usage, population metrics, and opportunity analysis, and use it to inform your audience segment strategies.

d) Seller Reports – To track profits, segment use and overall inventory performance.

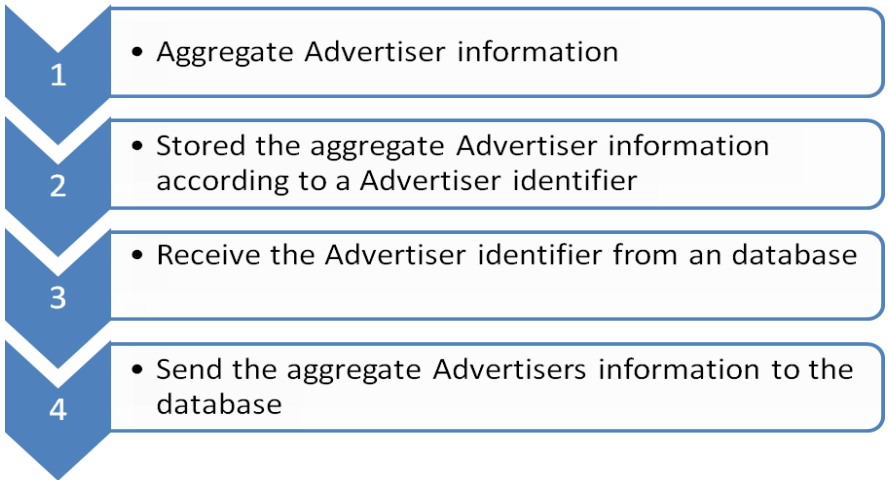


Figure 13: Stored Advertisers information process.

Figure 14: Bidding process.

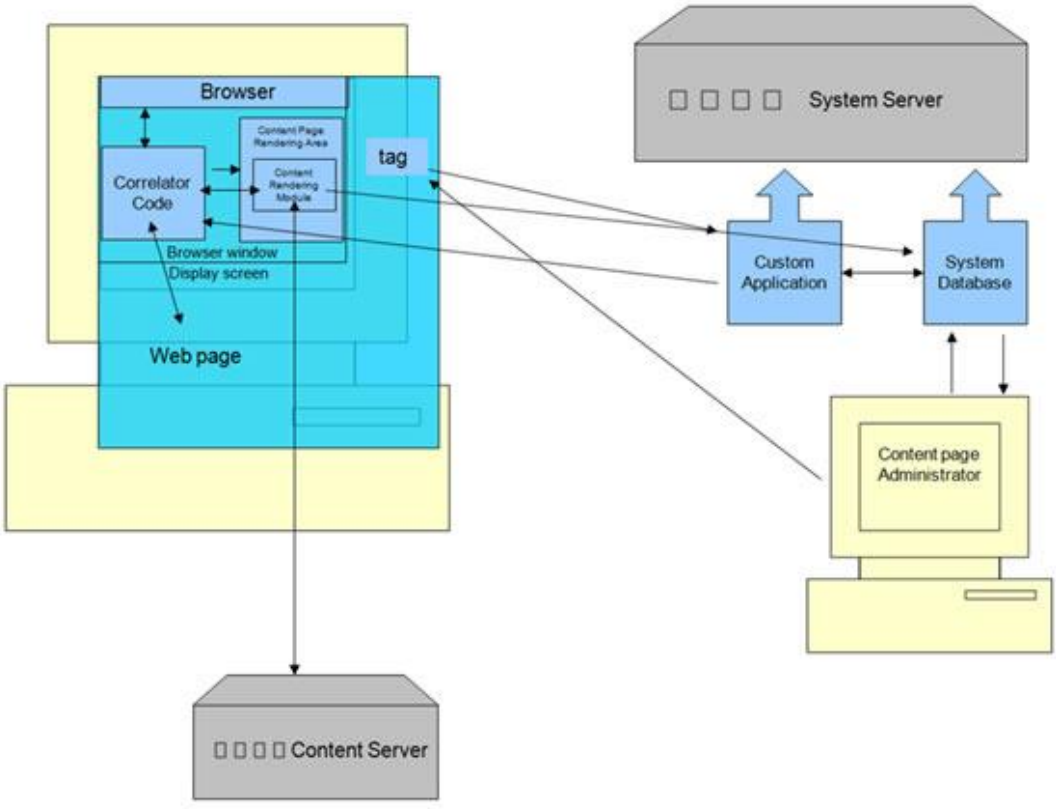


Figure 15: System architecture.

Description:

- The viewable impression relies on Web bugs (or 'tags') placed on the web pages that distribute ads on the website content pages.
- These tags are placed on a web page and when rendered, employing a "Correlator" (Correlator is a linear correlation control).
- The ad space is then been "marked up," an "ad request" (Server log impression) is recorded, and the Correlator begins communicating with the web page, browser and ad unit (Ad space) embedded in the webpage content.
- The Correlator can collect all additional non private information's from the viewer's browser, including the viewer's operating system, browser type and version and a list of other ads.
- Once any portion of the ad unit (Definable), on a viewer's in focus web page, hits the visible area of the browser window a request is sent to an ad content server to deliver an advertisement.
- Once the ad content is loaded and rendered an "Ad Rendered" is reported.
- The Correlator is then continues to monitor the ad space for each individual ad on the web page and its relation to the browser window dimensions
- The Correlator scrolling position and web page focus, considering if the viewer has scrolled the ad space in or out of the visible area of the browser window, minimized, tabbed away, or opened another browser or application window bringing the web page monitored out of focus or portion of the browser window with the ad space outside of the monitor screen.
- When 60 % of the ad content on a web page is within the visible area of the viewer's browser window for one second, a message is sent via Correlator and a "Viewable Impression" is reported.
- The Correlator code continues to monitor the web page focus and scrolling position, location of ad units and the visible area of the browser window, and communicates to the reporting server logging the "Time in View" for the ads being delivered on the webpage.

