

## **A QUALITATIVE MULTI-ATTRIBUTE MODEL FOR SELECTION OF PRIVATE HYDROPOWER PLANT INVESTMENTS IN TURKEY: BY FOUNDATION OF SEARCH RESULTS CLUSTERING ENGINE (Carrot<sup>2</sup>), HYDROPOWER PLANT CLUSTERING, DEXi AND DEXiTree**



Source: The International Energy Agency Implementing Agreement for Hydropower Technologies and Programmes (<http://www.ieahydro.org/>)

# Journal of Industrial Engineering and Management

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### INTRODUCTION

Year	Peak Load (MW)	Electricity Consumption (GWh)	Minimum Load (MW)
1990	9.180	56.812	N/A
1991	9.965	60.499	*3.388
1992	11.113	67.217	*3.779
1993	11.921	73.432	*3.815
1994	12.760	77.783	*4.594
1995	14.165	85.552	*4.958
1996	15.231	94.789	*5.331
1997	16.926	105.517	*6.770
1998	17.799	114.023	*6.764
1999	18.938	118.485	*1.515
2000	19.390	128.276	*9.501
2001	19.612	126.871	*8.433
2002	21.006	132.500	9.127
2003	21.729	141.151	9.270
2004	23.199	149.239	8.888
2005	25.174	160.806	10.120
2006	27.594	174.230	10.545
2007	29.249	190.000	11.100
2008	30.517	198.085	10.409
2009	29.870	194.079	11.123
2010	33.392	210.434	13.513
2011	36.122	230.306	14.822
2012	39.045	242.370	13.922

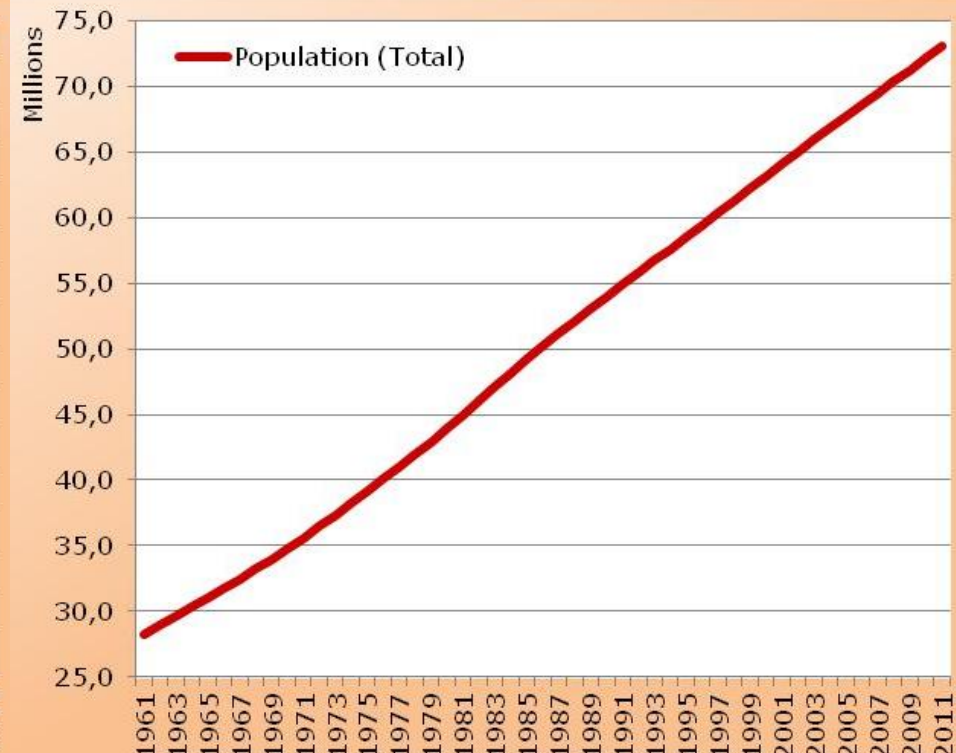
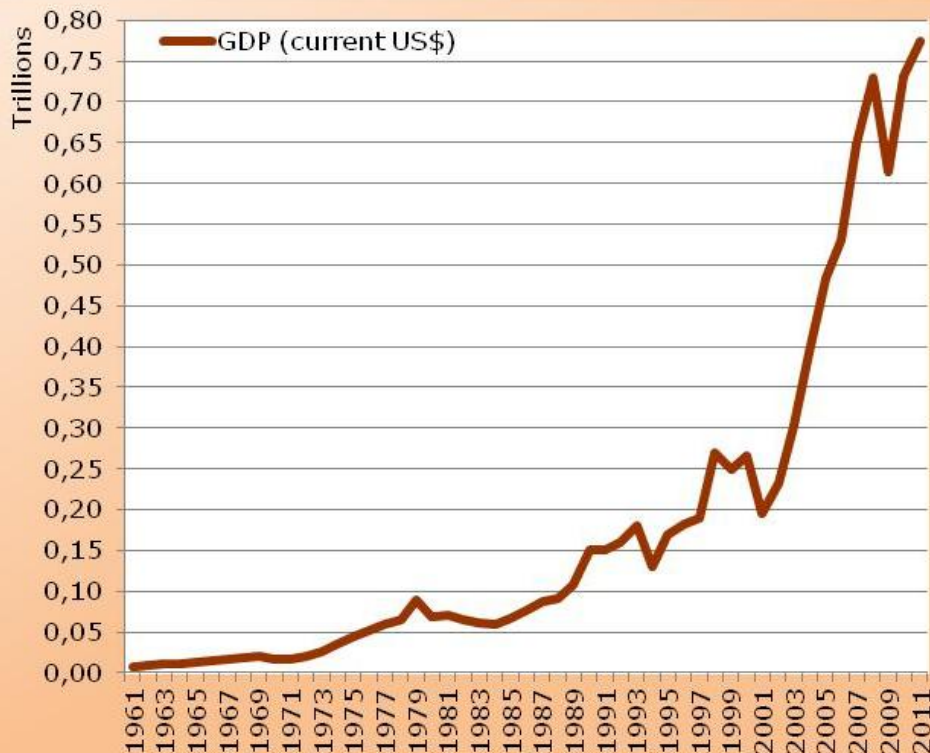
The peak load, the overall electricity consumption, and the minimum load of Turkish Interconnected Electricity System *Data & Source*: (EMRA, 2013; TEIAS, 2013) (\* indicates the calculated value from the published graph, N/A indicates not available data, MW indicates the unit of power in megawatts ( $10^6$  W: Watt), GWh indicates the unit of energy in gigawatthours ( $10^9$  Wh: Watthour))

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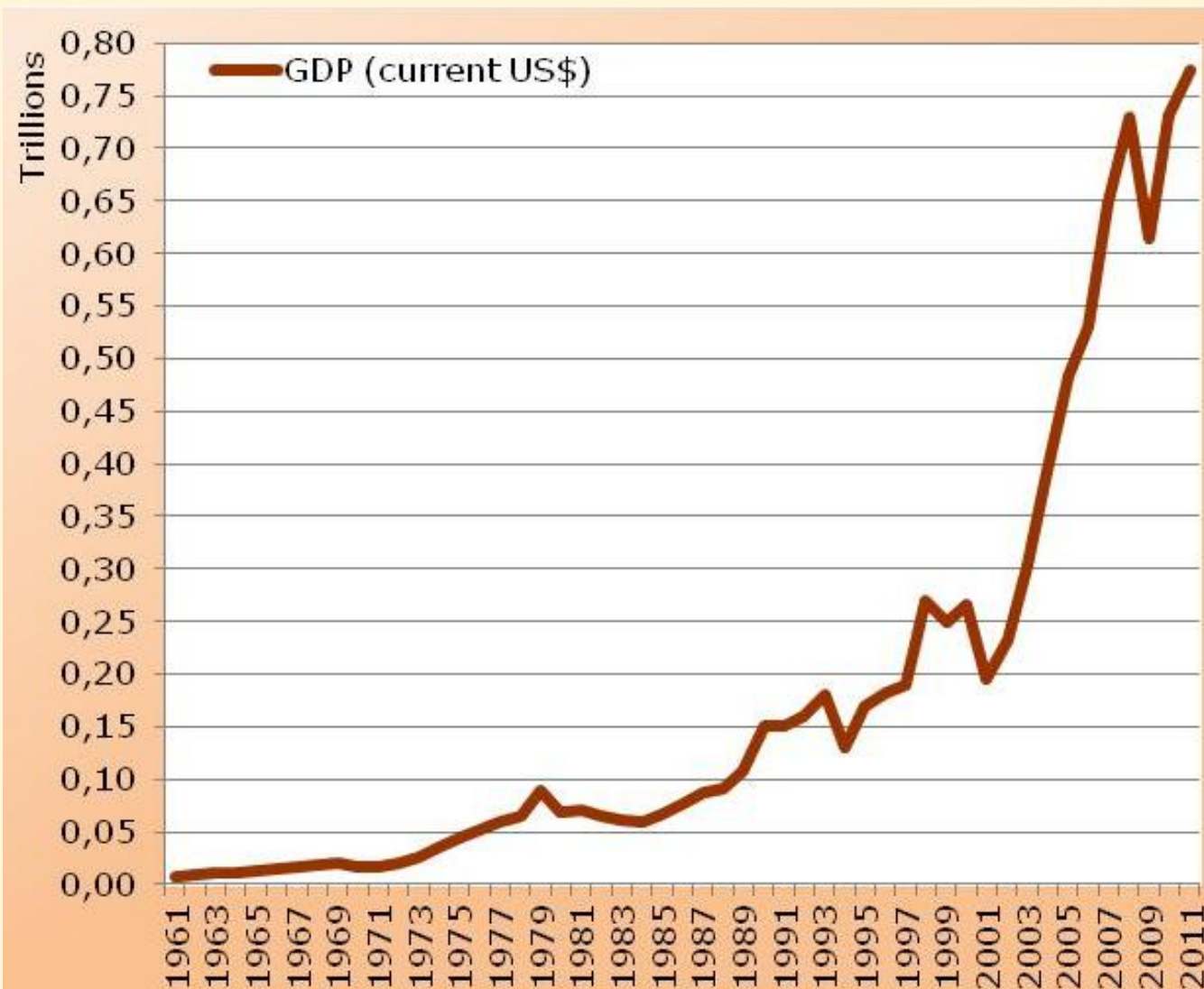


