

# An evaluation of Iranology CD-ROM databases

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## ABSTRACT

*This article aims to evaluate Iranology CD-ROM databases using survey method. Data were collected using a researcher-developed checklist which is composed of four main criteria namely storage, search and retrieval, software design, and indexing. The study sampled all Iranology CD-ROMs recorded by the Iranian High Council of Informatics (IHCI). As a result, 35 CD-ROMs were identified for final evaluation. It was found that the most critical point of Iranology CD-ROMs which its defined indices have been less observed by the softwares is related to criterion "search and retrieval", while the most observed indices belonged to criterion "software design". Findings of this study may assist related bodies improve the status of information flow especially in the field of tourism as this resource has a variety of information about different aspects of Iranian history, literature, art and cultural heritage.*

**Keywords:** CD-ROMs; Databases; Information retrieval; Software design; Iranology

## INTRODUCTION

Traditional archives management systems have been gradually replaced by computer media since the mass of data can be restored in the form of electronic media using compact disk read only memory (CD-ROMs) (Chen and Chen 2002; Yu and Chen 2001). After the emergence of CD-ROM, high volume data storage became possible and it expanded very rapidly. The popularity of CD-ROM, based on Harry and Oppenheim (1993), is due to a number of factors: they are versatile; large amounts of data can be held in a variety of formats; access to information is fast and a variety of user-friendly search options is offered; and end-users can use a CD-ROM with little or no instruction. Hence, CD-ROM is a popular and rapidly growing medium of information (Griffiths and Lamber 1995; Richards and Robinson 1993). CD-ROM, however, should not be thought of simply as a document supply system. It also has searchable bibliographic and textual data, it functions as a search and retrieval tool, and as such has an impact on, and invites comparison with, online searching. CD-ROM has become popular with end-users for a number of reasons, particularly "user-friendliness", and the absence of the "taxi meter" associated with online (Oppenheim and Rodgers 1995). These features make CD-ROM particularly suitable for "background state-of-the-art or routine current awareness searches", and for these purposes, CD-ROM fills a comfortable space between cumbersome manual searching of paper documents and expensive online searching even for heavy online users (Oppenheim and Rodgers 1995). Moreover, concerning the significance of these tools, Bowers (1994, quoted in Griffiths and Lambert 1995, p. 26) said that "CD-ROM has proved, however, that it has a great deal to offer both at the present time and in the future... It may be that we will then see that CD-ROM has opened the door to the next computer revolution", and Kumar (1997) declared that CD-ROMs have rapidly emerged as the network data distribution method of choice for a number of reasons,

including the medium's capacity to store huge amounts of data (up to 640MB), as well as its durability and portability. Random access and formatting standards also make CD-ROMs an attractive.<sup>1</sup>

As a matter of fact, this growth has created a variety of databases running under an ever growing number of software packages (Richards and Robinson 1993). According to Nicholls et al. (1990, p. 43), "*CD-ROM database products are packages consisting of three basic parts: a database, a retrieval engine, and a user interface... there wasn't a lot of experience with evaluating such self-contained products. Most of these studies approached the evaluation question quite broadly, giving general criteria touching on all three components of the package*". Consequently, in accordance with Zumer's (2000, p. 282) saying i.e. "*the transition from intermediary searching to end-user searching was a major change in the development of information retrieval (IR) systems. This has resulted in the need for IR systems to be designed in a user-friendly way*", this article aims to evaluate Iranology CD-ROM databases using a checklist with which four criteria namely storage, search and retrieval, software design, and indexing, are studied. Additionally, designing a tool for evaluating other CD-ROM databases provided by *Iran's Cultural Heritage, Handcrafts and Tourism Organization (ICHHTO, <http://www.ichto.ir>)* is another purpose of the present research.