3.8 Implementation

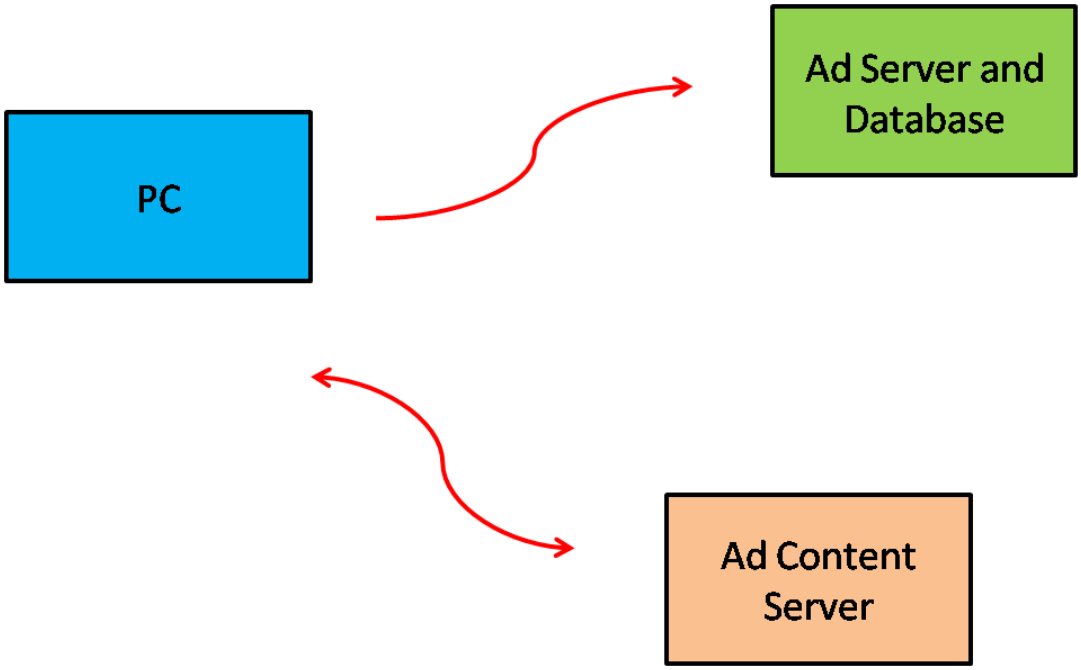


Figure 16: System implementation.

Description:

- The complete viewer's environment is gathered by a client side technology for every viewable impression reported and transmitted back to a server side database.
- Data for each view includes the viewers display resolution, the viewer's browser window dimensions, the dimensions of the web page the ad appeared on, the location of the ad on the page, and the scroll position at the time the viewable impression was recorded.
- This data results in a visual representation of the viewer's environment of each viewable impression reported.
- Then the position of the ad is calculated as is the area of the ad that shown on the screen.
- Also, the view time of the ad is collected by the client (viewer) side engine considering whether the web page the ad resides on is “In focus”. In focus is defined as when a Web page is the primary window open on a user's screen, unobstructed by any other application window.

- Web page focus can be affected by: minimizing the browser, opening or switching to another browser window or application, opening or switching to another browser window tab, or placing the curser on the browser address bar or other browser button).

3.9 Gantt chart

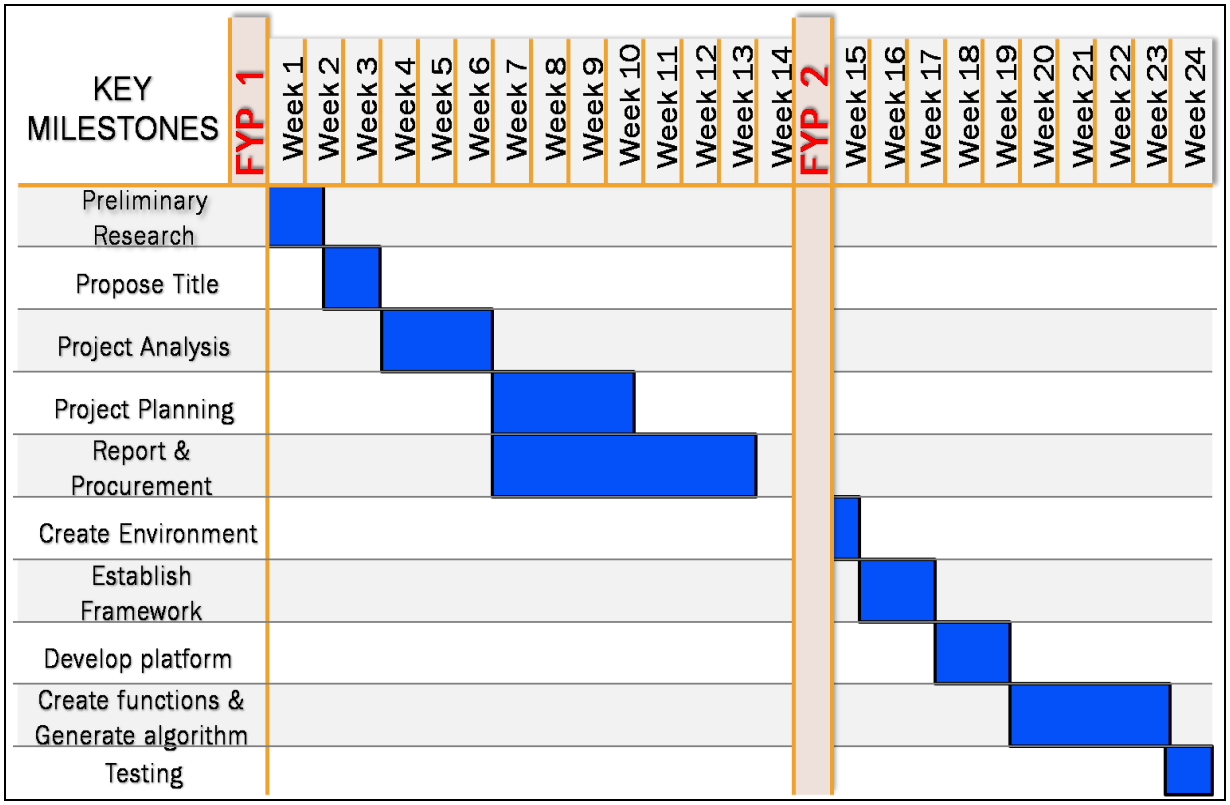


Figure 17: Gantt chart.