GDP (current USD, 1961-2011) of Turkey (on left), Population (total, 1961-2011) of Turkey (on right) *Data: (Worldbank, 2014)*

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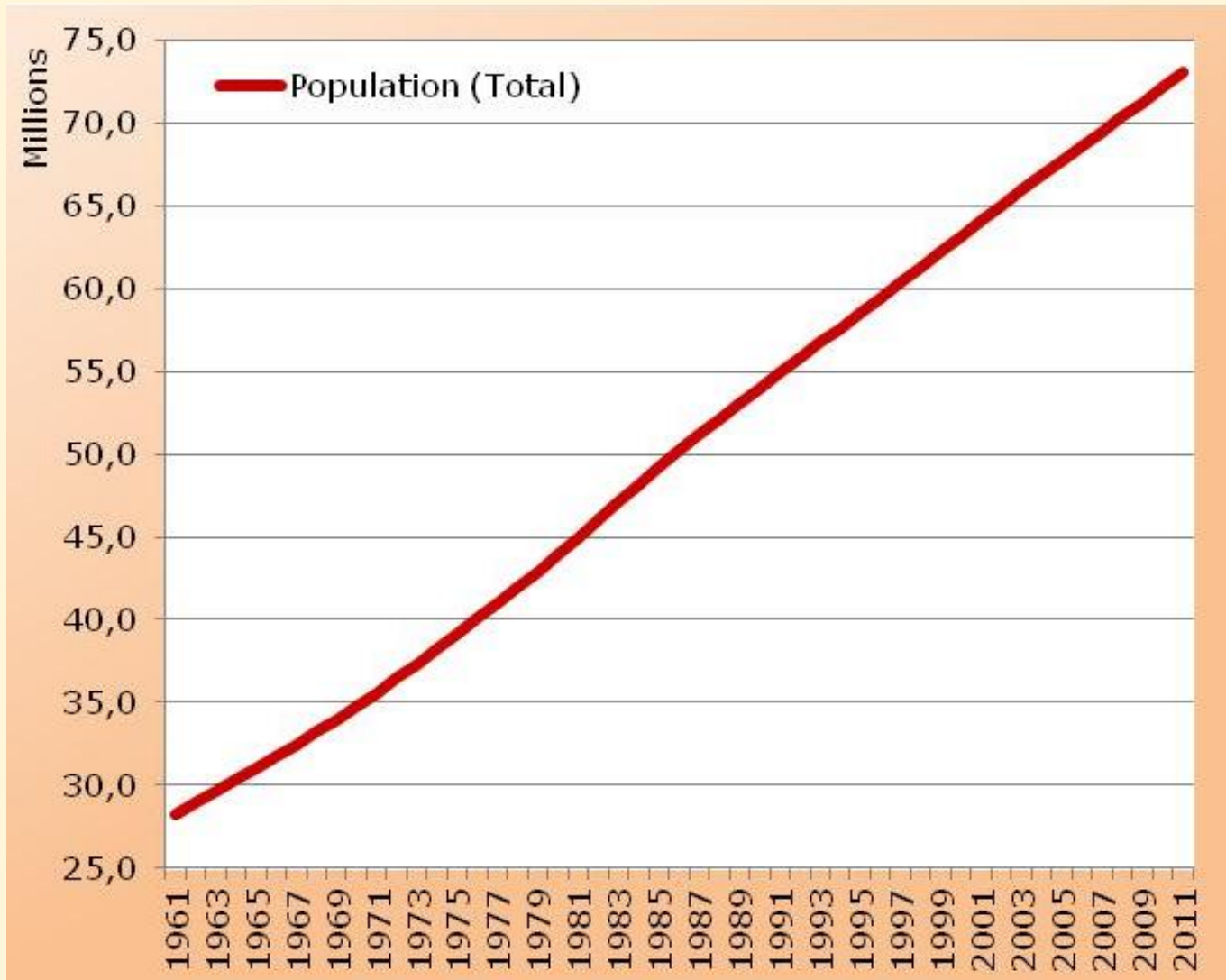




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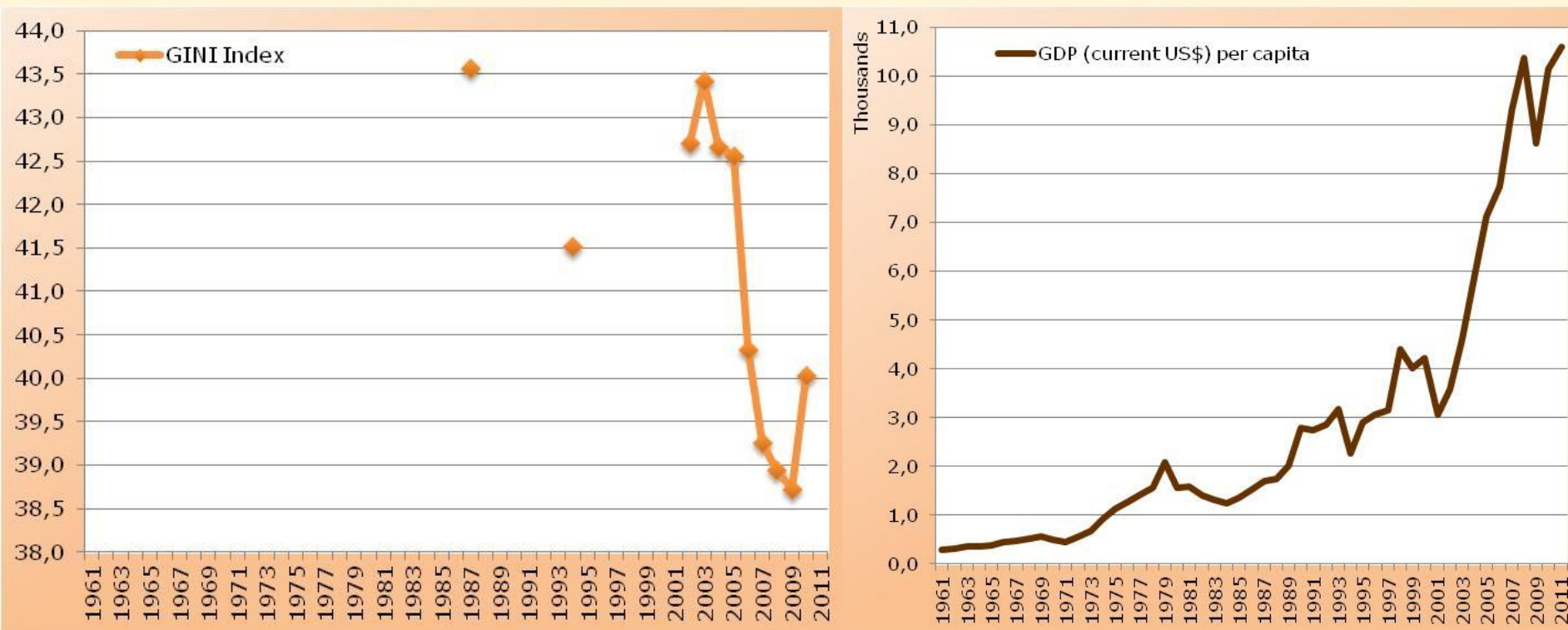


