CRITICAL LITERATURE REVIEW

CONTENT

1. What is literature review.
2. Purpose of the literature review.
3. What literature to review.
4. Analysis of the literature on the researches problem.
5. Primary literature.
6. Secondary literature.
7. Tertiary literature

Knowledge doesn't exist in a vacuum, and your work only has value in relation to other people's. Your work and your findings will be significant only to the extent that they're the same as, or different from, other people's work and findings.

You therefore need to establish what research has been published in your chosen area and try to identify any other research that might currently be in progress. The items you read and write about will enhance your subject knowledge and help you to clarify your research question(s) further. **This process is called critically reviewing the literature.**

Your critical literature review will form the foundation on which your research is built. Its main purpose is to help you to develop a good understanding and insight into relevant previous research and the trends that have emerged.

Your review also has a number of other purposes:

- to help you to refine further your research objectives;
- to highlight research possibilities that have been overlooked implicitly in research to data;
- to discover explicit recommendations for further research. These can provide you with a superb justification for your own research question(s) and objectives;
- to help you to avoid simply repeating work that has been done already;
- to sample current opinions in newspapers, professional journals, thereby gaining insights into the aspects of your research question(s) and objectives that are considered newsworthy;
- to discover and provide an insight into research approaches, strategies and techniques that may be appropriate to your own research question(s) and objectives.
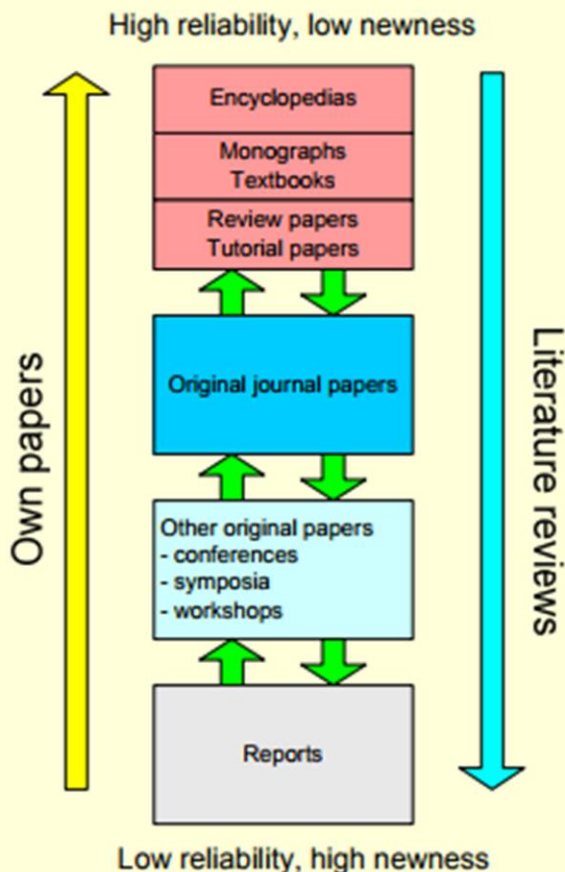
PURPOSE

Place of literature review

- **Bring clarity and focus to your research problem**
  - Helps you understanding the subject
  - Helps you to conceptualize your research problem
  - Helps identifying relationships with existing body of knowledge

- **Improve your method**
  - How the others have approached the problem
  - Which methods others have used and faced difficulties

- **Broaden your knowledge base in your research area**
  - You need to know where we are and where the gaps are

- **Help identifying trends**
  - It is convenient to know what are the hot research topics in the area
  - Also what are the assessment criteria in use

- **Contextualize your findings**
  - How your results fit into the existing body of knowledge
  - How do your results differ from others

Traditional sources

- **Books**

- **Journal papers**

- **Conference papers**

- **Technical reports**

High reliability, low newness

| Encyclopedias |
| Monographs Textbooks |
| Review papers Tutorial papers |

Original journal papers

Other original papers
- conferences
- symposia
- workshops

Reports

Own papers

Literature reviews

Low reliability, high newness

[Mämmelä, 2006]

Conceptual framework & related work

For a while you'll be confused !

Diversity of opinions, agreements, disagreements, perspectives, partial relation to your work, diversity of terminology (specially in new areas), ...