3.10 Tools required

- HTML (To develop website structures)
- JavaScript (To generate graph)
- PHP/ MySQL (To generate database & graph)
- AJAX (To create graph)
- JSON (To create graph)

3.10.1 HTML

HyperText Markup Language (HTML) is the main markup language for creating web pages and other information that can be displayed in a web browser. HTML is written in the form of HTML elements consisting of tags enclosed in angle brackets (like <html>), within the web page content. HTML tags most commonly come in pairs like <h1> and </h1>, although some tags, known as empty elements, are unpaired, for example <img>. The first tag in a pair is the start tag, the second tag is the end tag (they are also called opening tags and closing tags). In between these tags web designers can add text, tags, comments and other types of text based content.

The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page. HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript which affect the behavior of HTML web pages.

3.10.2 JavaScript

JavaScript (JS) is an interpreted computer programming language. It was originally implemented as part of web browsers so that client side scripts could interact with the user, control the browser, communicate asynchronously, and alter the document content that was displayed.

JavaScript is a prototype based scripting language that is dynamic, weakly typed, and has first class functions. Its syntax was influenced by the language C. JavaScript copies many names and naming conventions from Java, but the two languages are otherwise unrelated and have very different semantics. The key design principles within JavaScript are taken from the Self and Scheme programming languages. It is a multi paradigm language, supporting object oriented, imperative, and functional programming styles.

3.10.3 PHP

PHP is a server-side scripting language designed for web development but also used as a general purpose programming language. PHP is now installed on more than 244 million websites and 2.1 million web servers. While PHP originally stood for Personal Home Page, it is now said to stand for PHP: Hypertext Preprocessor, a recursive acronym.

PHP code is interpreted by a web server with a PHP processor module which generates the resulting web page: PHP commands can be embedded directly into an HTML source document rather than calling an external file to process data. It has also evolved to include a command line interface capability and can be used in standalone graphical applications. PHP can be deployed on most web servers and also as a standalone shell on almost every operating system and platform, free of charge.

3.10.4 MySQL

MySQL is the world's most widely used open source Relational Database Management System (RDBMS) that runs as a server providing multi user access to a number of databases. The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation.

MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack. LAMP is an acronym for "Linux, Apache, MySQL, Perl/ PHP/ Python." Free software open source projects that require a full-featured database management system often use MySQL.

3.10.5 AJAX

AJAX is a group of interrelated web development techniques used on the client side to create asynchronous web applications. With Ajax, web applications can send data to, and retrieve data from, a server asynchronously without interfering with the display and behavior of the existing page. Data can be retrieved using the XMLHttpRequest object. Despite the name, the use of XML is not required (JSON is often used instead), and the requests do not need to be asynchronous.

Ajax is not a single technology, but a group of technologies. HTML and CSS can be used in combination to mark up and style information. The DOM is accessed with JavaScript to dynamically display, and allow the user to interact with, the information presented. JavaScript and the XMLHttpRequest object provide a method for exchanging data asynchronously between browser and server to avoid full page reloads.

3.10.6 JSON

JSON, or JavaScript Object Notation, is a text based open standard designed for human readable data interchange. It is derived from the JavaScript scripting language for representing simple data structures and associative arrays, called objects. Despite its relationship to JavaScript, it is language independent, with parsers available for many languages.

The official Internet media type for JSON is application/json. The JSON filename extension is .json. The JSON format is often used for serializing and transmitting structured data over a network connection. It is used primarily to transmit data between a server and web application, serving as an alternative to XML.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Data gathering/ analysis

4.1.1 Rapid Application Development (RAD)

Rapid Application Development (RAD) is a software development methodology that uses minimal planning in favor of rapid prototyping. The "planning" of software developed using RAD is interleaved with writing the software itself. The lack of extensive pre-planning generally allows software to be written much faster, and makes it easier to change requirements.

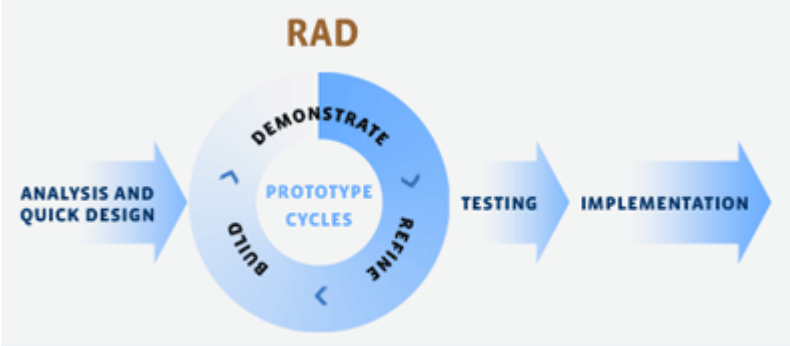


Figure 18: Rapid Application Development flows.
Source: http://1.bp.blogspot.com/_ZTG0gAdd1k8/TPCuC-kx8LI/AAAAAAAAA5k/exL2BAfIqmk/s1600/rapid+application+development.gif

4.1.2 Phases

a) Analysis and quick design phase – To combines elements of the system planning and systems analysis phases of the System Development Life Cycle (SDLC). Users, managers, and IT staff members discuss and agree on business needs, project scope, constraints, and system requirements. It ends when the team agrees on the key issues and obtains management authorization to continue.

b) Demonstrate, refine, build phase - During this phase, users interact with systems analysts and develop models and prototypes that represent all system processes, inputs, and outputs. The RAD groups or subgroups typically use a combination of Joint Application Development (JAD) techniques and CASE tools to translate user needs into working models. User Design is a continuous interactive process that allows users to understand, modify, and eventually approve a working model of the system that meets their needs.

c) Testing – To focuses on program and application development task similar to the SDLC. In RAD, however, users continue to participate and can still suggest changes or improvements as actual screens or reports are developed. Its tasks are programming and application development, coding, unit-integration and system testing.

d) Implementation – To reassembles the final tasks in the SDLC implementation phase, including data conversion, testing, changeover to the new system, and user training. Compared with traditional methods, the entire process is compressed. As a result, the new system is built, delivered, and placed in operation much sooner. Its tasks are data conversion, full-scale testing, system changeover, user training but Rapid application development is important in the book of RPL it just a technic.