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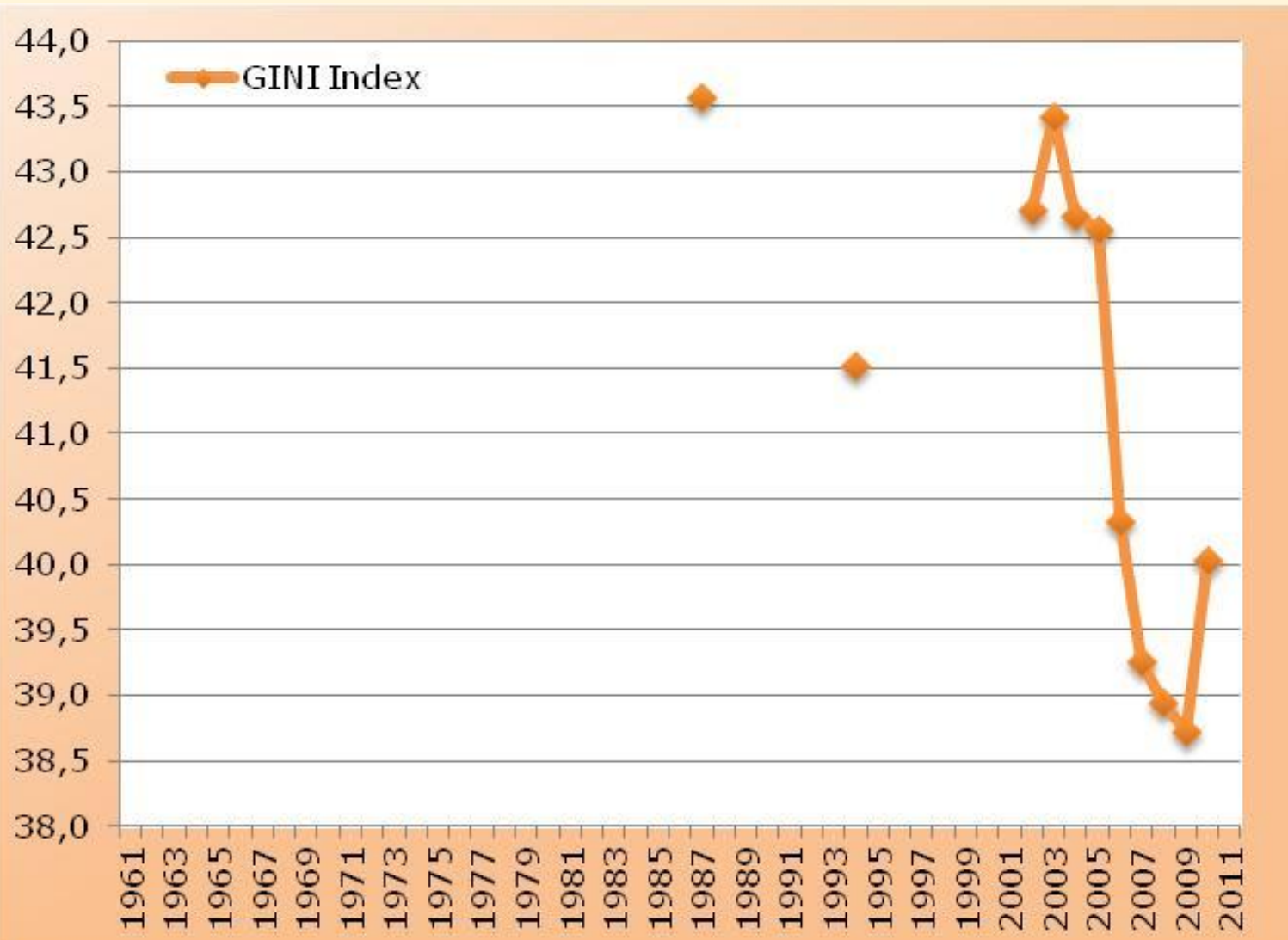


GINI Index (1961-2011: no data available for the years that not having any point on the graph) of Turkey (on left), GDP per capita (current US\$, 1961-2011) of Turkey (on right) Data: (Worldbank, 2014)

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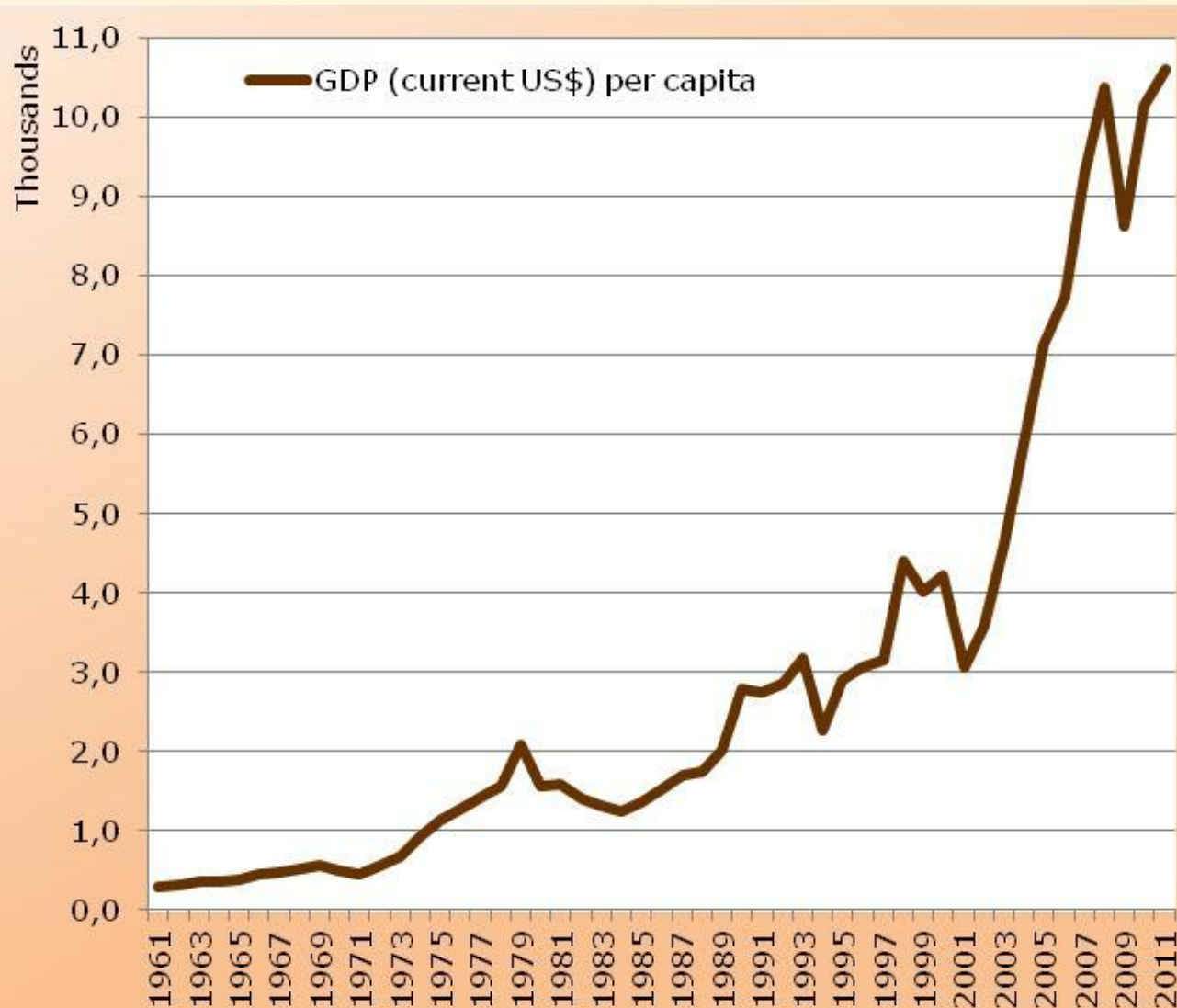
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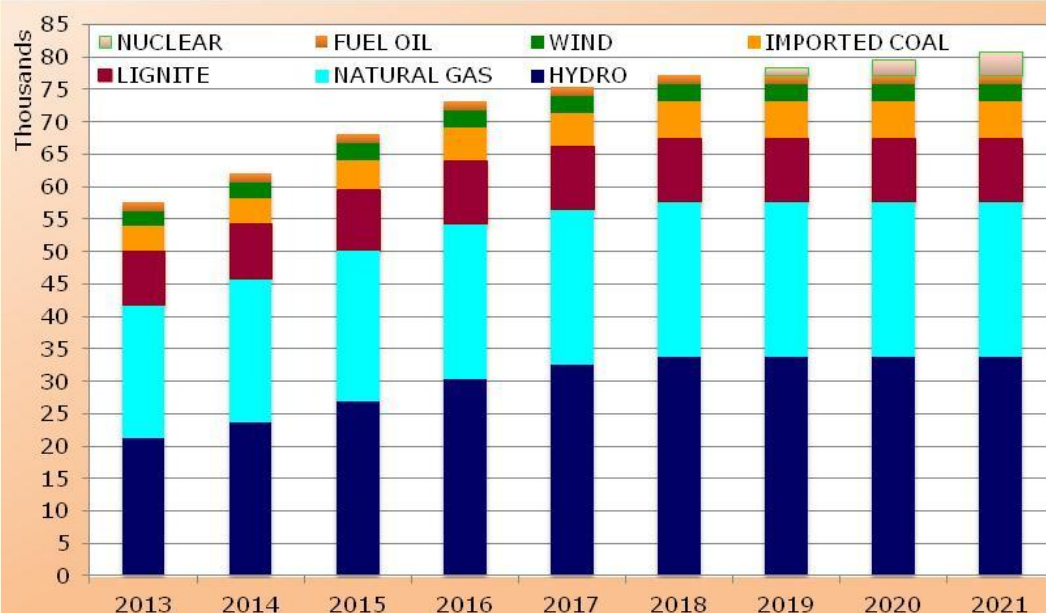
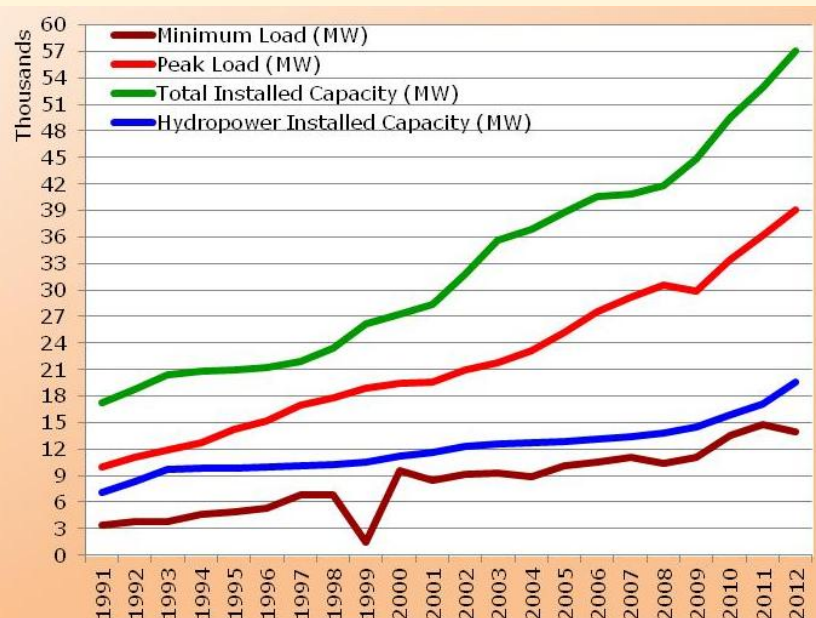


