



Evaluation of the Electronic Book Readers

by

Mr. Thanawat Rattanapahira

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

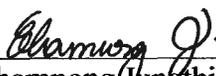
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ABSTRACT

eBook continues growing rapidly while the manifold of computers and digital devices. Many of eBook readers are available but the most famous is few. This project evaluates three well-known eBook readers based on PC Computer: Adobe Reader, Microsoft Reader, and Zinio Reader by the condition of functionality, hardware and software support, security, portability, and output using the data from documentation research and manually experimental. After examining, Adobe Reader is the most capabilities than others. Zinio and Microsoft Reader are ordered consecutively.



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I. INTRODUCTION

An eBook is an electronic version of a traditional printed book that can be read by using an eBook reader. (An eBook reader can be a software application for use on a computer, such as Microsoft's free Reader application, or a book-sized computer that is used solely as a reading device). Users can purchase an eBook as diskette or CD, but the most popular method of getting an eBook is to purchase a downloadable file of the eBook (or other reading material) from a Web site to be read from the user's computer or reading device. Generally, an eBook can be downloaded within few minutes.

They are popular because the options are similar to those of a paper book - readers can bookmark pages, make notes, highlight passages, and save selected text. In addition to these familiar possibilities, eBook readers also include built-in dictionaries, and alterable font sizes and styles.

Some eBooks can be downloaded for free or at reduced cost, however, prices for many eBooks - especially bestsellers - are similar to those of hardcover books, and are sometimes lower. Most eBooks are comparable in price to their traditional printed versions.

Many book publishers are operating the electronics publishing by the biggest revolution in technology since the Internet and eBook were invented. The eBook software companies are offering diverse solutions for production, protection the digital rights, distribution, and reading of content. eBook reader program is one of the important parts. Each has its own strengths and weaknesses.

To read an eBook, user must have the eBook reader installed and activated on the computer. The eBook reader is the program used to view the digital book and allow user to interact with activities such as searching, marking, and zooming.

Because each eBook reader has its own characteristics that impact user experience. This report will present the comparison among major well-known eBook reader candidates which are commonly used in Thailand now; “Adobe Reader”, “Microsoft Reader”, and “Zinio Reader”. The criteria used to consider are functionality, hardware support, software support, hardware required, security, portability, and output.

1.1 Objective of the Project

To identify the best eBook reader product

1.2 Significance of the Study

Many of eBook reader programs are available today; each has different characteristics. This evaluation will provide the information on their functionality and let the person who is willing to purchase eBook selects eBook format that is suitable to the needs.

1.3 Scope of the Project

Evaluate the specification of 3 eBook reader products which are run on PC; “Adobe Reader”, “Microsoft Reader”, and “Zinio Reader” on functionality, hardware support, software support, security, portability, and output.

II. LITURATURE REVIEW

2.1 The creation of the Internet

The USSR's launch of Sputnik spurred the United States to create the Advanced Research Projects Agency (ARPA, later known as the Defense Advanced Research Projects Agency, or DARPA) in February 1958 to regain a technological lead. ARPA created the Information Processing Technology Office (IPTO) to further the research of the Semi Automatic Ground Environment program, which had networked country-wide radar systems together for the first time. J. C. R. Licklider was selected to head the IPTO, and saw universal networking as a potential unifying human revolution.

In 1950, Licklider moved from the Psycho-Acoustic Laboratory of Harvard University to MIT where he served on a committee that established MIT Lincoln Laboratory. He worked on a Cold War project known as SAGE designed to create computer-based air defense systems. In 1957 he became a Vice President at BBN, where he bought the first production PDP-1 computer and conducted the first public demonstration of time-sharing.

Licklider recruited Lawrence Roberts to head a project to implement a network. Roberts based the technology on the work of Paul Baran who had written an exhaustive study for the U.S. Air Force that recommended packet switching (as opposed to Circuit switching) to make a network highly robust and survivable. After much work, the first node went live at UCLA on October 29, 1969 on what would be called the ARPANET, one of the "eve" networks of today's Internet. Following on this, the British Post Office, Western Union International and Tymnet collaborated to create the first international packet switched network, referred to as the International Packet Switched Service

(IPSS) in 1978. This network grew from Europe and the US to cover Canada, Hong Kong and Australia by 1981.

The first TCP/IP wide area network was operational by 1 January 1983, when the United States' National Science Foundation (NSF) constructed a university network backbone that would later become the NSFNet. (This date is held by some to be technically that of the birth of the Internet.) It was followed by the opening of the network to commercial interests in 1985. Important separate networks that offered gateways into, then later merged into the NSFNet include Usenet, Bitnet and the various commercial and educational X.25 CompuServe and JANET. Telenet (later called Sprintnet), were large privately-funded national computer networks with free dialup access in cities throughout the U.S. that had been in operation since the 1970s. This network eventually merged with the others in the 1990s as the TCP/IP protocol became increasingly popular. The ability of TCP/IP to work over these pre-existing communication networks, especially the international X.25 IPSS network, allowed for a great ease of growth. Use of the term "Internet" to describe a single global TCP/IP network originated around this time.

The network gained a public face in the 1990s. On August 6th, 1991 CERN, which straddles the border between France and Switzerland publicized the new World Wide Web project, two years after Tim Berners-Lee had begun creating HTML, HTTP and the first few Web pages at CERN.

An early popular Web browser was ViolaWWW based upon HyperCard. It was eventually replaced in popularity by the Mosaic Web Browser. In 1993 the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign released version 1.0 of Mosaic and by late 1994 there was growing public

interest in the previously academic/technical Internet. By 1996 the word "Internet" was common public currency, frequently misused to refer to the World Wide Web.

Meanwhile, over the course of the decade, the Internet successfully accommodated the majority of previously existing public computer networks (although some networks such as FidoNet have remained separate). This growth is often attributed to the lack of central administration, which allows organic growth of the network, as well as the non-proprietary open nature of the Internet protocols, which encourages vendor interoperability and prevents any one company from exerting too much control over the network.

Aside from the complex physical connections that make up its infrastructure, the Internet is facilitated by bi- or multi-lateral commercial contracts (for example peering agreements), and by technical specifications or protocols that describe how to exchange data over the network. Indeed, the Internet is essentially defined by its interconnections and routing policies.

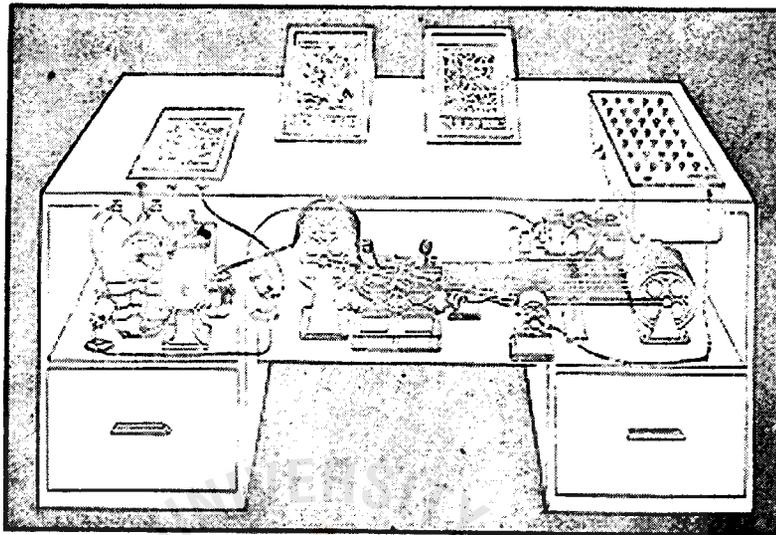
As of June 30th, 2006, over 1.04 billion people use the Internet according to Internet World Stats.

2.2 eBook

2.2.1 History of eBook

Electronic book has been around for a long time as a concept. The original idea was clearly defined for the first time in 1945 by Vannevar Bush who gives the beginning of electronic device "Memex". His proposal to link microfiche texts together to allow knowledge to be structured more efficiently in what he termed "associative indexing" (Bush) can be seen as the clearest visualization of the concept. Bush's Memex was a

response to what he considered to be a previously unknown problem; too much information.



Memex in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting, translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference (*LIFE* 1941, p. 123)

Figure 2.1 Vannevar Bush's Memex

The true value of the Memex would come in associative indexing, the tying together of two items in the texts. The user would be able to build a trail through the microfiche books contained in the device, following threads of associations through books and articles. The user could interject their own thoughts into the trail in the form of longhand passages of their own. It would also have been possible to record the trail that one had blazed and to reproduce it, to allow others to follow it by placing it into their own Memex (Bush). For this idea, Vannevar Bush is frequently honored as the originator of the idea of hypertext. Arguably, he should also be recognized as the originator of the electronic book. The text may not have existed in digital form, but that was due only to the limitations of the then-current technology. Now the technology is approaching the point at which the original idea of the Memex can be made a reality.

After the invention of Memex machine, the following product is Kay's Dynabook in 1968 which constructed resembled a laptop to a book-sized computer.