4.1.3 Advantages of RAD for project development

a) Agile - To minimizes feature creep by developing in short intervals resulting in miniature software projects and releasing the product in mini-increments.

b) Extreme - Lowers the cost of changes through quick spirals of new requirements. Most design activity occurs incrementally and on the fly.

c) Scrum – An agile framework. Improved productivity in teams previously paralyzed by heavy “process”, ability to prioritize work, use of backlog for completing items in a series of short iterations or sprints, daily measured progress and communications.

d) Lean - To creates minimalist solutions and delivers less functionality earlier; per the policy that 80% today is better than 100% tomorrow.

e) Joint application - To captures the voice of the customer by involving them in the design and development of the application through a series of collaborative workshops called JAD sessions.

f) RAD – To promotes strong collaborative atmosphere and dynamic gathering of requirements. Business owner actively participates in prototyping, writing test cases and performing unit testing.

4.2 Prototype

4.2.1 How the system works?

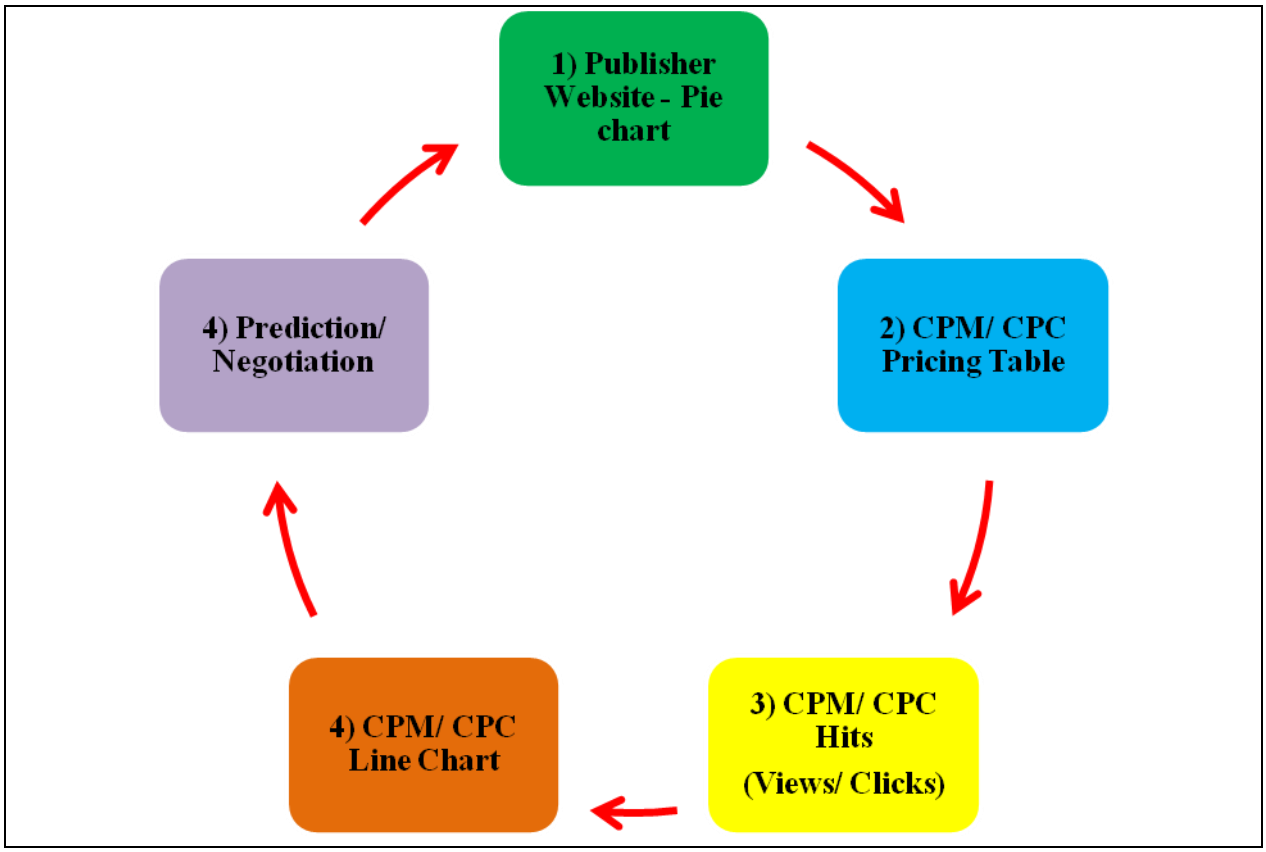


Figure 19: Pricing model system flows.

Publisher Website – Pie chart

The website main functions is to record the total number of ad views on CPM or clicks on CPC. The ad (CPM & CPC) that being publishes for user view and click is linked to server. The server stored all captured data for next usage. The data variables is including user background; countries, town and cities. The pie chart is providing clear view of result as Publisher/ Advertiser reference to monitor, record and predict online advertisement performance.

CPM/ CPC Pricing Table

The total number of user views/ clicks on ad is then linked to CPM/ CPC Pricing Table. The pricing table is allow Advertiser to select which one ad approach (CPM/ CPC) based on their budget, as category, size of ad, ad allocation etc. There is a list of ad category; Clothes, Foods, Manufacturing, Automotive etc.

CPM/ CPC Hits (Views/ Clicks)

The purpose of CPM/ CPC Hits (Views/ Clicks) is to record into database the number of user who views or clicks the ad for every month. The data collection is recorded based on previous ad been publish to website, either CPM or CPC ad.

CPM/ CPC Line Chart

This is the important part of pricing model system architecture. CPM/ CPC Line Chart are generated based on CPM/ CPC Hits (Views/ Clicks). The graph had shown the performance or achievement of each category of ad (E.g. Clothes) for a specific period of time. In this situation, we do choose month and year as the standard variation. The total number of user views or clicks to ad is highlighted here.