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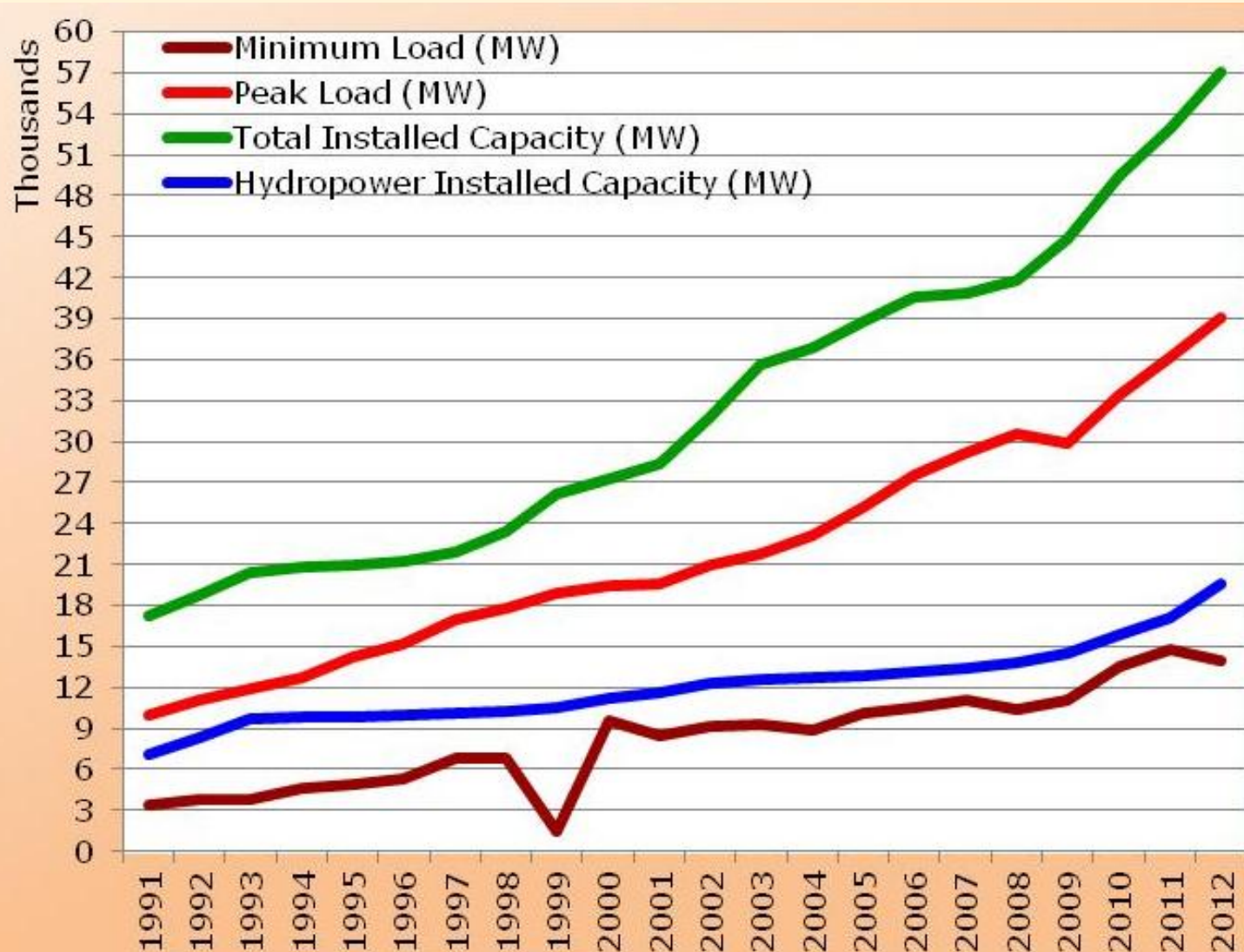


Load (Min & Peak in MW) and capacity (Hydropower & Total Installed Capacity in MW) of Turkish Electricity System (1991-2012) (on left), projected installed capacities of hydro, natural gas, lignite, imported coal, wind, fuel oil, and nuclear power plants (2013-2021) (on right) *Data & Source: (EMRA, 2013; TEIAS, 2013)*