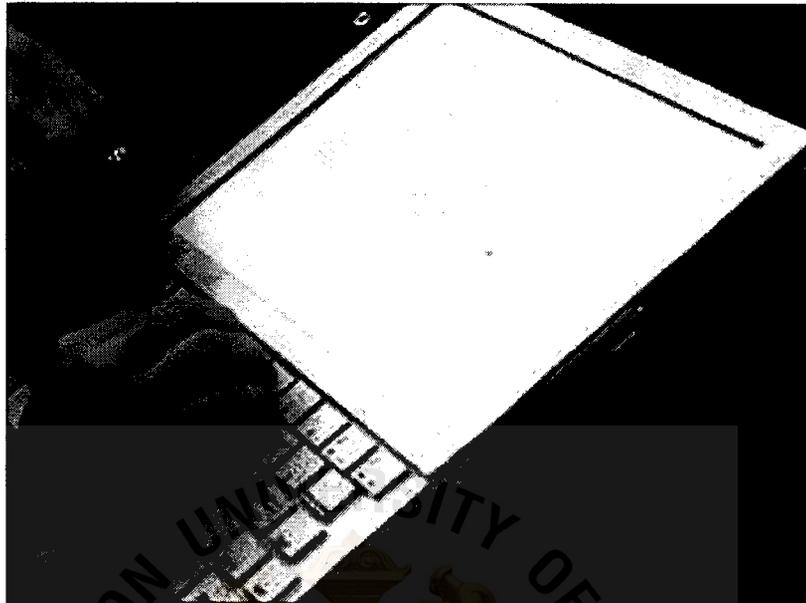


Figure 2.2 Kay's Dynabook

This device would use the strengths of the computer and the strengths of the book to change the way that discourse and argument are conducted. Kay also stated that he hoped to avoid the hundred years that it took from the introduction of the printing press to change the way that scholarly arguments were conducted. Arguments stopped appealing to authority and precedent and began using “observation, model sand logic”. Kay stated that the media should be purposely designed to avoid the useless imitation of previous forms that took place during the decades after the printing press was introduced. Shortly after this presentation in 1971, two engineers, Chuck Thacker and Butler Lampson, asked Kay if they could try to build his Dynabook. What they produced was called the Alto, a desktop computer that provided the inspiration for the Apple. Another attempt, by a company called GriD, led to the laptop computer, as we

know it. The “clamshell” design was intended to protect the display, a problem with the original conception of the Dynabook.

In 1971, Project Gutenberg began. While not an attempt at building a device, Project Gutenberg was an attempt to place public-domain textual works into a digital format, thereby making them available for people throughout the world and, incidentally, providing resources for electronic book devices.

The project was begun by Michael Hart, who received a user account with \$100,000,000 in spare computing time in it by the operator's of the Xerox Sigma V mainframe at the Materials Research Lab at the University of Illinois. Hart reportedly felt that there was nothing that he could do in the way of a normal computing project to repay that value, so he announced that “the greatest value created by computers would not be computing, but would be the storage, retrieval, and searching of what was stored in libraries. He began by typing in the “Declaration of Independence.” His theory was that anything that could be entered into a computer could be reproduced indefinitely, creating what he termed a “replicator culture”

To provide these texts for the future, Project Gutenberg, which aims for simplicity, has since its inception held to one specific standard for the texts that it holds. This format is ASCII (American Standard Code for Information Interchange) text, the simplest form of text file. While not capable of advanced formatting, ASCII text is capable of being read in a tremendous variety of computer systems. It is a file system that assigns a number to each character, which includes letters, both upper and lower-case, and basic punctuation. Formatting is by means of spaces, carriage returns, and line feeds. Over 99% of all computer systems ever made will be capable of displaying the ASCII text files, regardless of what make, model, or operating system they use. Rather than tying the preservation of a truly historic mass of texts to the survival of a single

company, they took the least common denominator of the computer world and made that their standard. More texts will be added to the library as volunteers create the files, and as more texts reach the public domain.

The recent extension of the length of copyright has limited the number of modern texts that will be reaching the public domain. These texts provide a vast pool of information that is accessible for inclusion in the modern e-book. The use of Project Gutenberg would have to wait 14 years from the beginning of the project, because the first electronic book could not access those files. In 1984, Franklin Electronic Publishers released an electronic dictionary, capable of displaying a single line of text on a pocket calculator-sized device. This was followed by other devices: electronic foreign language translators/dictionaries, Bibles, and specialty dictionaries, among others. They were sold in consumer electronics stores, department stores, and many other retail venues. Each of these devices is a hard-wired book, incapable of being upgraded or changed.

Another electronic book device was produced by Sony, the Japanese electronics company. The Data Discman was introduced to the American marketplace in 1991. The Discman played both audio CD's and data CD's in Sony's proprietary electronic book format. There were two separate models released in North America, with the only difference being the number of electronic book titles that came bundled with the device. Both weighed 1.5 pounds, measured 4.25x2x5.35 inches. They had a LCD screen that measured 3.4" diagonally, and displayed 10 lines of 30 characters each. The battery provided three hours of use. The DD-1EXB had a retail price of \$550 and came with three texts: Compton's Concise Encyclopedia, Wellness Encyclopedia, and Passport's World Travel Translator. The DD-1EXE came with only the Compton's concise Encyclopedia and sold for \$450. At the time of their introduction, only 20 titles were

available in the Sony electronic book format. The limitations of the device form a list that mirrors many of the failings of later devices. Nancy Herther gave them as:

Using a battery as power source limits multimedia capabilities; the screen is small and resolution limited; the closed, proprietary architecture limits creativity; the search engine is not very robust; and the lack of DOS capability or a note field limits its current value to many vertical markets. This did not prevent it from selling a reported 90,000 units in Japan, mainly to “professional men in their forties who feel a need for quick access to reference information”.

Sony’s second device, the Bookman was built to answer the critics of the first device. It weighed two pounds, had a 4.5” (diagonal) screen, and used cartridges to store texts. In 1995, Franklin purchased and began marketing the Bookman line of hardware based electronic books. These devices changed greatly from their original form at Sony. The current Franklin Bookman, still available for purchase from Franklin, uses matchbox-sized memory cards to store texts and some small programs. Readers can download information from a computer to one of the proprietary cards with the purchase of a Bookman Writer, a \$50 accessory. The texts that are available for the Bookman consist of primarily reference works, including multiple versions of the Bible, a wine guide, multiple dictionaries, and some card and trivia games. The pricing of the texts averages \$20 for the purchase of a unit on a card or \$14 for a downloaded file that is loaded to a card through the Bookman Writer.

Today the specialized eBook reader devices are not pretty successful according to price, limited functions, and publisher’s book supply unlike the generic computer devices such as Desktop PC, Notebook, Tablet PC, and PDA. Most of publishers are now focusing to sell their contents through Internet which is accessible by eBook reader program on personal computers.

2.2.2 Electronic vs. Paper Books

3257 e-1

eBook

Advantages

- Text can be searched, except when represented in the form of images.
- Take up little space.
 - Hundreds (or thousands) may be carried together on one device.
 - Approximately 500 average e-books can be stored on one CD (equivalent to several shelves' worth of printed books)
 - Because they take up little space, e-books can offer indefinitely, with no 'out of print' date, allowing authors to continue to earn royalties indefinitely (copyright law permitting), and allowing readers to find older works by favorite authors.
- E-books may be read in low light or even total darkness, with a back-lit device.
- Type size and type face may be adjusted
- Can be used with text-to-speech software.
- Readily reformatted for independent platforms.
- Instantly copied
 - When a backup is kept in a remote place, cannot be lost by fire, etc.
 - Once distributed, elimination is difficult and sometimes impossible.
- Distributed at low cost.

- Distributed instantly, allowing readers to begin reading at once, without the need to visit a bookstore
- Simultaneously share book in the computer network.
- Errors may be easily corrected with downloadable lists of errata or simply with corrected text. (This can also be an advantage for printed books, in different circumstances.)
- eBooks are commonly published by independent publishing houses, which can mean greater editorial and authorial freedom and more room for experimentation.
- An inexpensive format for works that require color.
- An excellent choice of format for works that benefit from search and cross-reference capabilities, such as dictionaries, reference works, and certain kinds of textbooks.
- Eco-friendly, cuts down on paper production

Disadvantages

- Can be incompatible with new or replacement hardware or software
- Require care in handling and storage of the files, to avoid damage or loss
- Reading on the computer screen can be hard on (or even harmful to) the eyes
- Lacks the quality of a printed book as an item
- Limited battery life on portable devices

- Portable reading devices can be expensive
- Sometimes vendors can track readers and reading habits
- Some eBook restricts times a document can read
- Some eBook is printing restricted
- Publisher may face in cases of hacking, or dissemination without approval from the author
- Not normally a good format choice for works that have extensive and/or large illustrations, such as works in art history, photography, large maps, etc.