Prediction/ Negotiation

Based on the trends recorded to the databases, Publisher is now able to predict the future ad trends and might provide clear and facts proof to Advertiser who interested to advertise their products/ services. Let say when Advertiser wants to advertise their clothes products, so we referring to database to track and identify the previous history of clothes ad and analyses the ad performance. Advertiser must choose one marketing approach between CPM or CPC. If the last 6 months of line graph record the graph going up, so we suggest Advertiser to apply CPM, vice versa to CPC. The negotiation process is including category of ad, size, allocation, total cost running ad, total estimated audience, formula, price/ per thousand views, total number of clicks and price/ per click. The term and conditions is applied based on Advertising Standards Authority Malaysia since the business transaction is done within Malaysian region. Once agreement made between Publisher and Advertiser, the next actions is taken; to publish ad as per agreed.

4.2.2 Publisher website – Pie chart

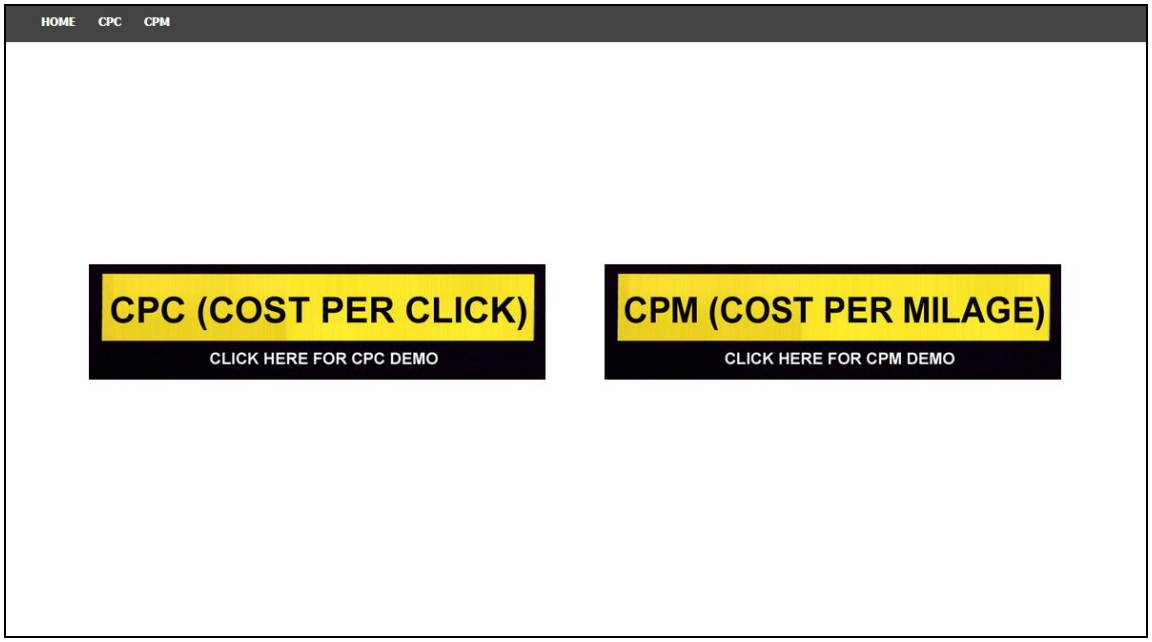


Figure 20: Publisher website.

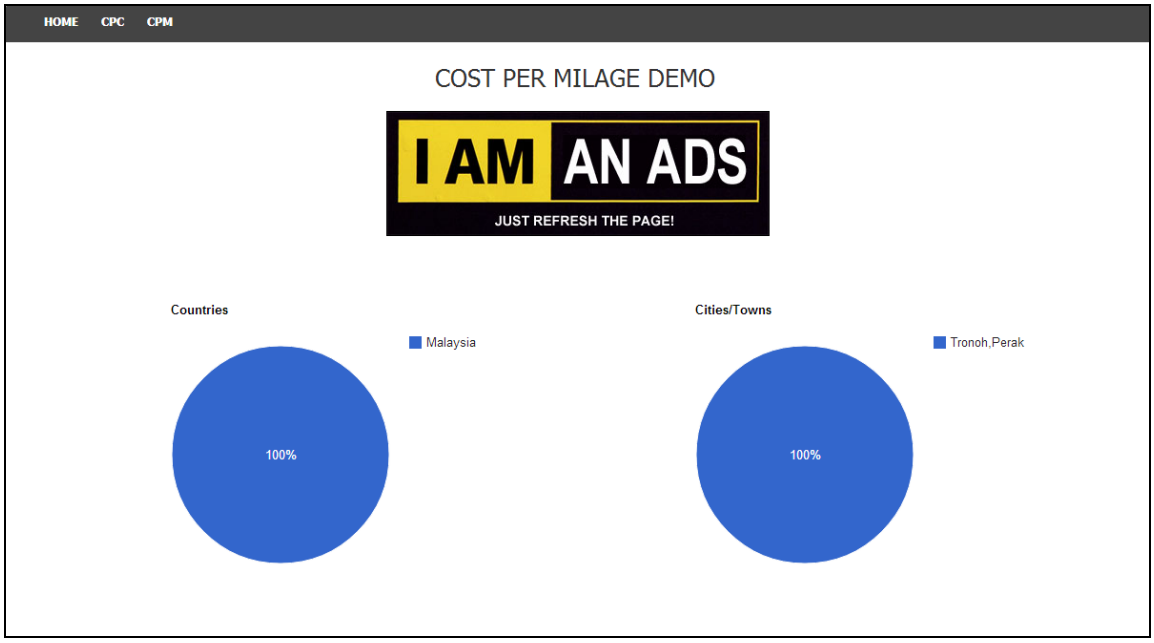


Figure 21: CPM demonstration.