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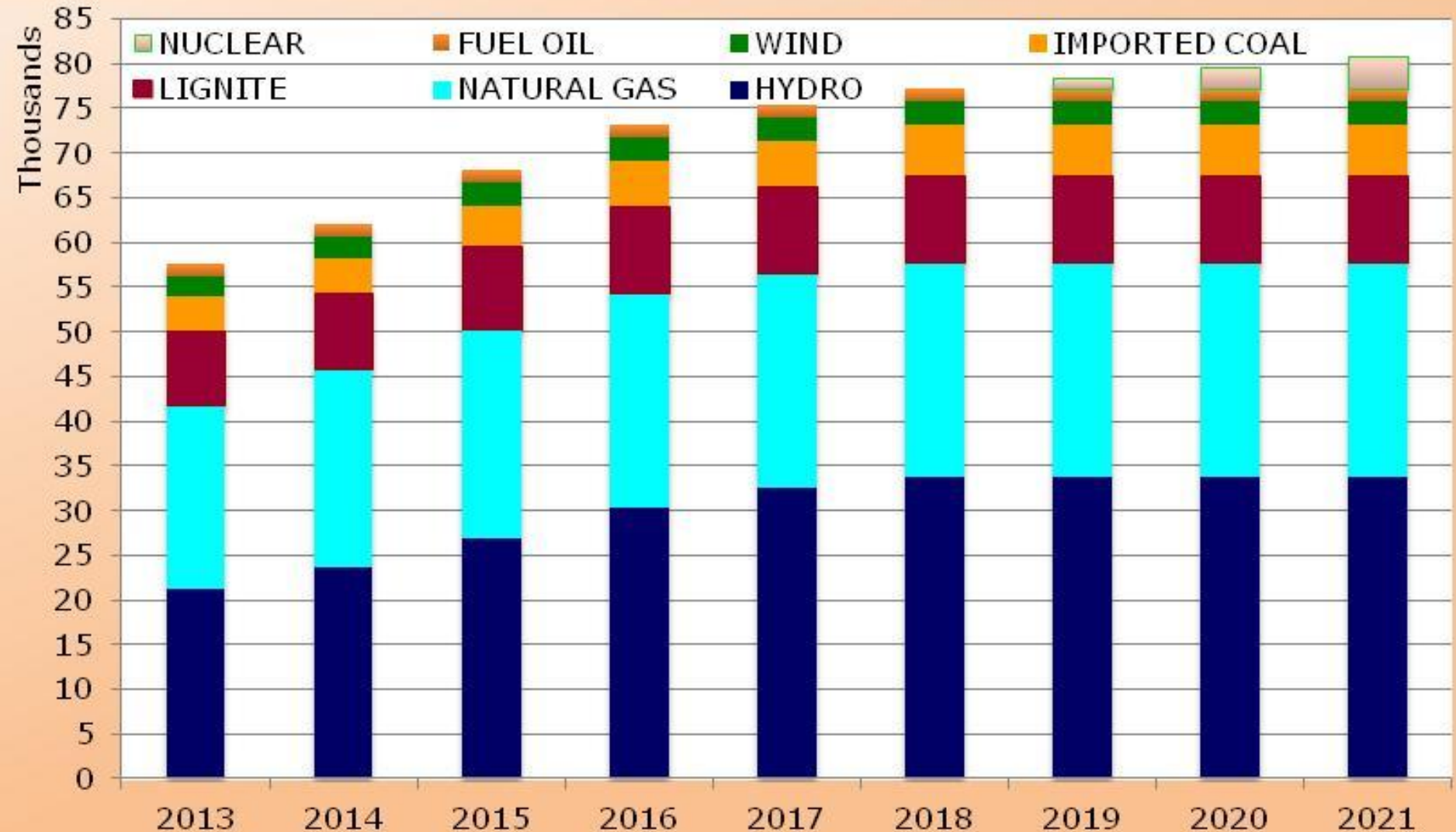
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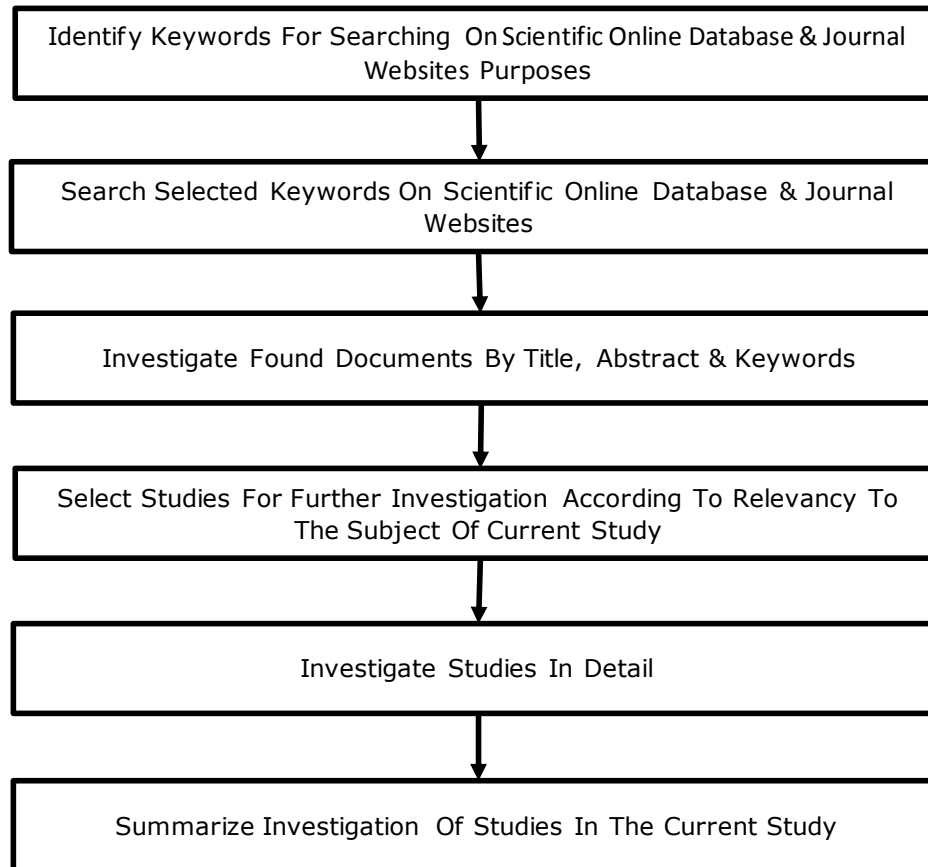


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### LITERATURE REVIEW

*See next slide for larger version*

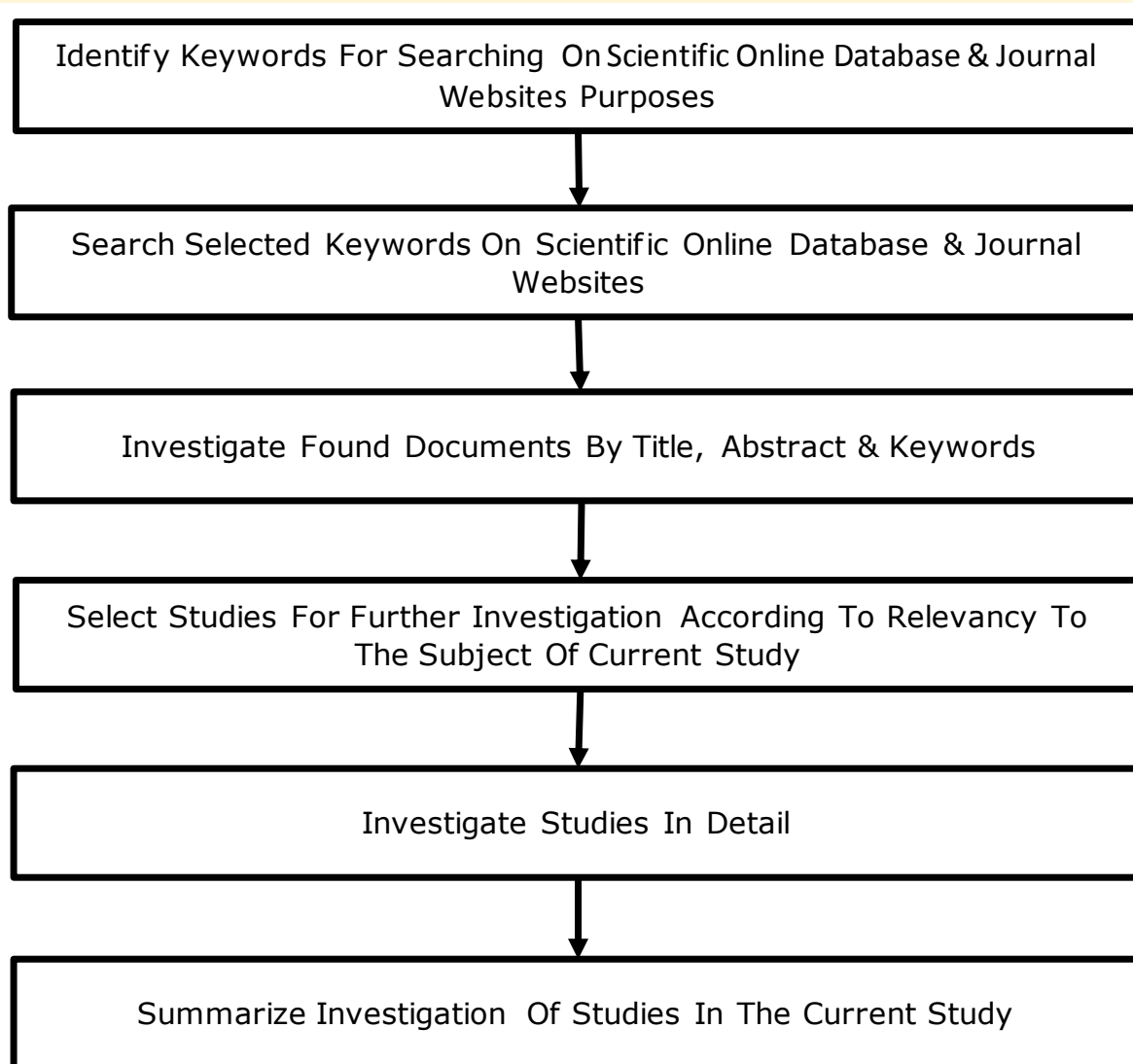


The literature review procedure in the current study

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### LITERATURE REVIEW





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### LITERATURE REVIEW

*See next slide for screenview version*



No Title Of Scientific Online Database And Journal Website

- 1 ACM Digital Library
- 2 ASCE Online Research Library
- 3 American Society of Mechanical Engineers
- 4 Cambridge Journals Online
- 5 Directory of Open Access Journals
- 6 Emerald Insight
- 7 International Journal of Industrial Engineering Theory, Applications and Practice
- 8 Journal of Industrial Engineering and Management
- 9 Science Direct
- 10 Taylor & Francis Online/Journals
- 11 Wiley-Blackwell/Wiley Online Library
- 12 World Scientific Publishing