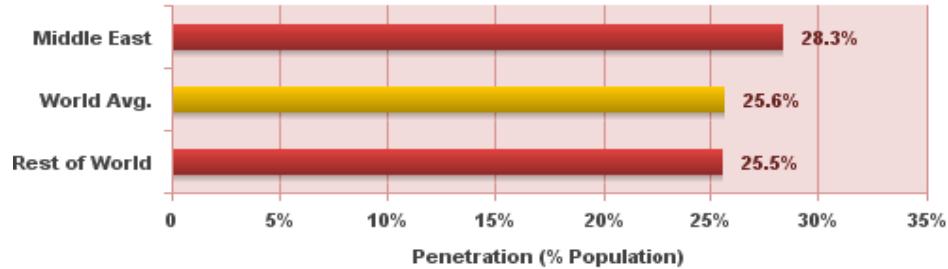
## **STATEMENT OF THE PROBLEM**

Since their debut in 1985, thousands of CD-ROM titles have been published, containing a wide variety of digital information (Beheshti, Large and Moukdad 2001). This growth is not an exception to cultural heritage and its preservation. Hence, in the recent years, electronic resources of Iranology have growingly increased and thus Iranology CD-ROMs have been presenting to market with different labels every day. Generally, these resources have different audiovisual, multimedia as well as textual information in the fields of geography, history, art, literature and cultural heritage, in order to introduce Iran tourist attractions. Presumably CD-ROM systems in Iran have been already utilized extensively because (a) these CD-ROM-based resources have a variety of information about different aspects of Iran tourism, (b) the online information systems like Internet, due to low quality of non-academic websites like ones concerning Iranology have attracted less audiences, and (c) low Internet penetration among common individuals as well as households in Iran (48.5 %) and the Middle East (28.3 %) (Figure 1) which has led to the existence of information divide (Jeevan 2001) and digital divide (Aqili and Isfandyari-Moghaddam 2008) among the neighbouring countries of Iran. Consequently, many people who are interested in travelling across Iran can use CD-ROMs with fewer difficulties. Accordingly, evaluation of such resources which are vastly distributed by centres affiliated to ICHHTO can be useful and helpful to highlight their shortcomings and somehow, to facilitate finding needed

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<sup>1</sup> For more information about the advantages of CD-ROMs and why they are still frequently used even with the emergence of online technologies including Internet, refer to East, H. and Leach, K. (1998), "The continuing prominence of CD-ROMs in academic libraries: the findings and evaluation of a survey", *Aslib Proceedings*, Vol. 50 No. 8, pp. 208-14; Beheshti, J., Large, A. and Moukdad, H. (2001), "Designing and developing multimedia CD-ROMs: Lessons from the Treasures of Islam", *Online Information Review*, Vol. 25 No. 4, pp. 229-240; Yu, S.C. and Chen, R.S. (2001), "Developing an XML framework for an electronic document delivery system", *The Electronic Library*, Vol. 19, No. 2, pp. 102-110.

information by end-users. These databases are designed and produced by private software companies and they have not been assessed. Therefore, the main concern of this research is to find out the extent Iranology CD-ROM databases meet the evaluation criteria considered in this paper.



Source: Internet World Stats - [www.internetworldstats.com/stats5.htm](http://www.internetworldstats.com/stats5.htm)  
1,733,993,741 world Internet users on September 2009  
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Figure 1: Internet Statistics Relating to Internet Penetration in Middle East

## LITERATURE REVIEW

Very little has been written about how to evaluate CD-ROM software (Richards and Robinson 1993). A comprehensive search carried out by the authors in the existing literature confirms Richards and Robinson's (1993) saying even after about more than 17 years. Methodologies used particularly evaluation criteria applied by previous researchers are briefly discussed in this section. In one of notable precursors as well as comprehensive works entitled *"Evaluating CD-ROM versions of the MEDLINE database: A checklist"* Hewison (1989) states that when applied to a particular CD-ROM MEDLINE product, the evaluation procedure involves testing assumptions concerning database contents; mechanics of searching; display, print, and download capabilities; and user-friendly features. The extent to which a CD-ROM product preserves and exploits important MEDLINE strengths should be assessed, e.g. the MeSH controlled vocabulary, the designation of major and minor MeSH emphasis, and the use of subheadings. Search software characteristics that affect ease of searching and quality of results also need to be examined, e.g. the ability to truncate search terms and the order of precedence in which Boolean operators are evaluated. Finally, a checklist including 37 subcriteria under 6 general criteria namely "database content", "record content", "search functions", "MeSH descriptions", "output capabilities", and "user-friendliness" to assist in the evaluation process was presented.

Regardless of being involved in an off-line or on-line environment, Arms' (2000) belief seems to be true: "when a system is hard to use, the users may fail to find important results, may misinterpret what they do find, or may give up in disgust believing that the system is unable to help them" (p. 175). In fact, from Arms' (2000) perspective, user interfaces affect highly the effectiveness of the system. On the importance of user interface, Jeng (2005) declares that interface is one of the most important aspects of usability as it is the medium that users communicate and interact with the system. Accordingly, emphasizing that a poor or unsuitable interface can present a serious barrier to accessing the data on a CD-ROM, Nicholls et al. (1990) posit that the most important part of a CD-ROM is the user interface and that evaluation of the interface should

concentrate on its user-friendliness. As a result of this, they drew attention to five access evaluation criteria including hardware/software dependencies, interface features, search and retrieval functions, output functions, and general production functions. It is notable that each of these categories is subdivided into its own subcriteria. In fact, Nicholls et al. (1990) offered a framework for evaluating CD-ROM softwares as illustrated in Figure 2.

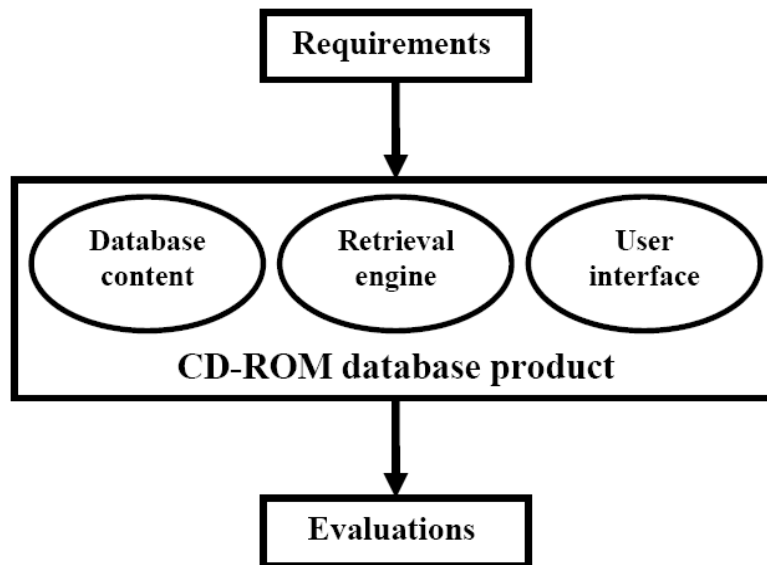


Figure 2: A Framework for Evaluating CD-ROM Database Softwares (Nicholls et al. 1990)