Printed book

Advantages

- Less eye strain over extended reading time
- If small, very portable.
- Usable in adverse environmental conditions.
- Robust and durable.
- Readable when severely damaged.
- Requires no power source, and no alternative reading device like a PC or a palmtop.
- Has more value as "collector's items," e.g., first editions or signed copies

- At the moment, printed books are primarily published by established houses including numerous international conglomerates, which can result in greater funds available for promotion of a title.

Disadvantages

- Errors are unchangeable.
- From the user's point of view: Can be priced in a way that inhibits availability
- From the user's point of view: Cannot be easily copied/shared
- From the user's point of view: Cannot be read in darkness
- From the user's and author's point of view: Can be put out of print and made unavailable to readers
- From the author's point of view: Can be difficult to get a publisher to amend errata
- Can be an awkward format for reference works or works that have many internal cross-references.
- An expensive format for works that require color, since color printing commonly requires several passes of paper through the press (typically three to five passes).

2.3 The relationship between Internet and eBook

The increasing number of Internet users around the world each year by lower price of computer and cheap connection charges while the electronics commerce continues

growing. Thousands of stuff both tangible (e.g. mobile phone, computer hardware, and music CD) and intangible (e.g. eBook, computer software, and video streaming) are being sold everyday. eBook is one of the intangible stuff that becomes more popular in the digital market. Unlike the hard-copy book because the reader does not have to wait for days while it transfers to home, eBook can be delivered within minute or seconds to the reader after being purchased. eBook has more functions rather than ordinary books such as finding words, print to paper, and multimedia inside it.

2.4 eBook reader program

A writer or publisher has many options when it comes to choosing a format for production. While the average end-user might arguably simply want to read books, every program has its exponents and champions, and debates over "which program is best" can become intense. For the average end user to read a book, every program has its advantages and disadvantages. These are some examples of eBook reader program available today.

2.4.1 FictionBook

FictionBook (FB) Reader is a free reader program for its own XML-based e-book format. FB eBook format can be read on free reader program 'Haali Reader' too.

2.4.2 Plucker

Plucker is a free e-book reader application with its own associated file format and software to automatically generate Plucker files from HTML files, web sites or RSS feeds. The format is a compressed HTML archives, somewhat like Microsoft's CHM.

2.4.3 Adobe Reader

Initially to provide a standard form for storing and editing printed publishable documents were provided by Adobe Systems Company. Documents in PDF format can easily be seen and printed by users on a variety of computer and platform types. They are very common on the World Wide Web. But since they are designed to reproduce page images, and the text cannot be re-flowed to fit the screen width, PDF files designed for printing on standard paper sizes are hard to view on screens with limited size or resolution. PDF files typically contain product manuals, brochures, magazine articles, or flyers as they can embed fonts, images, and other documents. A PDF file contains one or more page images, each of which you can zoom in on or out from. The PDF format can include interactive elements such as buttons for forms entry and for triggering sound and Quicktime or AVI movies. Acrobat PDF files are optimized for the Web by rendering text before graphic images and hypertext links. Adobe's PDF-like e-book format is incorporated into their reader.

2.4.4 Microsoft Reader

The Microsoft reader uses patented ClearType display technology. Navigation works with a keyboard, mouse, stylus, or through electronic bookmarks. The Catalogue Library records reader books in a personalized "home page". A user can add annotations and notes to any page, create large-print e-books with a single command, or create free-form drawings in the reader pages. A built-in dictionary allows the user to look up words.

2.4.5 eReader (formerly Palm Digital Media)

A program for viewing Palm Digital Media electronic books is available for PalmOS, PocketPC, Symbian OS, Windows, and Macintosh. The reader shows text one

page at a time as paper books do. eReader supports embedded hyperlinks and images. Most eReader formatted books are encrypted, with the key being the purchaser's full name and credit card number.

2.4.6 Mobipocket

The Mobipocket Reader has a home page library. Readers can add blank pages in any part of a book and add free-hand drawings. Annotations - highlights, bookmarks, notes, and drawings — can be applied, organized, and recalled from a single location. Mobipocket Reader has electronic bookmarks, appearing in the page margins. Dictionaries allow users to look up definitions through a built-in lookup function.

The reader has a full screen mode for reading and has Microsoft ClearType support. On Palm OS, readers can use sub-pixel rendering with the MobiType font. Mobipocket Reader runs on many PDA types (including Palm OS, Pocket PC and Windows CE, Tablet PC, Casio BE-300, Psion, Symbian OS Smartphones, Franklin eBookMan) and on Windows 2000/XP. Mobipocket products do not allow reading on Linux, Macintosh or other operating systems. These systems may be used only as a conduit to a PDA.

The Mobipocket e-book format based on the 'Open eBook standard' using XHTML can include JavaScript and frames. It also supports native SQL queries to be used with embedded databases.

The Mobipocket encryption system is not a password based system. Its Digital Right Management (DRM) relies on the PDA hardware serial number.

2.4.7 DesktopAuthor

An electronic publishing suite that allows creation of digital web books with virtual turning pages. Digital web books of any publication type can be written in this format,

including brochures, e-books, digital photo albums, e-cards, digital diaries, online resumes, quizzes, exams, tests, forms and surveys. DesktopAuthor packages the e-book into a ".dnl" or ".exe" book. Each can be a single, plain stand-alone executable file which does not require any other programs to view it. DNL files can be viewed inside a web browser or stand-alone via the DNL Reader.

2.4.8 Newton eBook

Commonly known as a Newton book; a single Newton package file can contain multiple books. All systems running the Newton operating system (the most common include the Newton MessagePads, eMates, Siemens Secretary Stations, Motorola Marcos, Digital Ocean Seahorses and Tarpons) which have built-in support for viewing Newton books. The Newton package format was released to the public by Newton, Inc. prior to that company's absorption into Apple Computer. The format is thus arguably open and various people have written readers for it (writing a Newton book converter has even been assigned as a university-level class project).

Newton books have no support for DRM or encryption. They do support internal links, potentially multiple tables of contents and indexes, embedded grayscale images, and even some scripting capability (for example, it's possible to make a book in which the reader can influence the outcome).

2.4.9 Zinio Reader

A reader program provides mainly print publishers with a way to distribute their printed publication digitally, to read online or offline. ID is required to access the magazines which utilizing a combination of technology licensed from Adobe and Contentguard. The program has page turning function and Digital Right Management (DRM) protections embedded in every file.

2.5 Common characteristics of eBook reader

Common characteristic is to protect author and publisher rights; eBooks may not be printed or copied unless permission is given to do so by the publisher or owner. In the file for each of the eBooks on some web site, buyer can see the permissions given for each title (printing, copying or lending).

Most eBook readers are free to use and available to download via many web sites.

Each eBook file remains linked to the computer where it was downloaded. So make sure to download it on to the computer from where to read it. Some readers are required activation before purchase. This process ties together information from the user account and computer. It uses that information to create a permission code that's stored on the computer. This permission code enables user to access eBook content that has been packaged. Most commercial eBooks use copyright-protected technologies to help ensure that they're available only to the purchaser.

III. RESEARCH METHODOLOGY

3.1 Research Methodology

This report is comprised of documentary and experimental research. The documents such as user manuals and technical papers that come from the official eBook reader's web sites are the primary source. The secondary information sources come from reliable web sites such as Wikipedia, United States Computer Emergency Readiness Team (US-CERT), and Secunia – Software Security Specialist Company. All of documents used are open-published.

Not only data from the documents, experimental approaches to the eBook readers is also a must to get more aspects of products. The experimental methodology in this report is trying to use eBook readers' function following the evaluation criteria and finding out capability of each reader as a result. At the final step, the information from collected documents and evaluation result is used for comparison would indicate that which one is the best eBook reader and the consecutives.

3.2 Developing the specification

The specification and evaluation procedure were evolved based on the common characteristics of eBook reader that runs on PC then compared them which one is the best among their features that eBook should possess in order to be considered at all. This list was to provide a first, filtration process.

Candidates are initially measured against a list of must features. The complete evaluation criterion is described in the section 3.3 “Developing the evaluation criteria”.

3.3 Selecting candidates

This evaluation is concerned with readers as a free product to use. In this report, three programs are Adobe, Microsoft, and Zinio Readers are used. The reasons to choose them are:

Adobe is one of the first digital book reader programs on computer and very famous in digital content distribution market. Most of eBook sellers already have Adobe PDF file format.

Microsoft reader is also one of the first digital book reader programs which was early version for Tablet PC. It supports drawing on the eBook like marking on the paper and very famous in digital publishing on handheld device.

Zinio is a newly born company, founded in 2000. It is one of leaders in digital publishing. More than 1,700 popular magazines are served by Zinio. The reader program that is using for the first eBook commercial in Thailand is provided by True Digital Entertainment Co., Ltd.

3.4 Developing the evaluation criteria

From the three readers above, there are some comparable characteristics are used to evaluate them in terms of functionality, hardware support, software support, security, portability, and output.