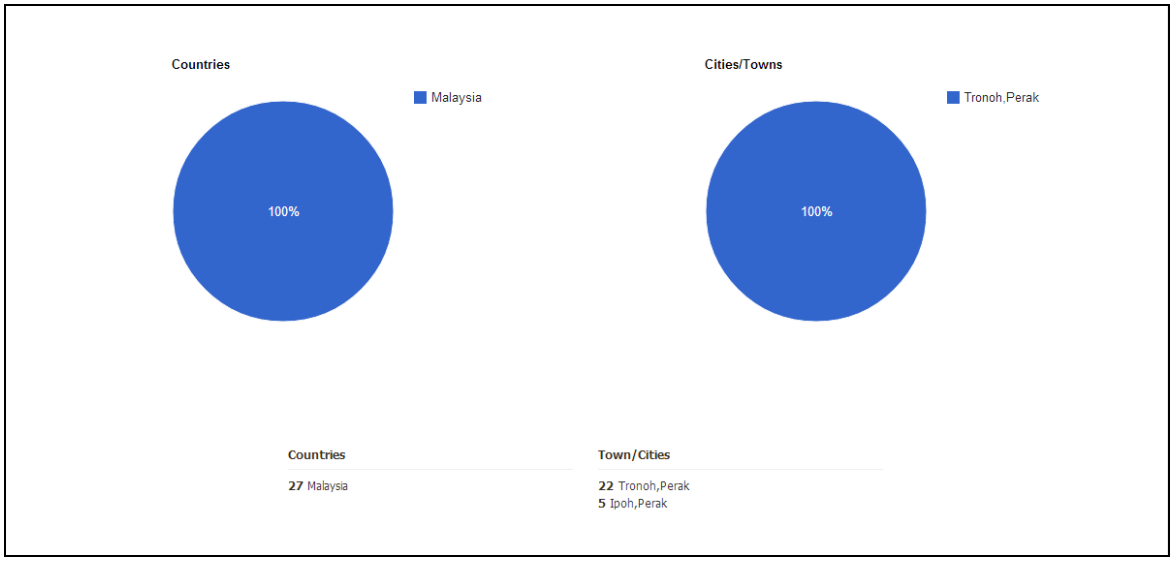


Figure 22: CPM ad result.

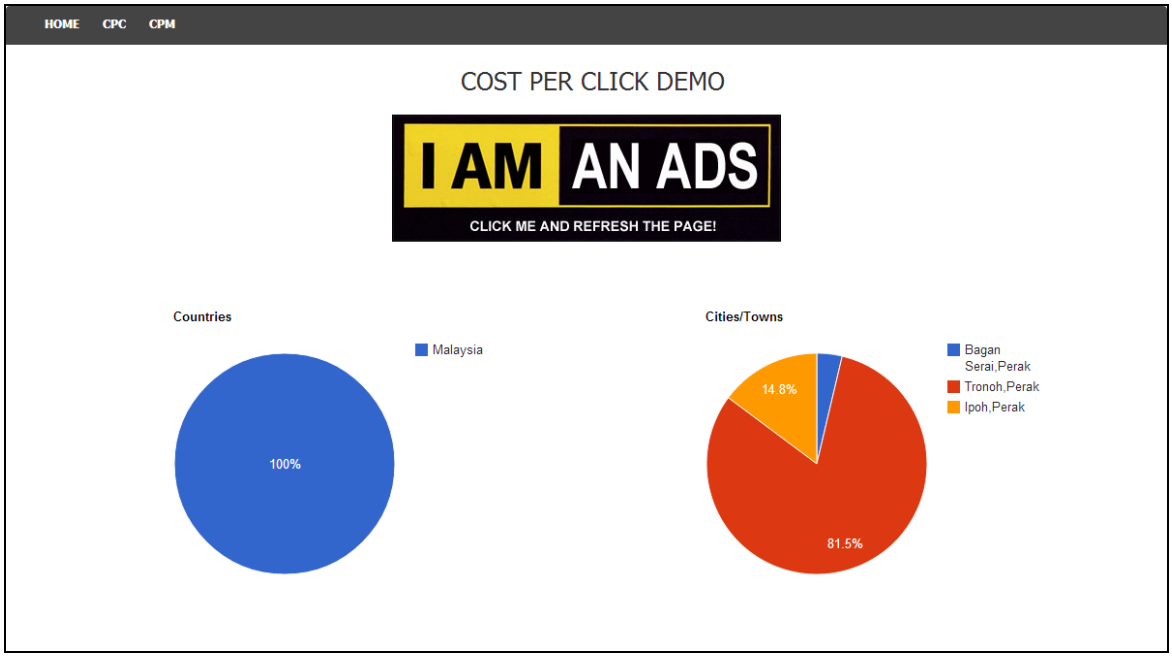


Figure 23: CPC demonstration.

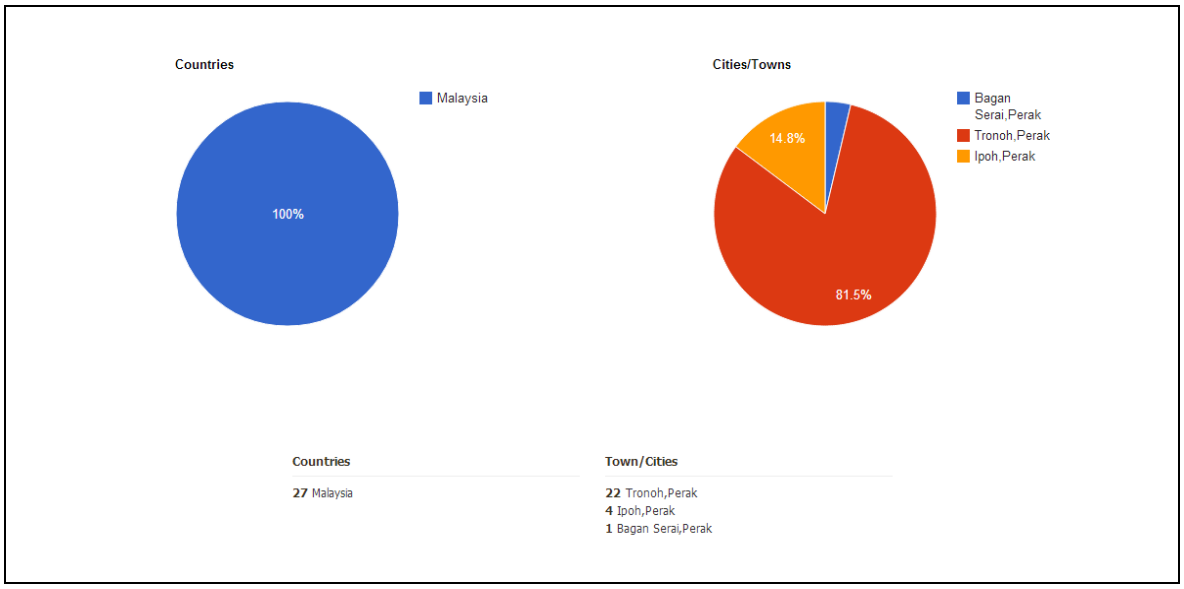


Figure 24: CPC ad result.