Abbreviation Website

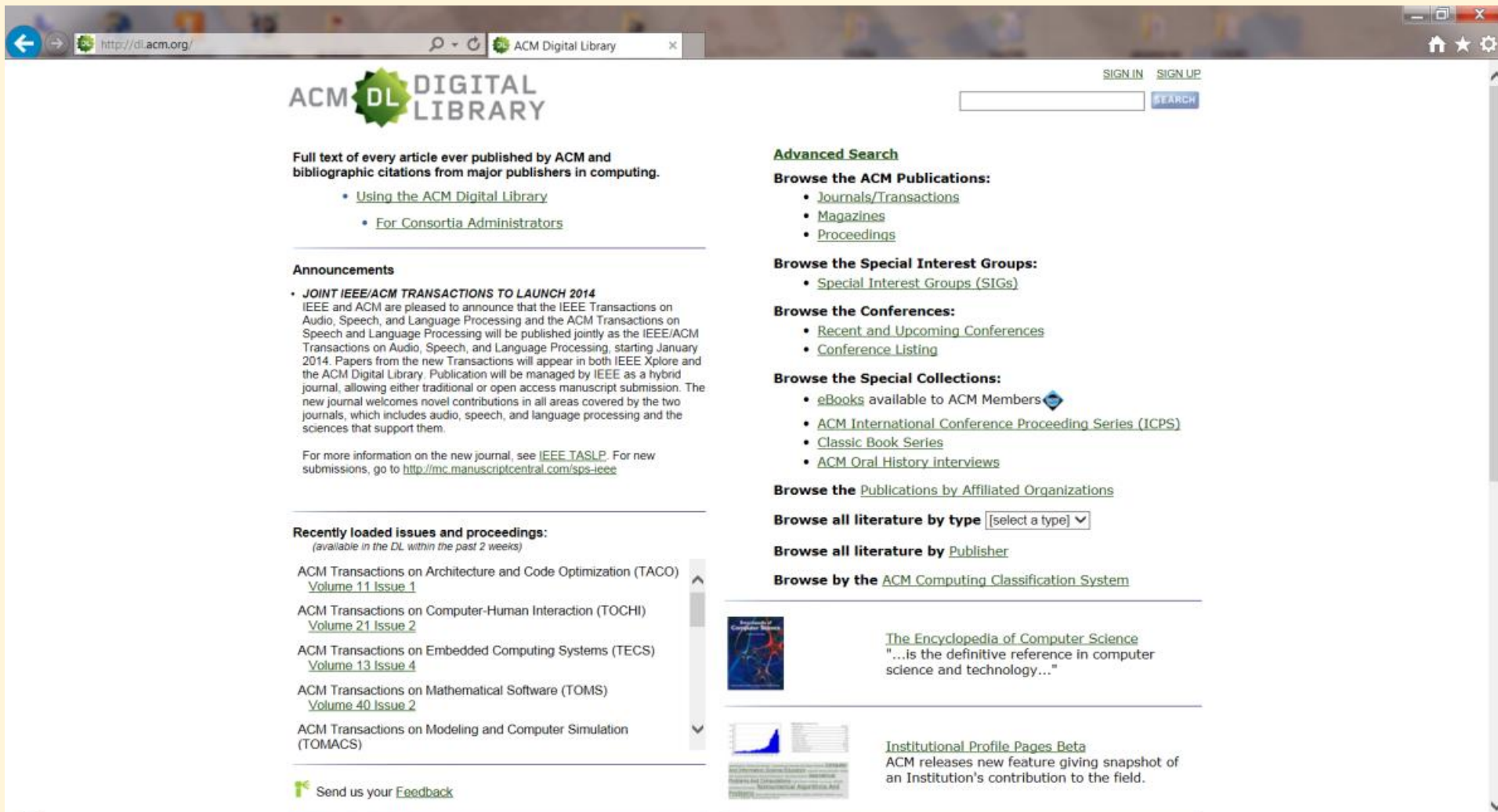
- |         |   |
|---------|---|
| ACMDL   | <a href="http://dl.acm.org/">http://dl.acm.org/</a>   |
| ASCEOR  | <a href="http://ascelibrary.org/">http://ascelibrary.org/</a>   |
| ASME    | <a href="http://asmedigitalcollection.asme.org/">http://asmedigitalcollection.asme.org/</a>                 |
| CJO     | <a href="http://journals.cambridge.org">http://journals.cambridge.org</a>                                   |
| DOAJ    | <a href="http://doaj.org">http://doaj.org</a>   |
| EI      | <a href="http://www.emeraldinsight.com/">http://www.emeraldinsight.com/</a>                                 |
| IJietap | <a href="http://journals.sfu.ca/ijietap/index.php/ijie/">http://journals.sfu.ca/ijietap/index.php/ijie/</a> |
| JIEM    | <a href="http://www.jiem.org/index.php/jiem">http://www.jiem.org/index.php/jiem</a>                         |
| SD      | <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>                                   |
| TFJ     | <a href="http://www.tandfonline.com/">http://www.tandfonline.com/</a>                                       |
| WB      | <a href="http://onlinelibrary.wiley.com/">http://onlinelibrary.wiley.com/</a>                               |
| WSP     | <a href="http://www.worldscientific.com/">http://www.worldscientific.com/</a>                               |

The reviewed scientific online database and journal websites in the current study

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### LITERATURE REVIEW



The screenshot shows the ACM Digital Library homepage. The browser address bar displays 'http://dl.acm.org/'. The page features the ACM Digital Library logo and a search bar with 'SIGN IN' and 'SIGN UP' links. Below the logo, a text block states: 'Full text of every article ever published by ACM and bibliographic citations from major publishers in computing.' This is followed by two links: 'Using the ACM Digital Library' and 'For Consortia Administrators'.

The 'Announcements' section highlights the 'JOINT IEEE/ACM TRANSACTIONS TO LAUNCH 2014', explaining the joint publication of IEEE Transactions on Audio, Speech, and Language Processing and ACM Transactions on Speech and Language Processing. It mentions the start date of January 2014 and the hybrid publication model. A link for more information is provided: 'For more information on the new journal, see IEEE TASLP. For new submissions, go to http://mc.manuscriptcentral.com/sps-ieee'.

The 'Recently loaded issues and proceedings:' section lists several publications with their respective volumes and issues, such as 'ACM Transactions on Architecture and Code Optimization (TACO) Volume 11 Issue 1' and 'ACM Transactions on Embedded Computing Systems (TECS) Volume 13 Issue 4'. A 'Feedback' link is also present.

The right sidebar contains several navigation links: 'Advanced Search', 'Browse the ACM Publications:' (with links to Journals/Transactions, Magazines, and Proceedings), 'Browse the Special Interest Groups:' (with a link to Special Interest Groups (SIGs)), 'Browse the Conferences:' (with links to Recent and Upcoming Conferences and Conference Listing), 'Browse the Special Collections:' (with links to eBooks available to ACM Members, ACM International Conference Proceeding Series (ICPS), Classic Book Series, and ACM Oral History interviews), 'Browse the Publications by Affiliated Organizations', 'Browse all literature by type' (with a dropdown menu), 'Browse all literature by Publisher', and 'Browse by the ACM Computing Classification System'.

At the bottom of the sidebar, there are two featured sections: 'The Encyclopedia of Computer Science' with a quote '...is the definitive reference in computer science and technology...' and 'Institutional Profile Pages Beta' with a description of the new feature.

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### LITERATURE REVIEW

The screenshot displays the ASCE Library website. At the top, a navigation bar includes links for Welcome, Log in, Register, View Cart, and various ASCE resources. The main header features the ASCE Library logo and a search bar with 'Quick Search' and 'Advanced Search' options. Below the header, a horizontal menu lists categories: JOURNALS, E-BOOKS, STANDARDS, PROCEEDINGS, COLLECTIONS, MY TOOLS, BOOKSTORE, and CONTRACT DOCUMENTS.

The main content area is titled 'Welcome to the ASCE Library' with the tagline 'The latest civil engineering knowledge and its practical applications.' It includes four dropdown menus for selecting content types: JOURNALS, E-BOOKS, STANDARDS, and PROCEEDINGS, each with a 'Please make a selection' prompt.

On the right side, there is a section for 'Transportation & Infrastructure Systems' highlighting 'Top Downloaded Articles' and a 'Register for Free Access' link. Below this is an 'ANNOUNCEMENTS' section titled 'ASCE E-books & Standards Now Available', which states that E-books and standards are now fully integrated with journals and proceedings content, with over 300 titles available for free access.

Further down, there is a section for 'ASCE Bridges Photo Contest' with a 'Photo © Sudharshun Gopalan' and a link to 'Enter to win'. At the bottom, there are four featured book covers: 'Slope Stability Analysis by the Limit Equilibrium Method', 'Curtain Wall Systems', 'Field Guide to Environmental Engineering for Development Workers', and 'Journal of Transportation Engineering'.