3.4.1 Functionality

These criteria refer to the utility of the reader from the user's perspective.

eBook Library To handle the eBook files which are downloaded from the publisher.

Searchable Texts The user should be able to search through the entire content of the book and any annotations that they have made

Ability to take notes The user can attach 'notes' to any part of the book. The annotations may be textual or graphical and are saved with the book.

Ability to bookmark The user can bookmark a page to refer to at a later time.

Ability to draw The reader allows user to use its pen write down on the page

Highlighting Text within the book may be highlighted in some way to signify its importance or for some other purpose, it can be erased also.

Copy Text Texts from the document can be selected and copied. Once copied the content can be pasted into other kinds of documents e.g. a word processing file.

Copy Picture Images from the document can be selected and copied. Once copied the content can be pasted into other kinds of documents e.g. a word processing file.

User-defined text size The user can select the text size that at which they wish to view the book.

Hyperlinks The hyperlinks within a book to jump to places within the document, other documents or external resources on the Internet.

Forms Interaction forms are provided to allow users to make structured input.

Page Rotation The reader can flip document page

Multiple Page View User can view multiple pages of document in the same time.

Full Screen View eBook pages will fill the entire screen.

Zoom User can expand the view point

Ability to read while offline When Internet connection has not presented, the reader can run normally.

3.4.2 Hardware Support

These criteria deal with the device upon which the eBook is viewed.

Range of platforms and devices PC, Mac, Tablet PC, PDA or smartphones. The eBook file should be viewable on a range of platforms and devices. More range of hardware support means when user purchases once, it can transfer file to more devices.

Network support The reader is able to connect to the internet to download new book, updates to existing material, software updates.

3.4.3 Software Support

These criteria described about the eBook reader can be run with the other software vendors

Operating System It is an advantage if the reader can be run on various operating systems such as Microsoft Windows, Symbian, and Mac OS X for example.

Software Incompatible Some applications are incompatible with the reader and could not be run simultaneously.

3.4.4 Security

Document Protection The reader can protect the document from illegal copying or transferring to other devices.

Vulnerability Report Weakness in the reader mean allowing an attacker to violate the integrity, confidentiality, access control, availability, consistency or audit mechanism of the system or the data and applications of its hosts. Vulnerabilities may result from bugs or design flaws in the reader.

3.4.5 Portability

Transfer to PDA Sometimes users want to transfer eBook to their PDA, the reader program may support this function

Transfer to another computer Sometimes users want to transfer eBook to their PDA, the reader program may support this function

3.4.6 Output

Print The user can print material from the reader

Play 3D Animation 3D Animations can be played in the document

Play sound Sounds can be played in the document

Play video Videos can be played in the document



IV. RESULT

After examining the readers followed by criteria from previous chapter with Adobe Reader, Microsoft Reader, and Zinio Reader, the result and additional comments are mentioned below.

4.1 Adobe Reader

4.1.1 Functionality



Figure 4.1 Adobe Reader's My Digital Editions

eBook Library Adobe Reader has eBook library called "Adobe Digital Editions" which stores PDF files that have been purchased from retailers, borrowed from libraries, or exchanged among users. This library can automatically retrieve magazines and periodicals by subscribing. To read eBook in 'Adobe Digital Editions', user must have a license to open and read (generally provided by the seller or lender) and must activate the Reader application.

Searchable Texts The reader allows user to search specific text with whole words only, case-sensitive, include bookmarks, and include comments then list the results. This search function can find words in Adobe PDF files stored in a specific location on hard disk or network drive also.

Ability to take notes It depends on the author's permission. If commenting is enabled in a document, user can use the Note tool to add notes on any page in the document with the text in a pop-up window

Ability to bookmark User cannot create a bookmark for the document. Only author or publisher can create them.

Ability to draw It depends on the author's permission. If commenting is enabled in a document, user can use the Pencil tool to draw lines and use the Pencil Eraser tool to erase parts of the pencil markups.

Highlighting It depends on the author's permission. If commenting is enabled in a document, user can use the Highlight Text tool to highlight a section of text.

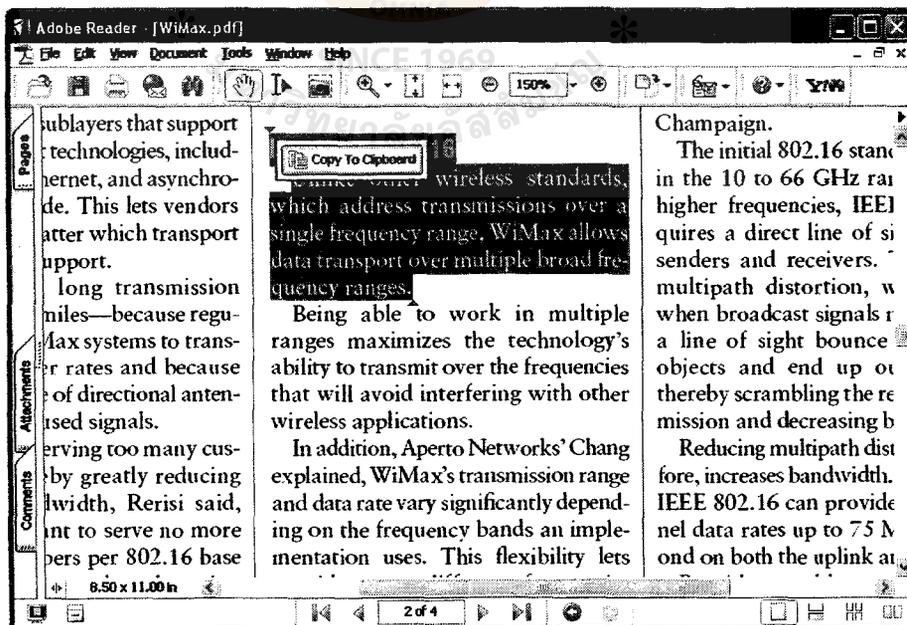


Figure 4.2 Copy Text Function

Copy Text Tool for selecting text and copy is available with the name “Select Tool”. User can copy message by selecting the range and copying them into clipboard to be used by other applications onward. Sometimes copy text command may have set restrictions properties.

Copy Picture “Snapshot Tool” is designed for copy picture or text with the single drag area in rectangle. Sometimes ‘Copy Picture’ command may have set restrictions properties.

User-defined text size PDF document can change text color, background color. But unfortunately the text size is unchangeable.

Hyperlinks Adobe Reader supports hyperlink as navigational aid in document to provide user to go directly to the section in document or external web site.

Forms Adobe Reader can collect data from a user and then send that data via email or the web. Document can contain static or interactive form fields; interactive form fields let the user fill in the form using their computer, while static form fields must be printed and filled in by hand. Users who fill in a PDF form that contains interactive form fields using Adobe Reader can be saved only a blank copy of the PDF form, unless the form author added special usage rights.

There are three types of Adobe PDF forms: Fill-and-print PDF forms are typically digital presentations of paper forms. Fill-and-print forms may contain interactive form fields or static form fields; either way, the user must manually deliver the form, such as via postal mail or fax machine.

Submit-by-email PDF forms contain a button that extracts the form data from the PDF form and attaches that data to an email message or attaches the complete PDF document.

Submit on-line PDF forms contain a button that sends the form data to an on-line repository, such as a database.

Page Rotation Rotate View is available with Clockwise and Counterclockwise page viewing with 90-degree increments. This changes the view of the page, not its actual orientation, and the change in view cannot be saved.

Multiple Page View User can view multiple pages of document in the same time.

Facing arranges the pages side by side, displaying only one or two pages at a time.

Continuous - Facing arranges the pages side by side in a continuous vertical column. If a document has more than two pages, the first page appears on the right to ensure proper display of two-page spreads.

Full Screen View eBook pages will fill the entire screen; the menu bar, command bar, toolbar, status bar, and window controls are hidden. A document creator can set a PDF document to open in Full Screen view, or user can set the view manually. Full Screen view is often used for presentations, sometimes with automatic page advancement and transitions.

Zoom Low-vision readers read documents more easily with wide range of view from 8.33 to 6400 percent of the origin.

Ability read while offline User open eBook while the Internet connection does not present if user has purchased it right and already activated the reader.

4.1.2 Hardware Support

Range of platforms and devices Adobe Reader program has many editions that can be run on Palm handheld, Tablet PC, PC, Mac, and Pocket PC.