Build a conceptual framework
(on your mind first)

- Your work won't be accepted for publication without a proper study of, and comparison with related work.

- Used ideas, results, ... from others must be **properly referenced**
  Facilitate contextualization
  Ethical issue – Plagiarism, reputation

SOURCES

Online sources

b-on resources

● Most publishers are making their products accessible online (subject to subscription)

● Reference databases are also available online

● Some scientific associations give online access to their publications for subscribers / members

● There is a trend in Universities to subscribe packages guaranteeing access to contents from multiple publishers.

        Example:
        In Portugal the **b-on** initiative offers a collective package of on-line subscriptions (table)

Publisher	Nº of titles
Academic Search Complete	9791 total
	5795 periodicals
American Chemical Society	34 periodicals
American Institute of Physics	12 periodicals
Annual Reviews	32 periodicals
Association for Computing Machinery	6 periodicals
	10 magazines
	28 transactions
	256 proceedings
	56 newsletters
	24 affiliated pubs
Association for Computing Machinery	c. 1 million records
Business Source Complete	4056 total
	3166 periodicals
Current Contents (ISI)	n.a.
Derwent Innovation Index (ISI)	n.a.
Elsevier	1961 periodicals
Essential Science Indicators (ISI)	n.a.
Eric	n.a.
IEEE	280 periodicals
	10093 proceedings
	1004 standards
Institute of Physics	36 periodicals
ISI Proceedings	n.a.
Journal Citation Reports	n.a.
Royal Society of Chemistry	34 periodicals
Sage	66 periodicals
Society for Industrial and Applied Mathematics	14 periodicals
Springer	1132 periodicals
Taylor& Francis	1221 periodicals
Web of Science	n.a.
Wiley	477 periodicals
Zentralblatt	n.a.

Online sources ...

● Many authors make their papers available through their web sites (found by Scholar Google)

● As having publications on-line increases the chance of being cited, many universities are promoting mechanisms to have the publications of their members online

... But there is the problem of Copyright !

... Some tricks to solve the problem.

● Other specialized sources:
Patents
Standards

The issue of reliability

When making a literature survey …
… pay special attention to the **reliability of the sources**

- ■ Is it coming from a prestigious journal?

- ■ Was it presented in a serious peer-reviewed conference?

- ■ Are there other related references?
    - ■ Is it from a recognized group?

- ■ Use Wikipedia with caution
    … A good starting point to get a general idea
    … But then seek more reliable and identified sources

The issue of completeness

You cannot guarantee that you checked ALL relevant papers ...

But it is very bad if you miss some major reference !

What to do (besides making exhaustive search):

♦ Get some (initial) help from your supervisor
  (but remember, it is your responsibility !)

♦ Identify most relevant sources (journals, conferences) in your area
  and check them more carefully

♦ "Follow the references"
  ... i.e. Follow common references indicated by several of the papers you checked

SYNTHESIS AND CRITICAL SPIRIT

10 steps in literature review

1. Identify a set of keywords (try also synonyms) to search via Google or specialized database.

2. If you are not yet very familiar with the subject, try to identify first surveys / overviews (or even books) that give a general overview of the topic. Then turn to journal articles and then to conference papers.

3. Try to select a set of 40 – 50 articles in order to help you get a first view of the topic.

4. Do a "fast reading" (without spending time with details) of these articles, just trying to filter what seems useful for your work or to give you a first global "picture".

5. Based on the useful literature, start elaborating a literature map, which gives you a visual picture of groupings of literature per sub-topic.

10 steps in literature review ...

6. While organizing the **map**, prepare **short summaries** of the key ideas conveyed by each relevante article.
   ... Use Post-It
   ... Or Add annotations on the margins of the paper
   ... Or use some electronic means (in this case you can also start to organize a references database, e.g. Using Endnote).

7. Use the most relevant articles to find other relevant literature (**following the references** included in those articles). Try to identify relevant groups of researchers / authors ("**schools** of thought").

8. **Diggest** all collected ideas, concepts, findings (read the most relevant articles again, now in detail); try to organize and **criticize** them. For specific topics consult research reports, PhD thesis, etc.