Like Nicholls et al. (1990), Zink (1991) paid attention to user interface and so recommended that when evaluating CD-ROMs four general criteria should be examined, i.e. "screen design", "use of color, spacing, and windowing", "standard terminology", and "help screens". Jacso (1992) put forward four areas – interface functions, search functions, set and query management functions, and output functions. Additionally, four broad criteria "overall ease of use", "searching", "search results", and "search management" were suggested by Schwartz (1993) for evaluating CD-ROM software. Richards and Robinson (1993) in an article entitled "*Evaluating CD-ROM software: A model*" provided a model in the form of four areas, i.e. top level, operational, navigational, and ergonomics. Because of its relative similarity with the criteria considered in this research, subdivisions of area top level are listed below:

- User guidance (help, tutorials, interface);
- Index (browse index, design of index, term selection);
- Search features;
- General output features;
- Record display (screen display, printing, downloading); and
- Database management (restart, changing databases, quitting)

Additionally, quoted in Jeevan (2001, p. 197), Richards and Robinson (1993) believe that the dominant features of a CD-ROM search are as follow:

- Provision for help and error messages;
- User friendly interface with an efficient retrieval engine;
- Search term selection from index/thesaurus/retrieved records;
- Facility for word truncation;

- Boolean and proximity operators;
- Field specific search;
- Range searching on numeric data;
- Limiting searches by language, year, significant search terms/phrases etc.;
- Monitoring the search process through search status display, search history;
- Output management through built-in formats, record layout, marking and unmarking of desired items, sorting of records;
- Downloading records or search strategy to floppy or hard disk;
- Options to change databases, restart, and quitting; and
- Navigational abilities in different fields of a record as well as within different records.

In 1994, to assess the quality of CD-ROM databases available in Sultan Qaboos University Library in Oman, Johnston applied some criteria including thesaural control, indexing policies, spelling mistakes, mistyping, and hyphenation. A year later, Oppenheim and Rodgers (1995) evaluated a CD-ROM database based on four criteria (product information, search and retrieval facilities, documentation, and test drive). Similarly, Zumer (2000) in a survey using 'expert evaluation' research method, and on the basis of five areas in the evaluation framework – dialogue, navigation, searching, results, and help – studied six national bibliographies on CD-ROM: British National Bibliography (BNB), Bibliographie Nationale Française (BNF), Bibliografía Nacional Española (BNE), Bibliografia Nazionale Italiana (BNI), Česká Národní Bibliografie (ČNB), and Slovenska Bibliografija (SNB). Ultimately, it was concluded that the interfaces of the bibliographies studied can be rated as relatively good. There are some problems with the general intuitiveness, which could be improved with better designed dialogues. The absence of sorting facilities can be noted as one of major limitations of result manipulation. Help facilities are one of the problem areas, although some improvement can be noted. And, in another study on softwares provided by SilverPlatter (*SPIRS*), Dialog (*OnDisc*) and the Institute of Scientific Information (*ISI-CD*), Jeevan (2001) made an attempt to compare and contrast the features in terms of function keys, searchable fields, and search facilities. For better understanding of how the mentioned works fed into the present research, the criteria used by the researchers are presented in Table 1.

Table 1: Evaluation Criteria Used in Related Studies

Researcher(s)	Criteria used
Hewison (1989)	Database contents; mechanics of searching; display, print, and download capabilities; and user-friendly features
Nicholls et al. (1990)	Hardware/software dependencies; interface features; search and retrieval functions; output functions; and general production functions
Zink (1991)	Screen design; use of color, spacing, and windowing; standard terminology; and help screens
Jacso (1992)	Interface functions; search functions; set and query management functions; and output functions
Schwartz (1993)	Overall ease of use; searching; search results; and search management
Richards and Robinson (1993)	User guidance (help, tutorials, interface); index (browse index, design of index, term selection); search features; general output features; record display (screen display, printing, downloading); and database management (restart, changing databases, quitting)
Johnston (1994)	Thesaural control; indexing policies; spelling mistakes; mistyping; and hyphenation
Oppenheim and Rodgers (1995)	Product information; search and retrieval facilities; documentation; and test drive
Zumer (2000)	Dialogue, navigation, searching, results, and help
Jeevan (2001)	Function keys, searchable fields, and search facilities

As can be seen in Table 1, the most common evaluation criteria used in the literature are database content or storage, search and retrieval (output) features, functions or facilities, thesauri control, index and indexing, and other related criteria such as display (screen design), print, and download capabilities, and search management. Accordingly, these evaluation criteria were brought under four general criteria including storage, search and retrieval, software design, and indexing so that Iranology CD-ROM databases are evaluated based on these constructs (Figure 3).