4.3 CPM

4.3.1 CPM Pricing Table

Ad Category	Size	Allocation	Total Cost Running Ad (RM)	Total Estimated Audience	Formula	Price/ Per Thousand Views (RM)
Clothes	300 x 200 pixels	Top side centre	15, 000.00	2, 400, 000	15, 000.00/ 2, 400, 000 = 0.00625	0.00625 x 1, 000 = 6.25
Foods	250 x 500 pixels	Bottom side centre	10, 000.00	1, 500, 000	10, 000.00/ 1, 500, 000 = 0.0067	0.0067 x 1, 000 = 6.70
Manufacturing	300 x 450 pixels	Right side top	25, 000.00	5, 000, 000	25, 000.00/ 5, 000, 000 = 0.005	0.005 x 1, 000 = 5.00
Automotive	350 x 400 pixels	Left side top	35, 000.00	6, 000, 000	35, 000.00/ 6, 000, 000 = 0.0058	0.0058 x 1, 000 = 5.80

Table 2: CPM Pricing Table.

4.3.2 CPM Hits (Views)

Year 2012	Jul	Aug	Sept	Oct	Nov	Dec
Clothes	1, 200	1, 400	2, 000	2, 300	2, 500	2, 800
Foods	1, 400	1, 700	1, 900	2, 300	2, 800	3, 000
Manufacturing	2, 500	2, 800	3, 400	3, 000	2, 700	2, 900
Automotive	3, 900	4, 200	5, 100	5, 800	6, 300	6, 600

Table 3: CPM Hits (Views) 2012.

Year 2013	Jan	Feb	Mar	Apr	May	June
Clothes	3, 100	3, 400	3, 700	4, 000	?	?
Foods	2, 900	2, 700	2, 500	2, 200	?	?
Manufacturing	2, 600	2, 500	2, 300	2, 100	?	?
Automotive	6, 900	7, 300	7, 500	7, 800	?	?

Table 4: CPM Hits (Views) 2013.

? – To be predicted based on previous CPM trends analysis.

4.3.3 CPM Line Chart

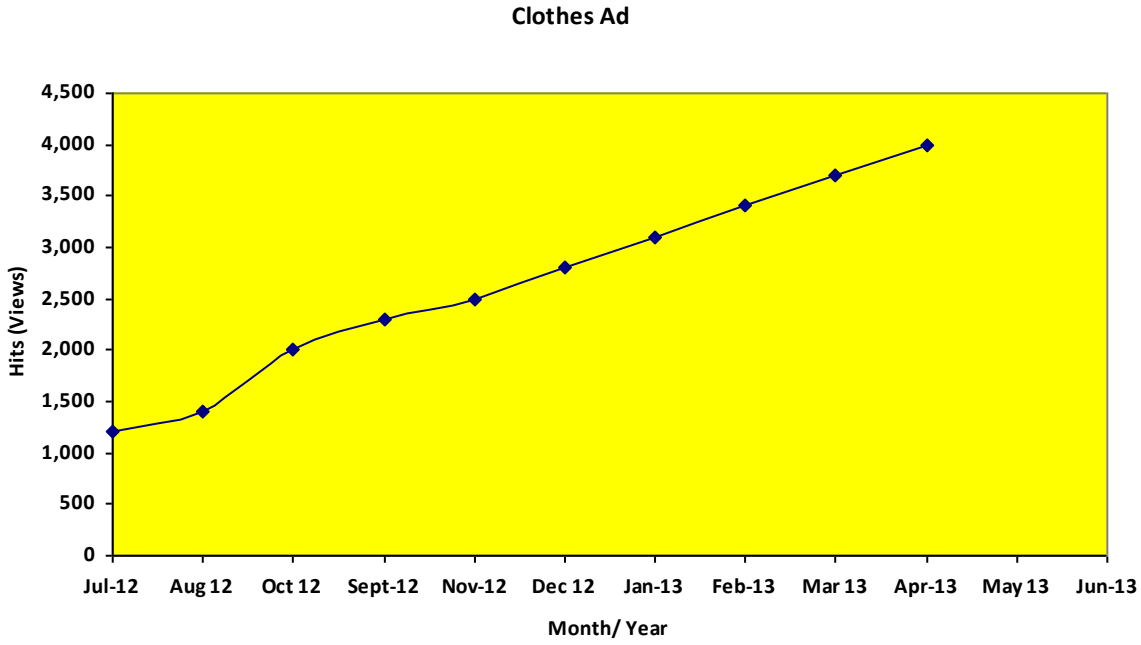


Table 5: CPM Line Chart

4.3.4 Prediction

Based on the analysis done, we predict that for the month May and June 2013, the graph for CPM ad may go up as per previous months. We as the Publisher suggest Advertiser to choose CPM pricing model as the medium to advertise and market their Clothes.

4.4 CPC

4.4.1 CPC Pricing Table

Ad Category	Size	Allocation	Total Cost Running Ad (RM)	Total Number of Clicks	Formula	Price/ Per Clicks (RM)
Clothes	300 x 200 pixels	Top side centre	10, 000.00	40, 000	10, 000.00/ 40, 000 = 0.25	0.25
Foods	250 x 500 pixels	Top side centre	8, 000.00	50, 000	8, 000.00/ 50, 000 = 0.16	0.16
Manufacturing	300 x 450 pixels	Right side top	20, 000.00	100, 000	20, 000.00/ 100, 000 = 0.20	0.20
Automotive	350 x 400 pixels	Right side centre	30, 000.00	130, 000	30, 000.00/ 130, 000 = 0.23	0.23

Table 6: CPC Pricing Table.

4.4.2 CPC Hits (Clicks)

Year 2012	Jul	Aug	Sept	Oct	Nov	Dec
Clothes	1, 200	1, 400	2, 000	2, 300	2, 500	2, 800
Foods	1, 400	1, 700	1, 900	2, 300	2, 800	3, 000
Manufacturing	2, 500	2, 800	3, 400	3, 000	2, 700	2, 900
Automotive	3, 900	4, 200	5, 100	5, 800	6, 300	6, 600

Table 7: CPC Hits (Clicks) 2012.