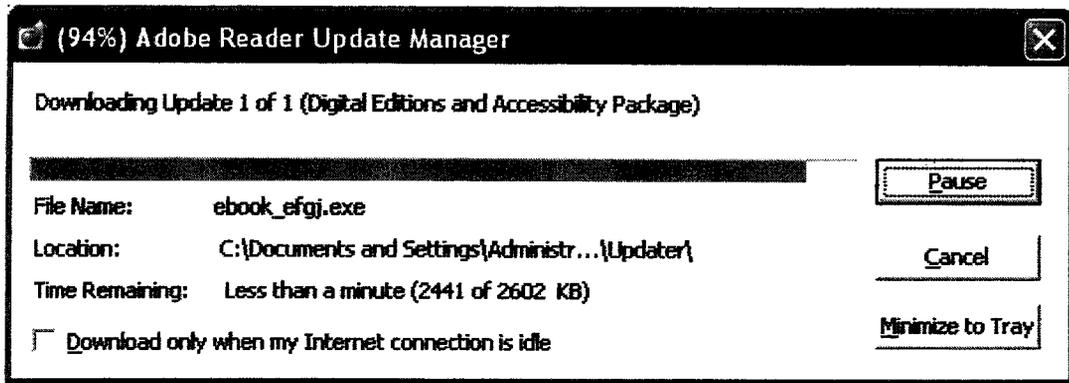


Figure 4.3 Adobe Reader Update Manager

Network Support The reader has participated with computer network in several ways. Update Manager performs downloading new updates from Adobe. Search function in the reader supports finding words in Adobe PDF files stored in the network such as network drive or Internet. User can send Adobe PDF documents to printers and fax machines in the PrintMe network or securely store PDF files online for on-demand printing. And the Digital Edition service in library is automatically downloaded periodical eBook which user subscribed.

4.1.3 Software Support

Operating System: Like many platform supports, the operating systems which Adobe Reader can run are Windows 2000 with Service Pack 2, Windows XP Professional or Home Edition, Windows XP Tablet PC Edition, Mac OS X, Palm OS® 3.0 (or later), Pocket PC 2002 or 2003 platforms for handheld devices, Symbian OS™, Linux®, AIX®, HP/UX, and Solaris™

Software Incompatible: There are few reports about some softwares affect the working of Adobe Reader. The following are incompatible:

- McAfee/Cybermedia First Aid, Guard Dog, and Oil Change 95, 98, or 2000
- McAfee VirusScan 1.x-3.x

- Mijenix SystemSuite 2000
- 4Developers Add/Remove 4Good
- Inoculan AntiVirus 4.x - (This product can be disabled rather than uninstalled)

These applications are quite old; it should not be installed on the computer which runs Adobe Reader. If they are they will need to be uninstalled before using the reader.

4.1.4 Security

Document Protection

Acrobat security features to "lock" PDF documents with RC4-based 40-bit, 128-bit, and AES (Advanced Encryption Standard)-based 128-bit encryption. For example, authors can add passwords to restrict users from opening a PDF document, and they can prevent users from printing or editing a document. They can also use digital signatures to certify and encrypt PDF documents. A document to which security features have been applied is called a restricted document.

With a restricted PDF document, it may need to enter a password to open it. If a document is encrypted, it might not be able to open it without permission from the person who created the document. Documents with special security policies applied may require user to log in to a server to open the document.

Vulnerability Report According to famous security advisory Secunia and US-CERT, there are reports on Adobe Reader's Local File Reading , Local Files Detection and Denial of Service, and "mailListIsPdf()" Function Buffer Overflow problems.

4.1.5 Portability

Transfer to PDA From the library, User can send eBook to any mobile devices such as PDA or mobile phone that has Adobe Reader installed and activated with the same login. If the devices are not activated with the same login or Non-DRM PDF documents, it cannot be sent out from the library.

Transfer to Another Computer From the library, User can ‘Save a copy’ command to send eBook to any computer that has Adobe Reader installed and activated with the same login. If the devices are not activated with the same login, it can be transferred but cannot open.

4.1.6 Output

Print User can print material from the reader (if the author’s allowed to print) and can send open Adobe PDF documents to printers and fax machines in the PrintMe network or securely store PDF files online for on-demand printing.

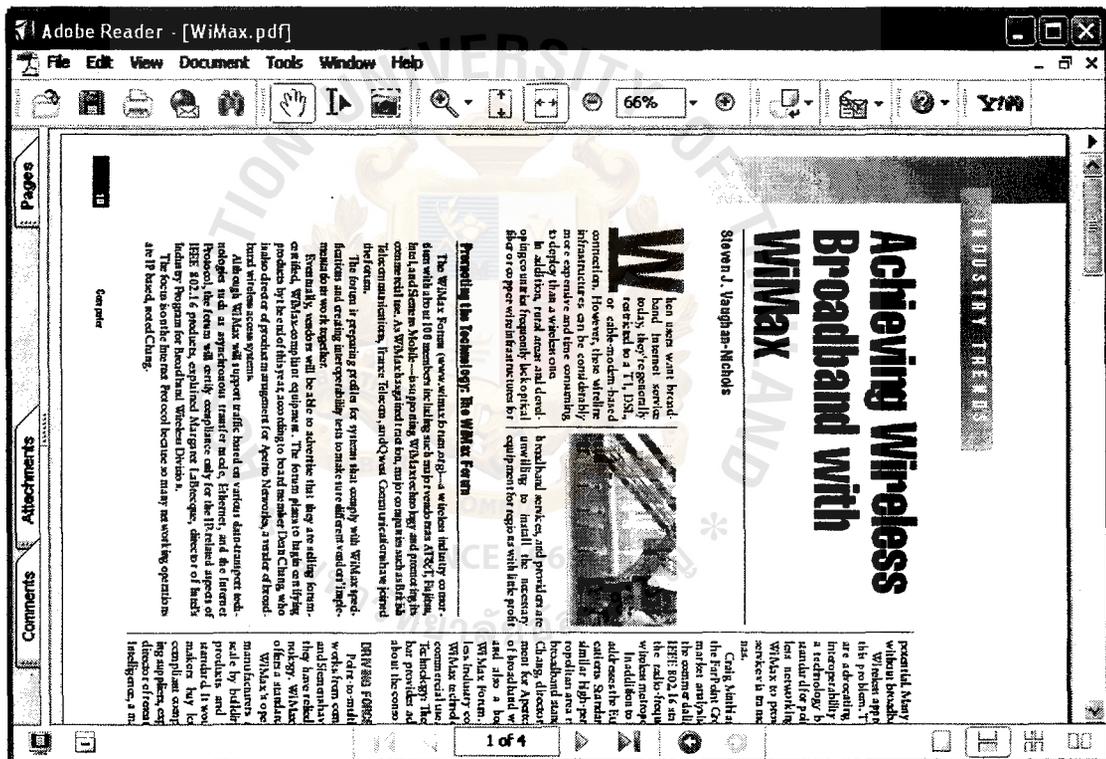


Figure 4.4 Page Rotation in Adobe Reader

Play 3D Animation Adobe Reader, user can view and interact with high-quality, 3D (three-dimensional) content created in professional 3D CAD (Computer Aided Design) or 3D modeling programs. Only full version of Adobe Reader includes 3D support.

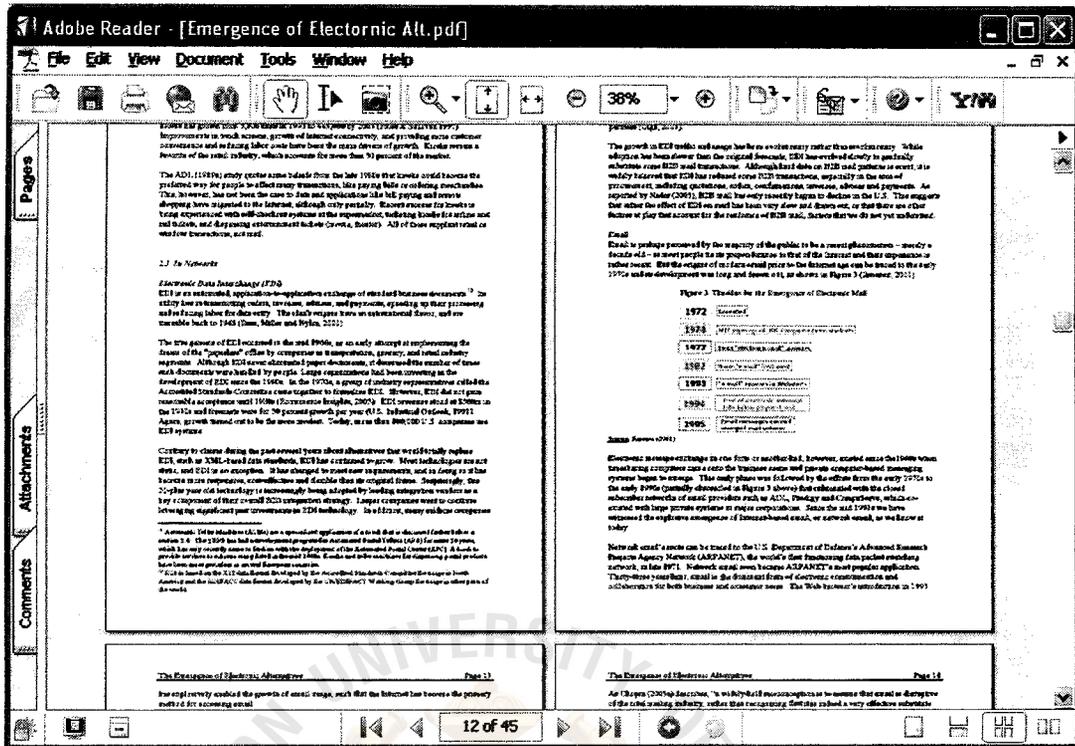


Figure 4.5 Multiple page view in Adobe Reader

Play sound Sound clips that authors have added to PDF documents may play automatically. In some cases, it plays when user clicks a link or bookmark. This function is in the full version of Adobe Reader.