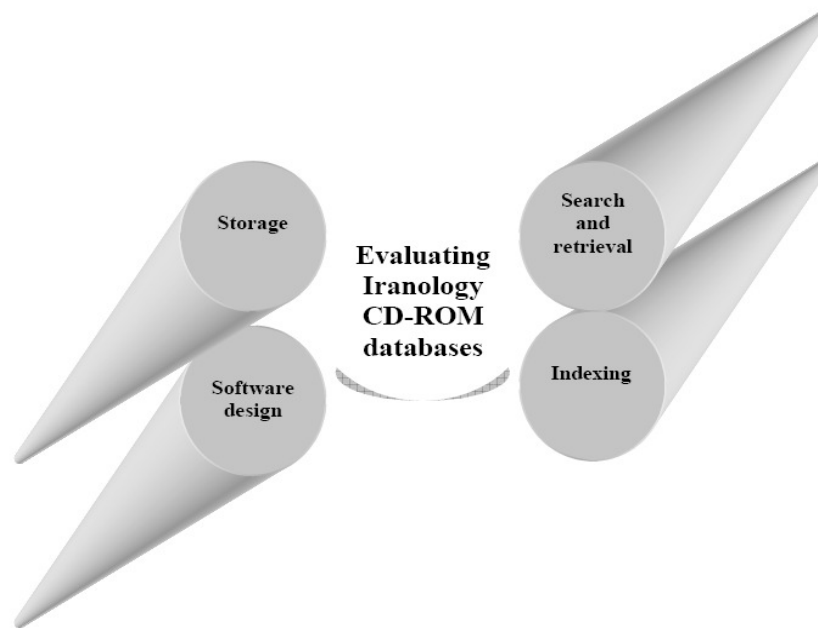


Figure 3: Fourfold Framework Used to Evaluate Iranology CD-ROM Databases

## **OBJECTIVES AND METHOD**

In line with the fourfold framework, 4 objectives are posed:

- a) To determine to what extent Iranology CD-ROM databases meet storage-related criteria;
- b) To determine to what extent Iranology CD-ROM databases meet search and retrieval-related criteria;
- c) To determine to what extent Iranology CD-ROM databases meet software design-related criteria; and
- d) To determine to what extent Iranology CD-ROM databases meet indexing-related criteria.

Accordingly, this study aims to answer four main questions:

- a) To what extent do Iranology CD-ROM databases meet storage-related criteria?
- b) To what extent do Iranology CD-ROM databases meet search and retrieval-related criteria?
- c) To what extent do Iranology CD-ROM databases meet software design-related criteria?
- d) To what extent do Iranology CD-ROM databases meet indexing-related criteria?

Methodology used in this is a survey. To do this, desirable data were collected using a researcher-developed checklist (Appendix 1). To develop the checklist, six experts as well as related studies (Hewison 1989; Nicholls et al. 1990; Zink 1991; Jacso 1992; Schwartz 1993; Richards and Robinson 1993; Johnston 1994; Oppenheim and Rodgers 1995; Zumer 2000 and Jeevan 2001) were consulted. Also, for selecting target criteria and defining their respective subcriteria and thus finalizing the checklist, the researchers observed and reviewed some similar CD-ROM databases. The approach applied to determine whether a feature is considered or not is based on 1/0 (yes/no) assessment. The research sampled all Iranology CD-ROMs recorded by Iranian High Council of Informatics (IHCI, www.shci.ir). As a result, a total of 35 CD-ROMs produced till 2008 were identified for final evaluation.

## RESULTS

Findings on the production year of these softwares are illustrated in Figure 4. It indicates that 22.8% (n=8) CD-ROM softwares were produced in 2005, 17.1% (n=6) were produced in 2006 and 2.9% (n=1) were produced in 2007 which in total equals 42.8% of the statistical population. The oldest CD-ROM software related to Iranology is *Noor<sup>1</sup> Bridge* (Bridge of Light) produced by Shayegan Company in 1997, and the newest one entitled *Azamat<sup>2</sup>-e-Iran*, produced by Apadana Company in 2007.

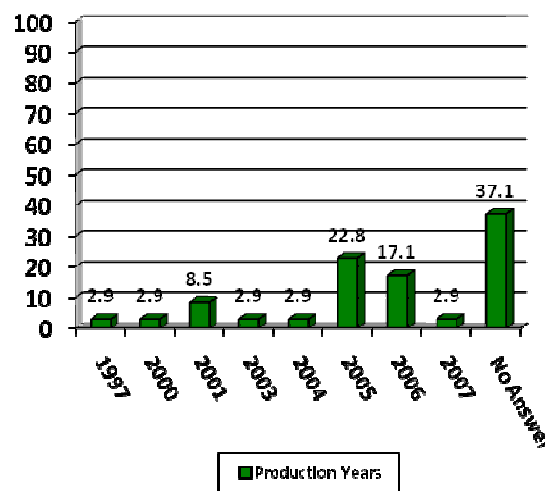


Figure 4: The Production Year of Iranology CD-ROM Softwares

### Q1: To what extent do Iranology CD-ROM databases meet storage-related criteria?

In order to address the first research question that aims to evaluate data storage features in Iranology CD-ROM databases, 22 different subcriteria were used. Results are shown in

<sup>1</sup> Noor means light and glory.