9. Try to **relate your work** to the existing literature.

10. Plan a structure for the literature review **synthesis**; think of original ways of summarizing the ideas (what can be your **added-value**).

Mind Mapping tools
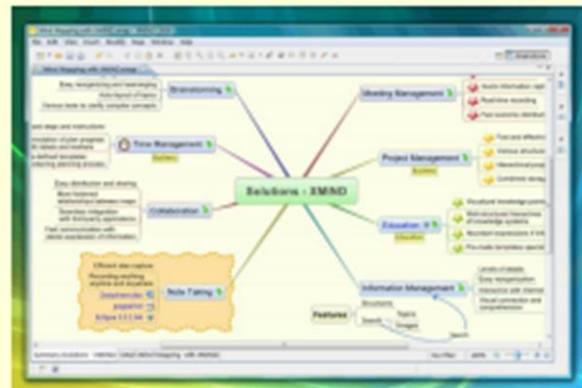
**Perhaps one possibility
to build literature maps ...**

Examples:

Freemind
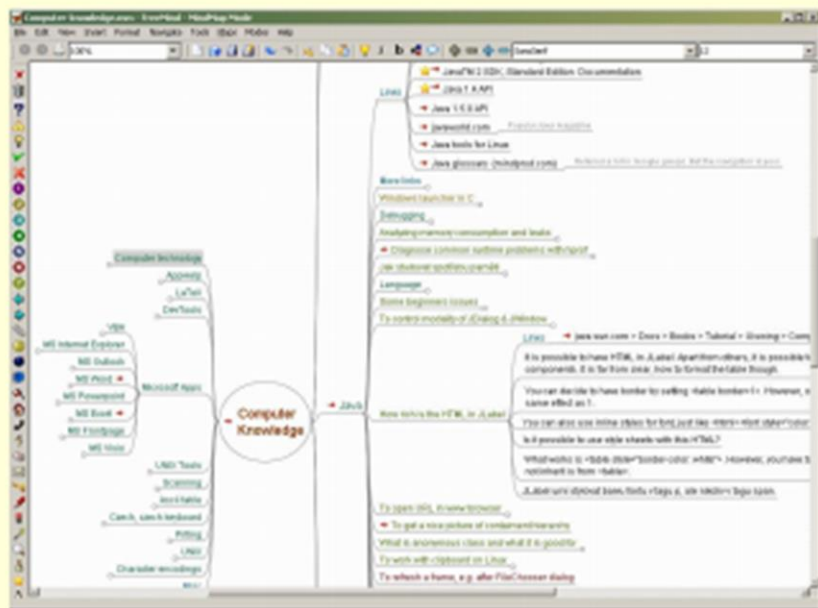
http://freemind.sourceforge.net/wiki/index.php/Main_Page