Play video Movies clips that authors have added to PDF documents may appear directly in the PDF document. In some cases, it plays when user clicks a link or bookmark. This function is in the full version of Adobe Reader.

4.2 Microsoft Reader

4.2.1 Functionality

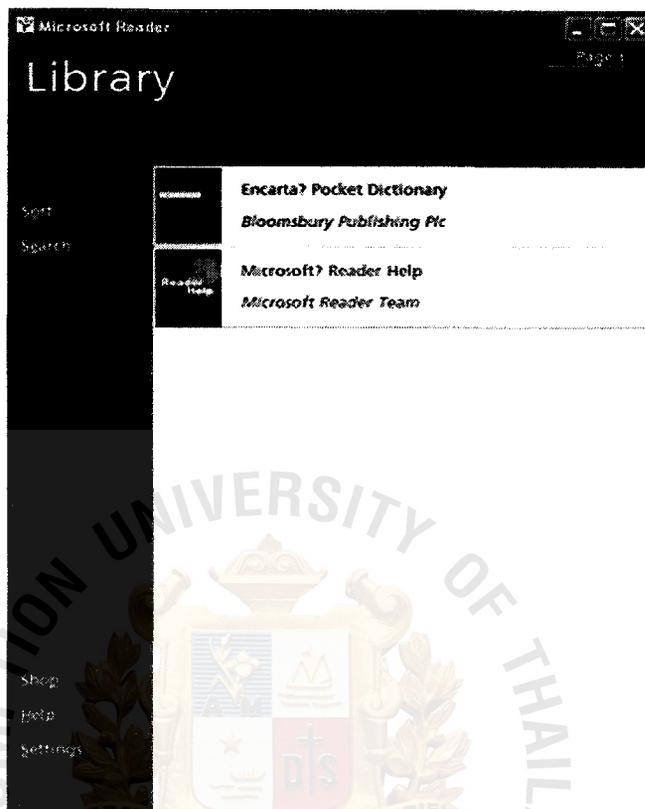


Figure 4.6 Microsoft Reader starts with Library

eBook Library The reader automatically adds a folder 'My Library' to the 'My Documents' folder on the computer's hard drive. After installing the software, when purchase an eBook and move to that folder, it will be listed in the Microsoft Reader Library. If there are many eBooks stored in the Library, the list may extend over multiple pages. User can move forward and backward through the list of eBooks by turning pages. If there is more than one page of eBooks in the Library, click the page number to turn pages and see more eBooks.

Searchable Texts with 'Find' function user can search an entire eBook for a specific word or group of words.

Ability to take notes User can add a note on an eBook page by clicking and dragging the cursor over the text to attach the note. And click 'Add Note' in the pop-up menu. After user has added the note, a note icon will appear in the left margin of the page.

Ability to bookmark User can add a bookmark by clicking and dragging over any text on the page and click Add Bookmark in the pop-up menu. A bookmark icon will appear in the right margin.

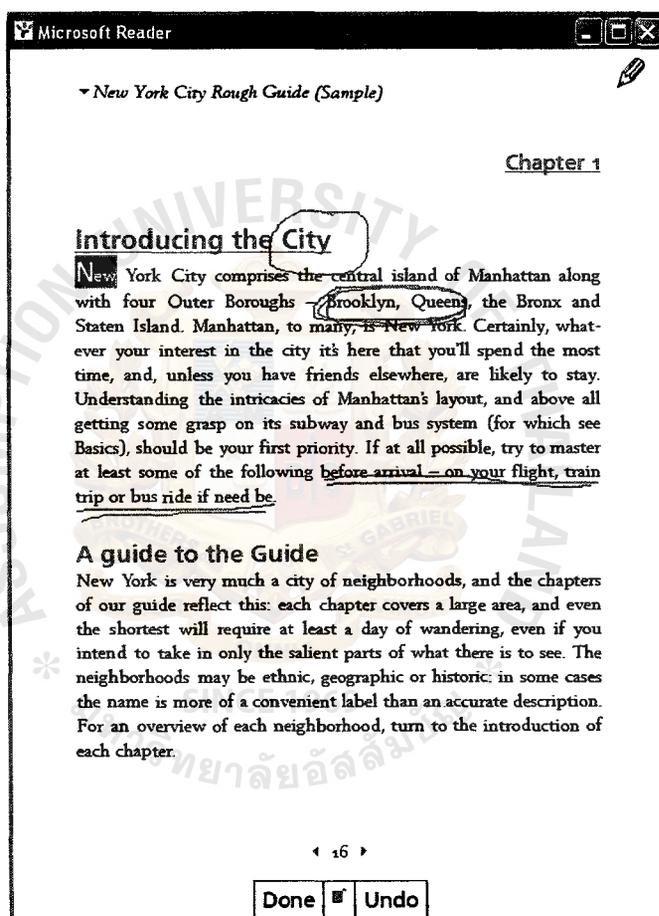


Figure 4.7 Microsoft Reader's Free-hand drawing

Ability to draw To draw on an eBook page user can click 'Add Drawing' in the pop-up menu. A cursor will function as a drawing tool then click and drag the mouse to make the drawing with changeable colors.

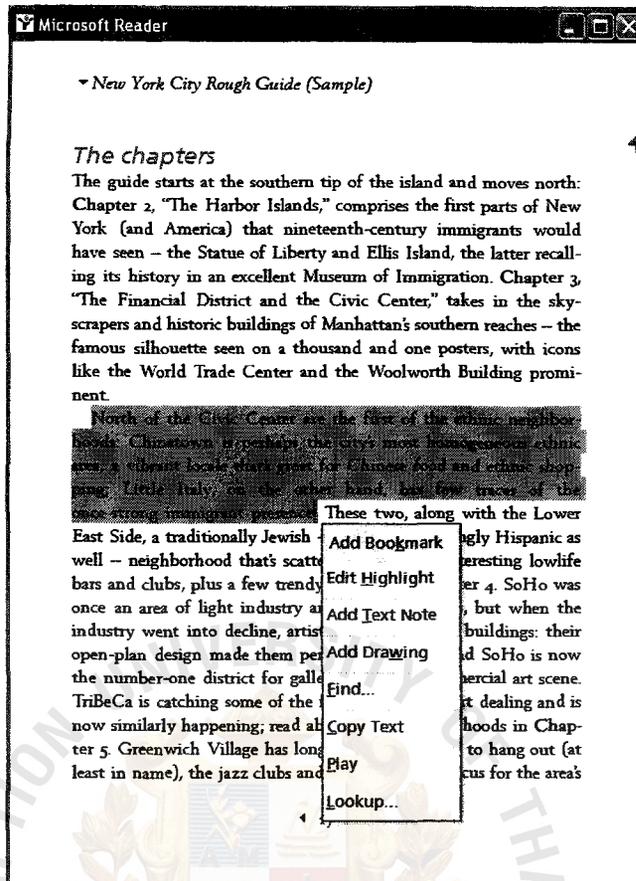


Figure 4.8 Microsoft Reader's Text Highlighting

Highlighting To highlight text user can click and drag the cursor over the text then click 'Add Highlight' from the pop-up menu.

Copy Text Some eBooks have been secured by their publishers not to support text copying. In this case, the menu option 'Copy Text' will appear grayed out. Otherwise select the text to copy by dragging the cursor across it and click 'Copy Text' from the pop-up menu.

Copy Picture In the current version (2.0) Microsoft Reader does not provide the copy picture tool. Any pictures cannot be copied from the document.

User-defined text size User can set own preferred text size by going to the setting menu of the reader.

Hyperlinks Microsoft Reader has hyperlink within eBook and external web sites.

Forms Some ebook has text-input box for entering some query. But it does not have a form.

Page Rotation User cannot change the page layout at all.

Multiple Page View User can view single page at a time.

Full Screen View Full Screen View option is available, but it offers single page per screen on the black background.

Zoom User cannot enlarge or reduce document size. This function is not available.

Ability to read while offline eBooks can be read when user is offline if it has already purchased and downloaded to the computer that Microsoft Reader is activated in the same log-in while purchasing.

4.2.2 Hardware Support

Range of platforms and devices Pocket PC, Tablet PC, PC, and Laptop

Network Support Microsoft Reader does not have network-related function.

4.2.3 Software Support

Operating System Microsoft Reader only supports on PC-based operating systems: Microsoft Windows® XP, Windows 2000, Windows 98, Windows Me, and Windows NT®4.0

Software Incompatible There is no report about software conflicts with Microsoft Reader.