<sup>2</sup> Azamat means dignity.

Table 2. Considering that 22 different subcriteria were evaluated for 35 CD-ROM softwares, a total of 770 indices were examined for all CD-ROMs and we can see that only 260 from 770 indices were observed by these CD-ROMs which is equal to 33.8% of the total storage indices. Therefore, we can claim that the studied CD-ROM databases have no optimal condition in case of meeting storage indices.

Table 2: Presence and Absence of Data Storage Criteria in Iranology CD-ROMs

	Subcriteria	Yes	No
		Frequency	Frequency
1	Supporting textual data	32	3
2	Supporting numerical data	32	3
3	Supporting textual-numerical data	32	3
4	Supporting historical data	32	3
5	Possibility of copying data from other databases available within the software	0	35
6	Possibility of separating and transferring a part of data in the software	0	35
7	Possibility of changing data such as fonts	1	34
8	Possibility of controlling correctness of data according to software standard	0	35
9	Possibility of storing a group of data	0	35
10	Possibility of updating data in the software	0	35
11	Possibility of updating and controlling data correctness simultaneously	0	35
12	Possibility of using a thesaurus to control terms	1	34
13	Possibility of expanding and updating thesaurus	1	34
14	Possibility of extracting terms from thesaurus for search	1	34
15	Possibility of distinguishing related or similar terms in thesaurus	0	35
16	Possibility of showing thesaurus terms in hierarchy	0	35
17	Possibility of printing thesaurus lists	0	35
18	Attention to multilanguage thesaurus	1	34
19	Supporting audio files in the software	31	4
20	Supporting visual files in the software	35	0
21	Relevance of audiovisual files with textual data observed in the software	31	4
22	Supporting different data files with different postfixes	30	5
<b>Total frequency</b>		260	510
<b>Total percentage</b>		33.8%	66.2%

**Q2:** *To what extent do Iranology CD-ROM databases meet search and retrieval-related criteria?*

To answer this research question and to determine the status of search and retrieval features of Iranology CD-ROM databases, 29 subcriteria were used. Results are presented in Table 3. Considering that 29 different subcriteria were evaluated for 35 softwares, a total of 1015 indices were examined for all CD-ROMs and we can see that only 76 from 1015 indices were observed by these Iranology CD-ROMs which is equal to 7.5% of the total search and retrieval indices. Therefore, we can assert that the studied databases have no optimal condition in case of meeting search and retrieval indices.



Table 3: Presence and Absence of Search and Retrieval Criteria in Iranology CD-ROMs

	Subcriteria	Yes	No
		Frequency	Frequency
1	Determining special fields for search	9	26
2	Showing or suggesting the search term intended by user at the top or down of display	8	27
3	Possibility of using free language for search	7	28
4	Existence of an icon or array for showing search history	0	35
5	Showing possibilities for existing search strategies on the top of display	2	33
6	Possibility of using Boolean operators for search in the software	2	33
7	Possibility of combining Boolean operators in search with each other	0	35
8	Possibility of using restrictor symbols like - to limit search	0	35
9	Possibility of search through creator or organization field	0	35
10	Showing search term on the top of display to remind it to user	4	31
11	Possibility of using positive/negative or currency symbols for search	0	35
12	Possibility of using numerical/textual data for search	0	35
13	Possibility of shortening terms using symbols such as * for search (truncation)	1	34
14	Possibility of keeping search formats for next results	0	35
15	Determining icon(s) for storage and printing search results	4	31
16	Possibility of change or refinement in search(es) done	2	33
17	Possibility of using terms' pronunciation properties for search	1	34
18	Possibility of search using proximity facility	2	33
19	Possibility of search through name/title	0	35
20	Possibility of search using terms without or with	0	35
21	Possibility of search through indexes, lists and selecting their entry(ies)	24	11
22	Showing quantity of recalls after doing any search	4	31
23	Possibility of determining priority like relevance, date to show search results	0	35
24	Possibility of keeping and re-showing previous results of search(es) done	0	35
25	Possibility of storing search results on auxiliary memories	1	34
26	Possibility of sending search results via email	0	35
27	Possibility of determining special format(s) like pdf and so on for printing search results	5	30
28	System for controlling spell of terms used in search	0	35
29	Possibility of changing, deleting, and adding terms to the system controlling software spell	0	35
<b>Total frequency</b>		<b>76</b>	<b>939</b>
<b>Total percentage</b>		<b>7.5%</b>	<b>92.5%</b>

**Q3:** To what extent do Iranology CD-ROM databases meet software design-related criteria?

As Table 4 shows, 40 different subcriteria were used for evaluating characteristics of software design in Iranology CD-ROMs in this study. In total, 1400 indices were examined for the 35 CD-ROMs. Accordingly, out of 1400 indices concerning software design only 723 (51.6%) were observed by databases of Iranology CD-ROMs.