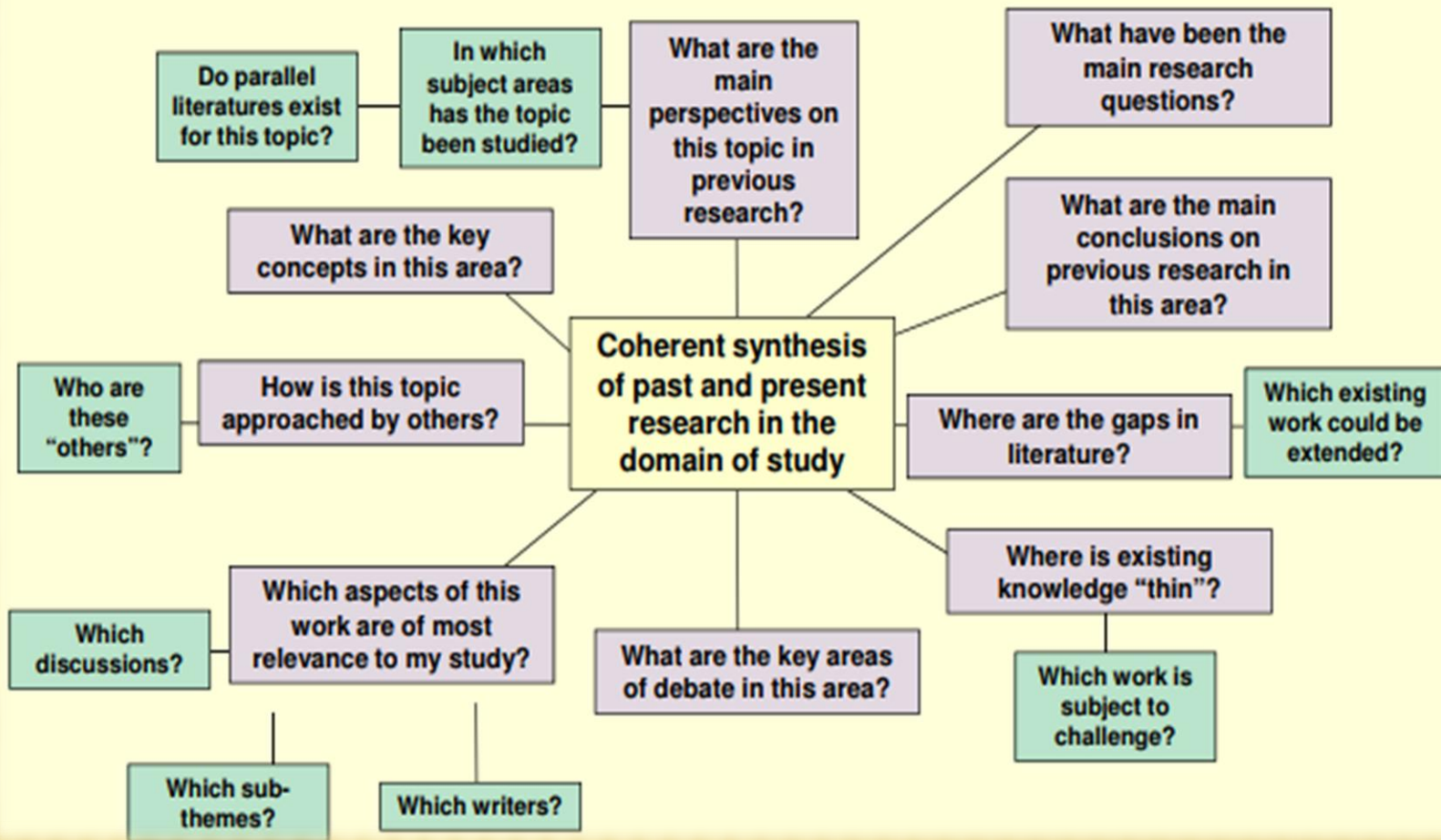**XMind**   www.xmind.net/

NovaMind   www.novamind.com/

More:
http://en.wikipedia.org/wiki/List_of_Mind_Mapping_software

Comprehensive Literature Review

Literature Review & your research evaluation

Towards the end of your dissertation [*or paper*] you will refer back to literature review

- Do your findings confirm those of others?
- Does your work extend that of others?
- Does your work provide new meaning to the work of others?
- Does your work break new ground?
- Does your work raise issues about the methodological choices made in previous studies?
- Does your work challenge existing ideas on your subject?

What a synthesis is not

- **Definitely not the result of "copy & paste" !**
  Plagiarism
  Even if properly referenced, what is the relevance?
  Copying sentences and making small changes is not acceptable

- **Not a simple (weakly linked) concatenation of excerpts from others !!!**

  "Author X said bla bla.... On the other hand, Y defends that bla bla ...
  Furthermore Z introduced bla bla .... and W agrees with ...."

- **Not a pedagogic text book !**
  Who is your reader?
  What is his / her background?
  What does he / she expect?

What is the relationship to your work?
What is your added value?

Interesting features in a synthesis

It shall:

- **Integrate a set of ideas that were previously dispersed and turn them into a coherent framework**

- **Clarify concepts that were only partially present in other works**

- **Introduce a new / original (fresh) look into the subject**

- **Show a critical perspective and some "personal touch" (how you see the current state of the art)**

- **Identify gaps / unsolved issues**

- **Be synthetic !**
  - Use synthetic representations – graphics, diagrams, tables, etc
  - Focus on the essential (namely what is relevant for your work)
  - But at the same time try to give a broad perspective in order to properly "locate" your work

found in different organizations (ISO/9001 1993). ISO 9000, SW-CMM and CMMI (staged representation) models claim to be flexible and tailorable to the goals of each organization. However, there is no support for tailoring, thus the three improvement efforts cannot be considered **adaptive**. Another problem is that there is no guidance for how much tailoring is acceptable within the limits of the model. Nevertheless, CMMI continuous model is more flexible since process improvement is performed for each process area following the approach proposed by ISO/IEC 15504.