4.2.4 Security

Document Protection Microsoft Reader uses its own Digital Right Management called 'Microsoft DRM' (currently is version 5). The DRM5 locks content to a particular device to encrypt and protect the alteration, opening, and copying without permission from publisher. These are three types of protection.

- Sealed: Titles are encrypted to prevent tampering (this does not guarantee authenticity of the copy or its source); that is, once created, a Sealed eBook title cannot be opened, changed, and saved. A Sealed title, in and of itself, does not provide for any copy protection.
- Inscribed: Titles are sealed and can prominently display data about their acquisition on the cover page so as to enable tracking and thereby reinforce honest usage.
- Owner-Exclusive: Titles are Inscribed titles that can be opened only by recipients in control of a Reader-enabled device that has been "activated" for the receipt of such titles and that has furthermore verified that the title downloaded is intended for the recipient in control of that device. The reader can protect the document from illegal copy or transfer to another devices

Vulnerability Report For Microsoft Reader 2.0, there is no vulnerability reports, according to famous security advisory Secunia and US-CERT

4.2.5 Portability

Transfer to PDA To copy eBooks to a Pocket PC, be sure that the user has activated Microsoft Reader in Pocket PC with the same log-in as PC. User has to copy the file manually, the reader does not offer any transfer options.

Transfer to Another computer User can copy eBooks to another computer that activated Microsoft Reader with the same log-in. User has to copy the file manually, the reader does not offer any transfer options.

4.2.6 Output

Print Currently this is not possible. However a Microsoft representative has stated publicly that this functionality is coming in a future release.

Play 3D Animation Microsoft Reader does not support Three-Dimensional objects in eBook.

Play sound The reader has AudibleReady™ and can play audio eBooks.

Play video At this moment, Microsoft Reader does not offer video functions.

4.3 Zinio Reader

4.3.1 Functionality

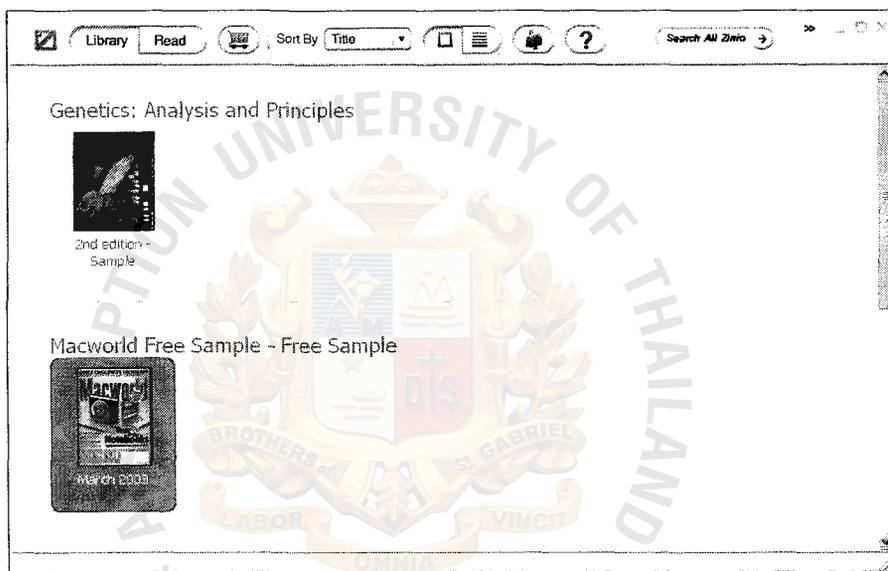


Figure 4.9 Zinio's Library

eBook Library Downloaded documents is automatically stored in the 'My Zinio Library' folder. To view the collection of publications downloaded, user can click the Library button on the toolbar.

Searchable Texts User can find text in a document or all eBooks in the Library with search toolbar.

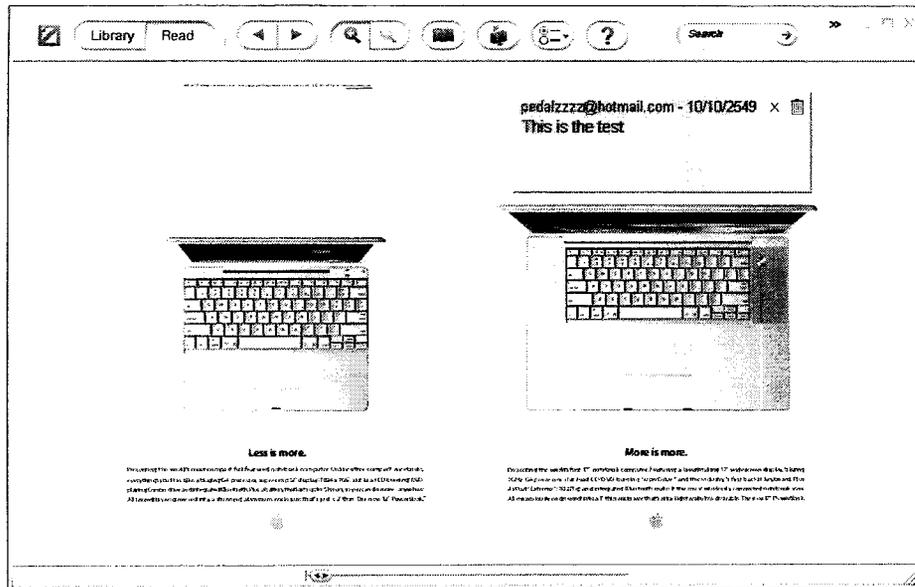


Figure 4.10 Taking note

Ability to take notes User can choose Note from the Annotations menu, then click and drag the note cursor over the area of the page where to place the note. A note appears with user's name, current date, and field to enter text.

Ability to bookmark When user has added notes, highlights, or ink; it becomes a list in 'Annotation'. To locate them, click the Options button on the toolbar, and then select 'Show Annotations List' from the menu that appears.

Ability to draw Zinio Reader has no free-hand drawing function.

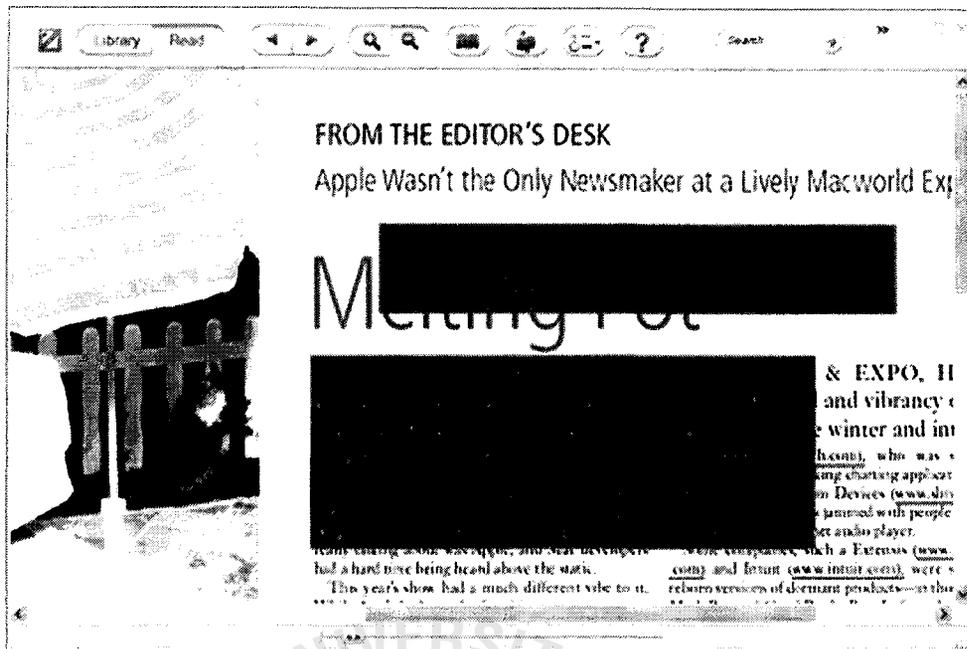


Figure 4.11 Highlighting

Highlighting User can choose Highlight from the Annotations menu then click and drag the highlight cursor over the text.

Copy Text The reader has no copy text function.

Copy Picture The reader has no copy picture function.

User-defined text size Zinio's eBook text size cannot be changeable.

Hyperlinks The reader is supported hyperlinks between topics in the document or external link to the web sites.

Forms Text-input form is not available.

Page Rotation Zinio Reader cannot rotate document page.

Multiple Page View The reader allows user to view single or double pages per screen.

Full Screen View User can press F11 to toggle full screen view on/off.

Zoom Three ways offer to enlarge document: mouse click, zoom toolbar, and Enter key.

Ability to read while offline Internet connection is not need after user purchased and downloaded eBook to the computer which Zinio reader is activated already.