**Q4:** To what extent do Iranology CD-ROM databases meet indexing-related criteria?

To answer this question, 4 different subcriteria were evaluated in this research to determine the condition of indexing in Iranology CD-ROMs. Table 5 indicates that only 29 (20.7%) out of 140 indices were met by the Iranology CD-ROMs.

To facilitate better understanding of the key findings in this study, and in fact, highlighting weak points of the CD-ROMs for ICHHTO, IHCI as well as their manufacturers, the weakest features in Iranology CD-ROMs based on frequency distributions are shown in Table 6.

Table 4: Presence and Absence of Software Design Criteria in Iranology CD-ROMs

	Subcriteria	Presence	Absence
		Frequency	Frequency
1	Possibility of viewing software capabilities through menus	31	4
2	Apprehensible division and separation of data on display	32	3
3	Using colors or different fonts to separate different parts	32	3
4	Possibility of giving different commands in the software	7	28
5	Utilization of proper and soft (user-friendly) colors for showing data	31	4
6	Utilization of proper and soft (user-friendly) colors for the background pages	31	4
7	Optimal density of data on display (interface)	32	3
8	Proper size of letters for reading textual data available on display	32	3
9	Auxiliary commands and facilities located permanently on a fixed place of page(s)	25	10
10	Different icons for using software's facilities	31	4
11	Use of shortcut keys for giving different commands	31	4
12	Existence of enough help for software usage	25	10
13	Existence of an online help for the software	3	32
14	Automatic display of help when facing a problem	1	34
15	Offering enough guidance for software installation	21	14
16	Providing each user with a special username and password	0	35
17	Easy installation of the programme	29	6
18	Accessibility of users to the website of software's manufacturers through a link	14	21
19	Possibility of choosing a desired date for displaying needed data	0	35
20	Permission for customizing display by user	0	35
21	Existence of a special title at the top or down of each page for showing data content	32	3
22	Clarity and shortness of each page's title	32	3
23	Data support and presentation by more than one language	20	15
24	Possibility of choosing language at the time of entrance into the software	14	21
25	Giving in-time error messages	3	32
26	Possibility of choosing error message based on user's choice	1	34
27	Existence of a list or index of auxiliary facilities and user guide	10	25
28	Visibility of guide list in every step of search and retrieval	11	24
29	Special key such as F1 or similar key for help	2	33
30	Accordance of auxiliary facility list with user's requirements	13	22
31	Possibility of changing images' size by user	33	2
32	Ability of showing the text and image simultaneously	32	3
33	Possibility of changing images' format	1	34
34	Providing auxiliary possibilities logically and based on user's expectation	13	22
35	Possibility of exit from the software at any time and any part	35	0
36	Possibility of running the software through network	0	35
37	Possibility of connection to special hardware such as printer	29	6
38	Existence of some documents such as bill of guarantee along with the software	17	18
39	Support of the software by its manufacturers	17	18
40	Possibility of updating the software through the Internet	0	35
<b>Total frequency</b>		<b>723</b>	<b>677</b>
<b>Total percentage</b>		<b>51.6</b>	<b>48.4</b>

Table 5: Presence and Absence of Indexing Criteria in Iranology CD-ROMs

	Subcriteria	Presence	Absence
		Frequency	Frequency
1	Term-by-term indexing	16	19
2	Indexing prepositions and meaningless words (stop-list words)	1	34
3	Possibility of observing different indexes	12	23
4	Possibility of changing and updating indexes	0	35
<b>Total frequency</b>		<b>29</b>	<b>111</b>
<b>Total percentage</b>		<b>20.7</b>	<b>79.3</b>

Table 6: Overview of the Weakest Features in Iranology CD-ROMs

Criteria	Subcriteria (feature)	Frequency
<b>A. Storage</b>	Possibility of copying data from other databases available within the software	0
	Possibility of separating and transferring a part of data in the software	0
	Possibility of changing data such as fonts	1
	Possibility of controlling correctness of data according to software standard	0
	Possibility of storing a group of data	0
	Possibility of updating data in the software	0
	Possibility of updating and controlling data correctness simultaneously	0
	Possibility of using a thesaurus to control terms	1
	Possibility of expanding and updating thesaurus	1
	Possibility of extracting terms from thesaurus for search	1
	Possibility of distinguishing related or similar terms in thesaurus	0
	Possibility of showing thesaurus terms in hierarchy	0
	Possibility of printing thesaurus lists	0
Attention to multilanguage thesaurus	1	
<b>B. Search and retrieval</b>	Existence of an icon or array for showing search history	0
	Showing possibilities for existing search strategies on the top of display	2
	Possibility of using Boolean operators for search in the software	2
	Possibility of combining Boolean operators in search with each other	0
	Possibility of using restrictor symbols like - to limit search	0
	Possibility of search through creator or organization field	0
	Showing search term on the top of display to remind it to user	4
	Possibility of using positive/negative or currency symbols for search	0
	Possibility of using numerical/textual data for search	0
	Possibility of shortening terms using symbols such as * for search (truncation)	1
	Possibility of keeping search formats for next results	0
	Determining icon(s) for storage and printing search results	4
	Possibility of change or refinement in search(es) done	2
	Possibility of using terms' pronunciation properties for search	1
	Possibility of search using proximity facility	2
	Possibility of search through name/title	0
	Possibility of search using terms without or with	0
	Showing quantity of recalls after doing any search	4
	Possibility of determining priority like relevance, date to show search results	0
	Possibility of keeping and re-showing previous results of search(es) done	0
Possibility of storing search results on auxiliary memories	1	
Possibility of sending search results via email	0	
Possibility of determining special format(s) like pdf and so on for printing search results	5	
System for controlling spell of terms used in search	0	
Possibility of changing, deleting, and adding terms to the system controlling software spell	0	
<b>C. Software design</b>	Existence of an online help for the software	3
	Automatic display of help when facing a problem	1
	Providing each user with a special username and password	0
	Possibility of choosing a desired date for displaying needed data	0
	Permission for customizing display by user	0
	Giving in-time error messages	3
	Possibility of choosing error message based on user's choice	1
	Special key such as F1 or similar key for help	2
	Possibility of changing images' format	1
	Possibility of running the software through network	0
	Possibility of updating the software through the Internet	0
<b>D. Indexing</b>	Indexing prepositions and meaningless words (stop-list words)	1
	Possibility of changing and updating indexes	0