The ISO/IEC 15504 includes two dimensions (processes and capability) which aren't coupled and provide greater flexibility than the CMMI staged representation, because any process can be managed at any capability level. This standard is tailorable for different software life cycle models, and it is the organization's responsibility to map the activities and tasks of the standard into the chosen model. Several experiences, such as the experiences reported by Cass et al. (Cass et al. 2002), served as examples of the adaptation of the standard for particular industrial sectors and its extension into new domains.

The main problem detected in other SPI models is that they mandate rules that might reduce flexibility and adaptation to organization needs and goals. BOOTSTRAP major challenge was therefore the integration of appropriate mechanisms for tailoring the model to the actual needs of an organization (Stienen et al. 1997). Nowadays, the model is flexible enough to account for various application areas, different organization cultures and sizes across countries. BOOTSTRAP provides guidelines to identify which process highly affect organizations goals, but does not provide any suggestion on how to prioritise process improvement. Defining priorities is up to each organization.

The SPIQ improvement model has been applied to a number of very different projects with respect to technology, people, products and processes. This shows that the model is applicable in various environments. Second, the fact that the model has been applied for 10 years shows that it is adaptable over time. As the goals of the organization change, so the improvement model does. The SPIQ model evolves according to goals based on the context. Here, adaptivity refers to evolution as well as suitability in different contexts.

ISO 9000, SW-CMM, ISO/IEC 15504, BOOTSTRAP and CMMI appraisal methods are mainly intended for people who have been trained with the management of a large process initiative. They are important for staging and managing a successful program and represent a step towards an institutionalised Software Process Engineering system. The methods have certain strengths and weaknesses when compared to each other's. For the IDEAL, the main strength comes from the fact that it has been derived from actual industry cases, rather than being a theoretical (untested) model. It has also been applied successfully later on, as will be apparent from the industry case reports. The model lacks insights to specific multi-site SPI program issues - e.g. activity synchronisation problems

Using critical spirit ...
Discussing ...
Giving opinion ...

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Where to include it? – case of papers

Case 1:

> Paper Title
> Authors
> Afillition
>
> Abstract
>
> 1. Introduction
> **2. Literature review**
> 3. Contribution A
> 4. Contribution B
> 5. ...
> 6. Conclusions
> 7. References

This approach is used in those works that employ a strong theory / literature background on which the work is rooted on

Case 2:

> Paper Title
> Authors
> Afillition
>
> Abstract
>
> 1. Introduction
> 2. Contribution A
> 3. Contribution B
> 4. ...
> **5. Related work**
> 6. Conclusions
> 7. References

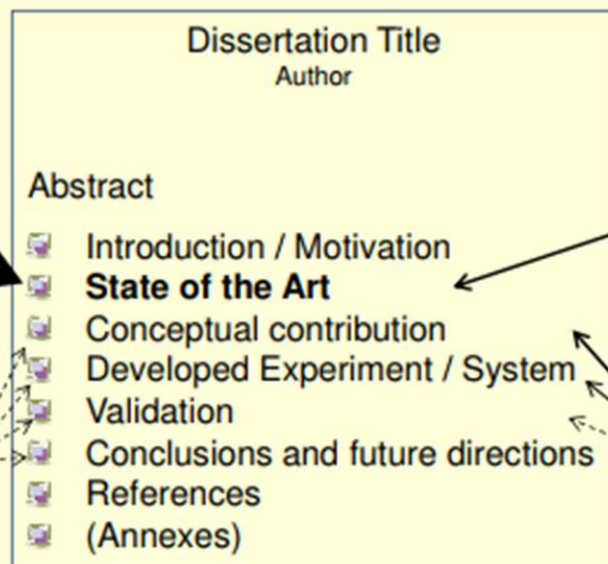This approach is used when the idea is to provide a basis for comparing and contrasting findings of the work

Where to include it? – case of dissertation

Case 1
(The most common)

A strong literature review / state of the art section after the introduction (1 or more chapters)

Sporadic references can also be made along the text.