A small icon with the letter 'E' is shown next to the text 'What is this icon?', which explains that free content is available when logged in and registered with ASCE Library.



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### LITERATURE REVIEW

The screenshot displays the ASME Digital Collection website. At the top, a banner for ASME Press eBooks encourages users to subscribe to access the entire eBooks collection. Below this, the ASME logo and 'DIGITAL COLLECTION' text are visible, along with a search bar and a 'SEARCH' button. A navigation menu includes links to Home, Journals, Conference Proceedings, eBooks, Topic Collections, Library Service Center, and Help. The main content area features a carousel of book covers, including 'Turbo Expo: Power for Land, Sea, and Air', 'International Conference on Offshore Mechanics and Arctic Engineering', 'Energy and Power Generation Handbook', and 'Offshore Mechanics and Arctic Engineering'. Below the carousel, the 'Newest Content' section highlights the 'Journal of Fluids Engineering' (April 2014 | Volume 136 | Issue 4) and the 'Journal of Energy Resources Technology'. A sidebar on the right provides information about 'The ASME Digital Collection', stating it was founded in 1880 as the American Society of Mechanical Engineers and is the premier professional membership organization for over 127,000 mechanical engineers. It also lists the collection's contents: ASME's Transaction Journals from 1960 to the present, ASME's Conference Proceedings from 2002 to the present, and ASME Press eBooks selected from 1993 to the present. At the bottom, there is a link to the 'AMR Podcast' and a button to view all episodes.

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**The ASME Digital Collection**

Founded in 1880 as the American Society of Mechanical Engineers, ASME is the premier professional membership organization for more than 127,000 mechanical engineers and associated members worldwide. ASME also conducts one of the world's largest technical publishing operations in the world, offering thousands of titles including some of the profession's most prestigious journals, conference proceedings, and ASME Press books.

The ASME Digital Collection, previously known as The ASME Digital Library, is ASME's repository of current and archival literature featuring:

- ASME's Transaction Journals from 1960 to the present.
- ASME's Conference Proceedings from 2002 to the present.
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**Journal of Fluids Engineering**  
April 2014 | Volume 136 | Issue 4

**Journal of Energy Resources Technology**

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### LITERATURE REVIEW

The screenshot shows the Cambridge Journals Online website. The browser address bar displays the URL: <http://journals.cambridge.org/action/login;jsessionid=E5C83B6F99CC373908DCE346C5F1DE33.journals>. The website header includes the Cambridge University Press logo and navigation links: Academic, Journals, Cambridge English, Education, Bibles, Digital Products, About Us, and Careers. Below the header, there is a search bar with a dropdown menu set to 'All Journal Articles and Book Content' and a 'Search' button. To the right of the search bar are links for 'Citation Search' and 'Quick Search'. The main content area features a large graphic with various icons (SMS, email, social media) and a megaphone. Below this graphic are four buttons: 'Cambridge Journals Blog', 'New Journals for 2014', 'New CJO Features', and 'Journals Price List 2014'. On the left side, there is a 'Welcome to Cambridge Journals Online' message with a 'Register for an Account' button and social media links (Facebook, Twitter, YouTube, Email, RSS). Below these links are 'Like' and '+1' buttons. A 'Cambridge Open' banner is also present, stating 'Open Access publishing at Cambridge'. The 'Browse Journals' section includes a dropdown menu for 'All Categories' and buttons for 'Browse by Subject' and 'Browse by Title'. A featured journal, 'Cambridge Journal of Postcolonial Literary Inquiry', is highlighted with a description: 'New to 2014, this peer-review journal aims to deepen our grasp of postcolonial literary history while enabling us to stay comprehensively informed of all critical developments in the field.' Below this, there is a section titled 'Boosting discoverability' mentioning 'Kudos', 'Dryad', and 'Reference Universe'.



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### LITERATURE REVIEW

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For those of you who have a journal indexed in DOAJ, you may now [log in to your account](#), upload metadata to us or update your account. We've provided new tools to make metadata uploading easier and we encourage you to start using them.

**New application process**  
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### LITERATURE REVIEW

The screenshot displays the Emerald Insight website. At the top, the browser address bar shows the URL <http://www.emeraldinsight.com/>. The website header includes the Emerald Insight logo and navigation links: Login, Register, Text View, Mobile View, Help, and Admin. A welcome message for a guest user is visible. Below the header, a secondary navigation bar contains links for Home, Journals & Books, Case Studies, and Marked lists, along with a resource area dropdown menu set to Emerald Resources. A search bar is prominently displayed with a search button and a link to Advanced Search. The main content area is titled 'Browse Journals & Books' and features a grid of 18 categories, each with a right-pointing arrow. These categories are organized into three columns. Below this grid, there are two featured sections: 'Most popular articles' and 'Journal of the Week'. The 'Most popular articles' section lists three recent articles from the last 7 days. The 'Journal of the Week' section features a stack of journal covers and a description of the feature.

**Emerald Insight**

Welcome: Guest

Home | Journals & Books | Case Studies | Marked lists

Resource areas: Emerald Resources:

Search in: All content Search Advanced Search

### Browse Journals & Books

- > Accounting and Finance
- > Built Environment
- > Business Ethics and Law
- > Economics
- > Education
- > Electrical & Electronic Engineering
- > Enterprise and Innovation
- > Environmental Management/Environment
- > Health and Social Care
- > Health Care Management/Healthcare
- > Human Resource Management
- > Industry and Public Sector Management
- > Information and Knowledge Management
- > International Business
- > Learning and Development
- > Library and Information Studies
- > Management Science/Management Studies
- > Managing Quality
- > Marketing
- > Mechanical & Materials Engineering
- > Operations and Logistics Management
- > Organization Studies
- > Performance Management and Measurement
- > Regional Management Studies
- > Sociology and Public Policy
- > Strategy
- > Tourism and Hospitality

### Most popular articles

From the last 7 days:

- Document Analysis as a Qualitative Research Method
- Strategy formulation framework for vocational education: integrating SWOT analysis, balanced scorecard, QFD methodology and MBNQA education criteria
- Building organisational culture that stimulates creativity and innovation
- Google Scholar: the pros and the cons

### Journal of the Week

Our Journal of the Week feature allows you to access all articles from our selected title free of charge

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### LITERATURE REVIEW

The screenshot shows a web browser window displaying the homepage of the International Journal of Industrial Engineering. The browser's address bar shows the URL: <http://journals.sfu.ca/ijietap/index.php/ijie/>. The page has a dark red header with the journal's title. Below the header is a navigation menu with links: HOME, ABOUT, LOGIN, REGISTER, SEARCH, CURRENT, ARCHIVES, and ANNOUNCEMENTS. The main content area features the journal's title, a brief description of its scope, and a list of journal coverage areas. On the right side, there is a user login section, a search bar, and links for browsing by issue, author, or title. At the bottom right, there is a font size selector.

International Journal of Industrial Engineering: Theory, Applications and Practice

HOME ABOUT LOGIN REGISTER SEARCH CURRENT ARCHIVES ANNOUNCEMENTS

Home > Vol 20, No 9-10 (2013)

### International Journal of Industrial Engineering: Theory, Applications and Practice

**The International Journal of Industrial Engineering: Theory, Applications and Practice** publishes original, quality articles reporting advances in industrial engineering theory, techniques, methodology, applications and practice; general surveys and critical reviews; educational or training articles including case studies; short communications; keynote papers; book reviews; announcements; etc., concerned with traditional aspects and recent advances in Industrial Engineering.

**Journal coverage areas are:**

- Artificial Intelligence in Industrial Engineering
- Consumer Product Design
- Engineering Economy and Cost Estimation
- Ergonomics in Job and Work Design
- Facilities Design and Location
- Hazard and Risk Assessment and Mitigation
- Healthcare Systems Engineering
- IE Applications and Practices in Defense and Homeland Security
- IE Applications and Practices in Traditional and Alternative Energy Management
- Information Systems
- Infrastructure Engineering, Development & Management
- Maintenance Engineering and Management
- Materials Handling
- Performance Analysis and Simulation
- Production Systems Design, Planning and Control
- Productivity and Business Strategies
- Project Management
- Service Systems Engineering and Management
- Sustainable Engineering and Development
- Technology Management and Transfer
- Total Quality Management and Quality Technology
- Work Measurement and Methods Engineering
- Industrial Engineering Education and Practices
- Resource Optimization including manufacturing processes and designs that minimize energy and water consumption, and carbon emission and other relevant topics in industrial engineering
- Technology Interface Design (hardware and software)

*The journal emphasizes use of engineering design and analysis and strives to maintain a balance between research and application. The journal disseminates information to both researchers and practitioners.*

The journal particularly encourages interdisciplinary studies requiring the use of Industrial Engineering techniques and methodologies.