Based on findings in Tables 2-5 and especially Table 6, it is evident that the most critical point of Iranology CD-ROMs is related to criterion "search and retrieval" of which only 7.5% of all its defined indices have been observed by the softwares. The other criteria have been considered as meeting 51.6% of the software design, 33.6% of the storage features and 20.7% of the indexing features. From a practical perspective, Table 6 tries to help Iranology CD-ROM database providers identify some of their shortcomings in the production of these information sources.

## **DISCUSSION**

It can be said that this study has contributed to the research into the evaluation of CD-ROMs particularly in Iran as a developing country in which CD-ROM databases are still of high usage. According to the results, it can be said that the features that have been included more than ninety percent in all 35 Iranology CD-ROMs studied in the research are: "Supporting visual files in the software"; "Supporting textual data"; "Supporting numerical data"; "Supporting textual-numerical data"; "Supporting historical data"; "Apprehensible division and separation of data on display"; "Using colors or different fonts to separate different parts"; "Optimal density of data on display (interface)"; "Proper size of letters for reading textual data available on display"; "Existence of a special title at the top or down of each page for showing data content"; "Clarity and shortness of each page's title"; "Possibility of changing images' size by user"; "Ability of showing the text and image simultaneously"; and "Possibility of exit from the software at any time and any part".

Unfortunately, in spite of high emphasis on the importance of searching and retrieving features in previously done studies by Nicholls et al. (1990), Jacso (1992), Schwartz (1993), Richards and Robinson (1993), Oppenheim and Rodgers (1995), Zumer (2000) and Jeevan (2001), the results of the present research showed that the weakest performer which its defined indices have been less observed by the softwares is related to criterion "search and retrieval". Moreover, among its indices one of the least observed indices was 'Boolean operators' which is of high necessity according to related literature (e.g. Hewison 1989; Richards and Robinson 1993). Therefore, more effort should be invested into this area. This may be an unattainable goal because of the general complexity of information retrieval systems, but could result at least in better context-sensitive help. On the other hand, better performance of software design in Iranology CD-ROMs indicates that their providers have more considered the format and intermediary searching than end-user searching. Yet, for more improvement and taking effective steps towards more interactive and floating CD-ROM environments, they should take this topic into account, enriching needed capabilities according to today's end-users' information needs and demands.

## **CONCLUSION**

In spite of fast pace of information technology and thus the growing emergence of modern information tools and carriers, the market of CD-ROMs seems to be prosperous. Hence, as Oppenheim and Rodgers (1995, p. 19) declare that *"a successful product will not only be a document supply and storage system, but will also offer a wide range of search and retrieval facilities, and a "user friendly" interface and manual"*, Iranology CD-ROMs need much attention. Because, it is evident that as the market grows, users' expectations will increase. In one word, CD-ROM providers in Iran should be vigilant more than before; they should understand the characteristics and functionality required by the various Iranology

CD-ROMs, and to make use of these to the benefit of the end users. Optimistically, findings of this study which can be a good starting point can help related bodies improve the status of information flow in the field of tourism because this resource has a variety of information about different aspects of Iranian history, literature, art and cultural heritage. Hopefully, in spite of outstanding place of on-line carriers, CD-ROMs are not neglected and doing studies such as this may assist help respective bodies reorient off-line information tools because of their undeniable attractions and potentials even in ever-changing on-line world. In a word, as the Hacker's Dictionary has very aptly expressed, "nothing beats the bandwidth of a Boeing 747 full of CD-ROMs!" (Cunningham and Rosebush 1996, p. 52; quoted in Beheshti , Large and Moukdad 1991, p. 229). CD-ROMs are never-ending and will be still alive. As for the future, it is suggested that such a research which can play as a platform for further user studies will be done based on end-users' perspectives, either beginner or expert.