Dissertation Title
Author

Abstract

- Introduction / Motivation
- **State of the Art**
- Conceptual contribution
- Developed Experiment / System
- Validation
- Conclusions and future directions
- References
- (Annexes)

Case 2

A shorter literature review / state of the art section after the introduction (1 short chapter) followed by...

Distributed sections of state of the art on different topics along the text (namely when the work involves several topics)

OTHER PRACTICAL ASPECTS

Referencing styles

There are several referencing styles available

Examples:

Harvard style - http://webhost.bridgew.edu/ebrush/CH135%20PDF/Lit%20Cited%20Guide.pdf
http://www.lib.monash.edu.au/tutorials/citing/harvard.html

Chicago style - http://library.osu.edu/sites/guides/chicagogd.php

A collection of styles and other materials - http://lib.jcu.edu/page/14774
http://www.library.american.edu/subject/citation.html
http://www.newcastle.edu.au/service/library/guides/referencing.html

Conferences and journals usually provide their own style.

Referencing styles ...

A frequent case:

WORK BY ONE AUTHOR:
The most recent study...(Author, 1995) suggests that....

WHEN THE AUTHOR'S NAME IS PART OF THE SENTENCE:
In Author's (1993) study of....

WORK BY TWO AUTHORS:
Other researchers (Author1 and Author2, 1981) have suggested....

WORK BY THREE OR MORE AUTHORS:
White-lined bark beetles...(Author1 et al., 1992).

MULTIPLE WORKS BY THE SAME AUTHOR:
The circulatory system...has been described...by Author (1978, 1980, 1983).

MULTIPLE WORKS BY DIFFERENT AUTHORS:
Many different models have been proposed...(Author1, 1977, 1979; Author2, 1988; Author3, 1992).

References are then listed alphabetically

Another case:

References in brackets - [4], [12]

In the end, references are listed according to the order of referencing in the text

Organization of references

In case there are prescribed rules, follow them !

Additional tips:

■ The list of given references is closely tied to the literature review / state of the art section of the thesis / paper.
  ■ Most examiners / reviewers scan your list of references looking for the important works in the field, so make sure they are listed and referred to.
    ■ Most examiners / reviewers, being experts with publications in the field, also look for their own publications … so, if they are in the topic area of your work list these too.
    ■ When submitting to a journal ... Editors also like to have citations to papers published by that journal (in order to increase their impact factor)!

■ All given references *must* be referred to in the main body of the thesis or paper.

■ Organize the list of references either alphabetically by author surname (preferred), or by order of citation in the text (if no other rules are imposed).

■ Although not so common, some thesis include the references at the end of each chapter (and not at the end of the thesis)
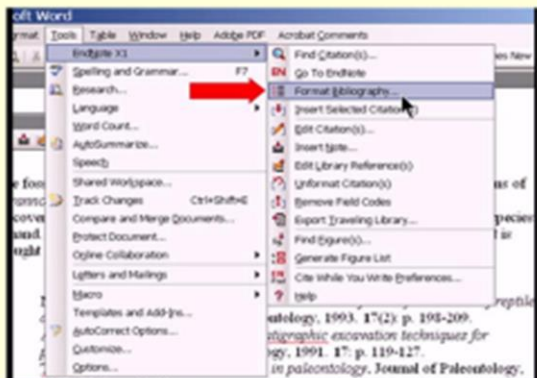
Tools

Some tools:

- **EndNote**

  www.endnote.com
  www.library.american.edu/Help/tutorials/endnote/index.html

- **ReferenceManager**

  www.refman.com/

- **ProCite**

  www.procite.com

- **Biblioscape**

  www.biblioscape.com/biblioscape.htm

- **Bibliographix**

  http://home.mybibliographix.com/

Lists of free tools:

http://mahbub.wordpress.com/2007/03/04/
comparison-of-free-bibliographic-managers/

http://en.wikipedia.org/wiki/
Comparison_of_reference_management_software

Thank you for attention!