4.3.2 Hardware Support

Range of platforms and devices PC, Tablet PC, and Mac

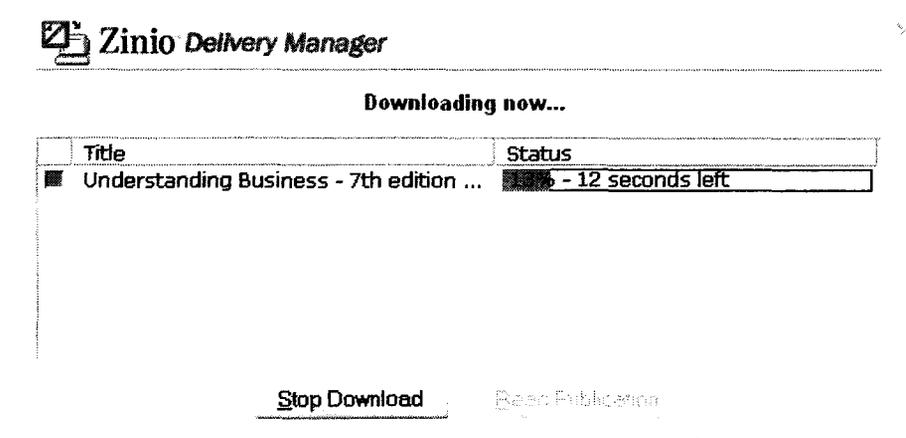


Figure 4.12 Zinio Delivery Manager

Network Support User can check the newer version of reader if available by clicking the Options button and choosing 'Check for Upgrade'. The Zinio Delivery Manager handles automatically downloading eBooks from Internet and places them in the library.

4.3.3 Software Support

Operating System Windows XP, 2000, Me, 98, and NT, Mac OS X 10.1

Software Incompatible There is no report about Zinio conflicted with other software.

4.3.4 Security

Document Protection Zinio has acquired the document license from Adobe Systems and combined with its own Digital Right Management called 'Zinio DRM' to protect document

Vulnerability Report There is no vulnerability reports from Secunia and US-CERT.

4.3.5 Portability

Transfer to PDA Zinio Reader does not have function to transfer eBook file to PDA.

Transfer to Another computer Zinio Reader does not have function to transfer eBook file to another computer. User has to copy it to another computer with the same log-in manually.

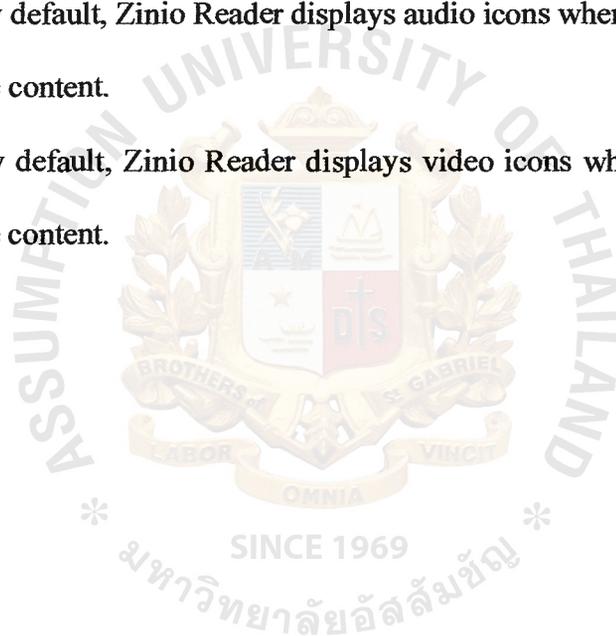
4.3.6 Output

Print This feature may not be available for some publications, because the publisher may choose to restrict the printing rights for a particular publication. To print the pages on the screen, click the Print button in the top toolbar.

Play 3D Animation Zinio Reader does not support 3D animation.

Play sound By default, Zinio Reader displays audio icons when user turns a page that contains voice content.

Play video By default, Zinio Reader displays video icons when user turns a page that contains voice content.



V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

From the previous chapter, after the evaluation of three eBook readers with similar criteria, the evaluation result is tabalized as follows.

Table 5.1 eBook reader comparison chart

	Adobe Reader 7.0	Microsoft Reader 2.0	Zinio Reader 3.0
Function			
eBook Library	Yes	Yes	Yes
Searchable Texts	Yes	Yes	Yes
Ability to take notes	Yes	Yes	Yes
Ability to bookmark	Yes	No	Yes
Ability to draw	Yes	Yes	No
Highlighting	Yes	Yes	Yes
Copy Text	Yes	Yes	No
Copy Picture	Yes	No	No
User-defined text size	No	Yes	No
Hyperlinks	Yes	No	Yes
Forms	Yes	No	No
Page Rotation	Yes	No	No
Multiple page view	Yes	No	Yes
Full Screen View	Yes	Yes	Yes
Zoom	Yes	No	Yes
Ability read while offline	Yes	Yes	Yes
Hardware Support			
Range of platforms and devices	Palm handheld, Tablet PC, PC, Mac, and Pocket PC	Pocket PC, Tablet PC, PC, and Laptop	PC, Laptop, Tablet PC, and Mac
Network Support	Yes	No	Yes
Software Support			
Operating System	Windows 2000 with Service Pack 2, Windows XP Professional or Home Edition, or Windows XP Tablet PC Edition), Mac OS X v.10.2.8 or 10.3, Palm OS® 3.0 (or later) and Pocket PC 2002 or 2003 platforms for handheld devices, Symbian OS™, Linux®, AIX®, HP/UX, and Solaris™	Microsoft Windows® XP, Windows 2000, Windows 98, Windows Me, and Windows NT®4.0	Windows XP, 2000, Me, 98, and NT, Mac OS X 10.1
Software Incompatible	Yes	No report	No report

Table 5.1 eBook reader comparison chart (Continued)

	Adobe Reader 7.0	Microsoft Reader 2.0	Zinio Reader 3.0
Security			
Document Protection	Yes	Yes	Yes
Vulnerability Report	Yes	No report	No report
Portability			
Transfer to PDA	Yes	No	No
Transfer to another computer	Yes	No	No
Output			
Print	Yes	No	Yes
Play 3D Animation	Yes	No	No
Play sound	Yes	Yes	Yes
Play video	Yes	No	Yes

From the table 5.1, the reader that meets most criteria is Adobe Reader, followed by Zinio Reader and Microsoft Reader consecutively.

Adobe Reader has more capability than others with wide range of hardware and operating system support. It connects to the network occasionally to retrieve security updates and periodic eBooks automatically. Among three eBook readers, only Adobe Reader has Page Rotation function and form-input support. Document can be transferred to PDA or other computers by library's sending out function.

The downside requires full installation package and additional updates to cover all functions in the table above that needs around two hundred megabytes of hard disk space (four times of Zinio's and ten times of Microsoft Reader's required hard disk space). Customizing text size is impossible. Highlighting, drawing, and taking notes in the most PDF documents are prohibited by publisher and/or not full version installed. Unlike Microsoft and Zinio reader, they offer these as basis.

Adobe Systems has announced that its eBook reader software might cause malfunctions when run in the same time with some software.

User should concern about Adobe Reader because it is frequently issued the update, which needs to be downloaded to protect computer from virus or attackers on the network according to vulnerability reports.

Zinio Reader has very beautiful interface with common functions like other eBook readers. Downloaded documents are automatically stored in the 'My Zinio Library' folder. There is no vulnerability report about this reader according to Secunia and US-CERT.

Drawbacks are that it cannot offer the functions such as drawing, changing text size, transfer eBook to other devices and rotating the document. Copy text and pictures are disabled at all. Zinio Reader has version for PC, Tablet PC, and Mac OS only that means operating system and hardware support are limited.

Microsoft Reader has free hand drawing, highlighting, taking a note, and searchable on the documents. It is the only eBook reader out of three that text size can be enlarged or reduced.

Lack of Microsoft Reader is the minimum function compares to Adobe Reader and Zinio Reader. It does not allow user to print, rotate the document, transfer to another devices, and view the document in multiple pages. Zoom the document is not available.

The reader supports only IBM PC platform computers that use Microsoft's operating system, so the hardware and software support are narrowed.

Common share characteristics of these three readers are library, searchable texts, taking notes, highlighting, document protection, full screen view, playing sounds, and ability to read while offline.

5.2 Recommendations

Overall, Adobe Reader is the best eBook reader with full-option reader according to the study. PDF is the most popular electronic document format. Many of computers have Adobe Reader installed.

For magazine readers I suggested to use Zinio. More than 1,700 magazine titles from 350 publishers are sold by this company with easy to use reader.



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6. <http://www.microsoft.com/reader/info/features/default.mspix>
7. <http://secunia.com/product/4546/>
8. <http://secunia.com/product/7657/>
9. <http://secunia.com/product/8225/>
10. <http://www.scribesworld.com/writersniche/articles/Ebookreadercomp.htm>
11. <http://www.ebookcult.com.br/acervo/livro.php?L=769&cat=COL006000>
12. <http://www.us-cert.gov/>
13. http://www.upu.int/news_centre/2005/en/paper_2005-08-15_pitney-bowes18_en.pdf
14. <http://www.zinio.com/help>