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APPENDIX 1

The Checklist Used to Evaluate Iranology CD-ROM Databases

Criteria		Presence	Absence
<b>A. Data Storage</b>			
1.	Supporting textual data		
2.	Supporting numerical data		
3.	Supporting textual-numerical data		
4.	Supporting historical data		
5.	Possibility of copying data from other databases available within the software		
6.	Possibility of separating and transferring a part of data in the software		
7.	Possibility of changing data such as fonts		
8.	Possibility of controlling correctness of data according to software standard		
9.	Possibility of storing a group of data		
10.	Possibility of updating data in the software		
11.	Possibility of updating and controlling data correctness simultaneously		
12.	Possibility of using a thesaurus to control terms		
13.	Possibility of expanding and updating thesaurus		
14.	Possibility of extracting terms from thesaurus for search		
15.	Possibility of distinguishing related or similar terms in thesaurus		
16.	Possibility of showing thesaurus terms in hierarchy		
17.	Possibility of printing thesaurus lists		
18.	Attention to multilanguage thesaurus		
19.	Supporting audio files in the software		
20.	Supporting visual files in the software		
21.	Relevance of audiovisual files with textual data observed in the software		
22.	Supporting different data files with different postfixes		
<b>B. Search and Retrieval</b>			
23.	Determining special fields for search		
24.	Showing or suggesting the search term intended by user at the top or down of display		
25.	Possibility of using free language for search		
26.	Existence of an icon or array for showing search history		
27.	Showing possibilities for existing search strategies on the top of display		
28.	Possibility of using Boolean operators for search in the software		
29.	Possibility of combining Boolean operators in search with each other		
30.	Possibility of using restrictor symbols like - to limit search		
31.	Possibility of search through creator or organization field		
32.	Showing search term on the top of display to remind it to user		
33.	Possibility of using positive/negative or currency symbols for search		
34.	Possibility of using numerical/textual data for search		
35.	Possibility of shortening terms using symbols such as * for search (truncation)		
36.	Possibility of keeping search formats for next results		
37.	Determining icon(s) for storage and printing search results		
38.	Possibility of change or refinement in search(es) done		
39.	Possibility of using terms' pronunciation properties for search		
40.	Possibility of search using proximity facility		
41.	Possibility of search through name/title		
42.	Possibility of search using terms without or with		
43.	Possibility of search through indexes, lists and selecting their entry(ies)		
44.	Showing quantity of recalls after doing any search		
45.	Possibility of determining priority like relevance, date, to show search results		
46.	Possibility of keeping and re-showing previous results of search(es) done		
47.	Possibility of storing search results on auxiliary memories		
48.	Possibility of sending search results via email		
49.	Possibility of determining special format(s) like pdf and so on for printing search results		
50.	System for controlling spell of terms used in search		
51.	Possibility of changing, deleting, and adding terms to the system controlling software spell		

<b>C. Software Design</b>		
52.	Possibility of viewing software capabilities through menus	
53.	Apprehensible division and separation of data on display	
54.	Using colors or different fonts to separate different parts	
55.	Possibility of giving different commands in the software	
56.	Utilization of proper and soft (user-friendly) colors for showing data	
57.	Utilization of proper and soft (user-friendly) colors for the background of software's pages	
58.	Optimal density of data on display (interface)	
59.	Proper size of letters for reading textual data available on display	
60.	Auxiliary commands and facilities located permanently on a fixed place of page(s)	
61.	Different icons for using software's facilities	
62.	Use of shortcut keys for giving different commands	
63.	Existence of enough help for software usage	
64.	Existence of an online help for the software	
65.	Automatic display of help when facing a problem	
66.	Offering enough guidance for software installation	
67.	Providing each user with a special username and password	
68.	Easy installation of the programme	
69.	Accessibility of users to the website of software's manufacturers through a link	
70.	Possibility of choosing a desired date for displaying needed data	
71.	Permission for customizing display by user	
72.	Existence of a special title at the top or down of each page for showing data content	
73.	Clarity and shortness of each page's title	
74.	Data support and presentation by more than one language	
75.	Possibility of choosing language at the time of entrance into the software	
76.	Giving in-time error messages	
77.	Possibility of choosing error message based on user's choice	
78.	Existence of a list or index of auxiliary facilities and user guide	
79.	Visibility of guide list in every step of search and retrieval	
80.	Special key such as F1 or similar key for help	
81.	Accordance of auxiliary facility list with user's requirements	
82.	Possibility of changing images' size by user	
83.	Ability of showing the text and image simultaneously	
84.	Possibility of changing images' format	
85.	Providing auxiliary possibilities logically and based on user's expectation	
86.	Possibility of exit from the software at any time and any part	
87.	Possibility of running the software through network	
88.	Possibility of connection to special hardwares like printer.	
89.	Existence of some documents such as bill of guarantee along with the software	
90.	Support of the software by its manufacturers	
91.	Possibility of updating the software through the Internet	
<b>D. Indexing</b>		
92.	Term-by-term indexing	
93.	Indexing prepositions and meaningless words (stop-list words)	
94.	Possibility of observing different indexes	
95.	Possibility of changing and updating indexes	