Year 2013	Jan	Feb	Mar	Apr	May	June
Clothes	2, 700	2, 200	1, 900	1, 400	?	?
Foods	2, 900	2, 700	2, 500	2, 200	?	?
Manufacturing	2, 600	2, 500	2, 300	2, 100	?	?
Automotive	6, 900	7, 300	7, 500	7, 800	?	?

Table 8: CPC Hits (Clicks) 2013.

? – To be predicted based on previous CPC trends analysis.

4.4.3 CPC Line Chart

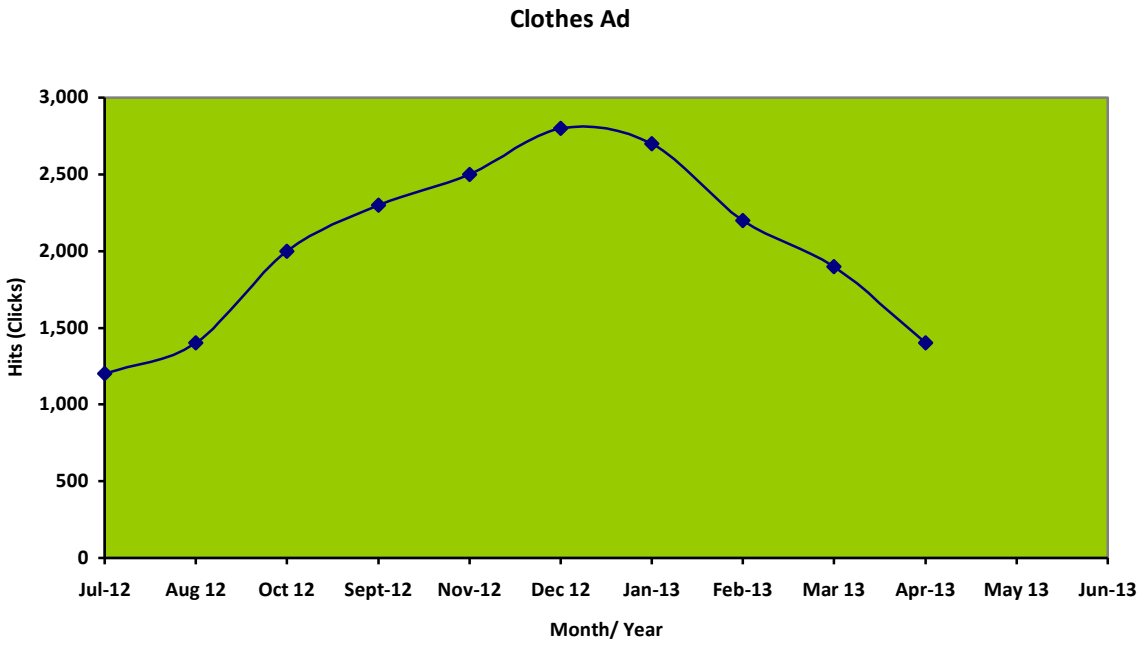


Table 9: CPC Line Chart.

4.4.4 Prediction

Based on the analysis done, we predict that for the month May and June 2013, the graph for CPC ad may go down as per previous months. We as the Publisher suggest Advertiser to choose CPM pricing model rather than CPC as the best pricing medium to advertise and market their Clothes.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Nowadays, online advertising will increasingly become an indispensable element of information technology companies' business models. We developed a model of advertising on a website and explained the role of the two most popular pricing models (CPM & CPC) for online advertising. We identified several factors that influence the choice of a pricing model; uncertainty effect, exposure value effect, mistargeting effect, and alignment effect. These factors may lead to conflicts between publishers and advertisers, and we highlighted the role of market characteristics on these factors. One possible direction for future research is investigating the impact of advertiser competition on the pricing model choices.

A reasonable assumption can be made such that a publisher wants to increase the level of advertiser competition, and advertisers want to reduce direct competition. Because CPC is characterized by the publisher making decisions with better information, the publisher may act to intensify competition. Considering this incentive on the publisher side, the advertisers may opt for CPM pricing, where they retain the control of targeting. This paper identifies market conditions in which the advertiser and publisher's preference for CPM or CPC coincide (diverge). It would be interesting, particularly when the two parties prefer different pricing policies, to develop a mechanism to resolve the conflict. This could be another promising avenue for future work.

In conclusion, this Extended Proposal highlights the technology in Internet advertising which has become popular in recent years. From the perspectives of advertisers, online publishers, ad exchanges and web users, we have presented the brief history and the overview of the entire ad eco systems and business models, and analyzed and compared the current challenges and recent solutions. In future, it is anticipated that ads delivered to users will become more targeted, where all participants in the eco system are harmonized by increased utility and satisfaction.

For publishers, the management of allocation and inventory is crucial, it is therefore important for publishers to have a trade between selling their spaces based on contracts and auctions. The inventory sold through contract gives guarantees of publisher revenue; nevertheless, the auction driven inventory makes good utility of remnant impressions and can bolster income occasionally. In order to improve the quality of the content/page, perhaps fractional factorial design could be employed to test which features of the websites are attractive to users, which could also be employed by advertisers to improve the quality and ROI for ads as well.

5.2 Recommendation

There are several interesting and relevant extensions to the model presented here that warrant further investigation. Firstly, the situation for both the advertiser and publisher may be better described as a portfolio of contracts rather than a single contract selected in isolation. Under such conditions, the role of risk changes, and therefore the optimal combination of advertisers (From the Publisher perspective) or publishers (From the Advertiser perspective) would be an interesting area for study.

The second area for extension involves forecasting the action probabilities and accounting for changes over time. Since market dynamics can change rapidly, the fluctuations of the value r may impact the contracts that each party is willing to commit to. Modeling this in more detail could lead to more sophisticated approaches for managing the contract and associated risks.

Finally, we suggest that the decision making framework, and particularly the role of negotiating power and information sharing will become increasingly important in online display advertising. If one party has the ability to withhold information or more accurately forecast or control the responses to an advertising campaign then there are many opportunities to take advantage of this capability.

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APPENDIX

Technical Paper