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## A QUALITATIVE MULTI-ATTRIBUTE MODEL FOR SELECTION OF PRIVATE HYDROPOWER PLANT INVESTMENTS IN TURKEY: BY FOUNDATION OF SEARCH RESULTS CLUSTERING ENGINE (Carrot<sup>2</sup>), HYDROPOWER PLANT CLUSTERING, DEXi AND DEXiTree

### LITERATURE REVIEW



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### LITERATURE REVIEW

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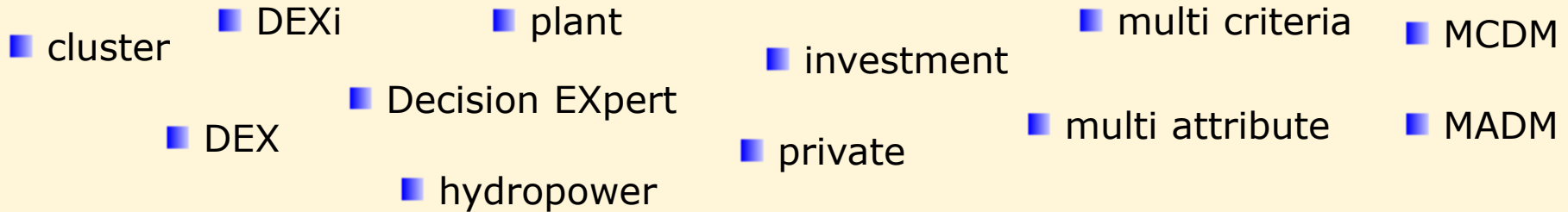
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The selected key words

- (A): cluster (B): DEX (C): DEXi (D): Decision EXpert (E): hydropower  
 (F): investment (G): plant (H): private (I): hydropower & plant  
 (J): private & hydropower & plant (K) private & hydropower & plant & investment  
 (L): hydropower & investment (M): hydropower & cluster (N): hydropower & DEX  
 (O): hydropower & DEXi (P): hydropower & cluster & DEXi  
 (Q): hydropower & Decision EXpert (R): hydropower & plant & multi attribute  
 (U): hydropower & plant & multi criteria (V): hydropower & plant & MADM  
 (W): hydropower & plant & MCDM (Y): hydropower & plant & investment & MADM  
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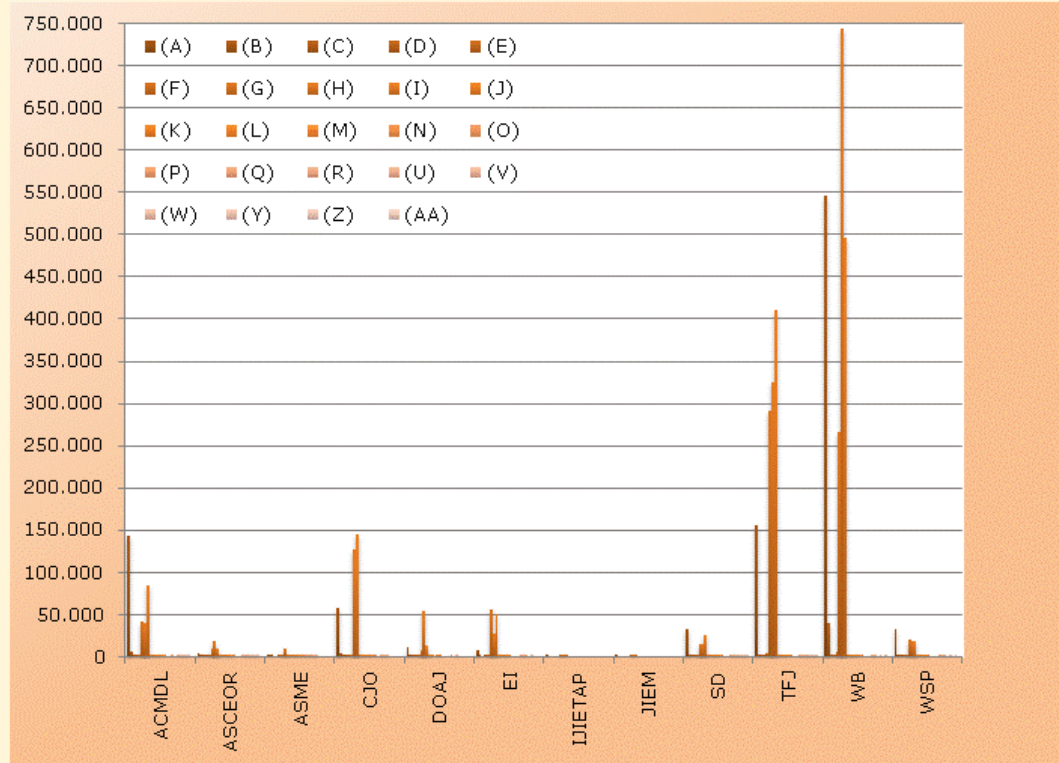
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### LITERATURE REVIEW

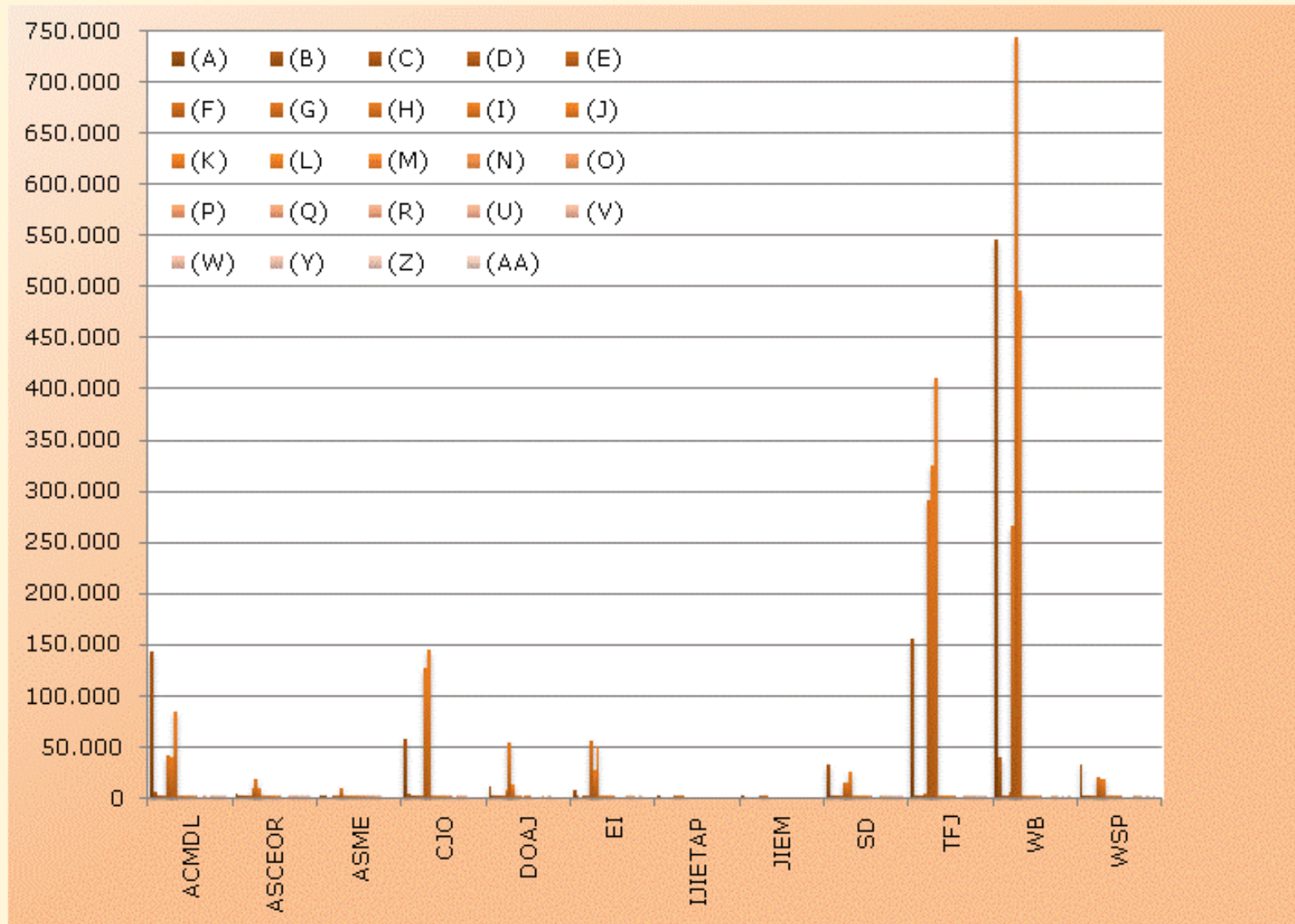
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Search results of keywords on scientific online database and journal websites *Keywords:* (A): cluster, (B): DEX, (C): DEXi, (D): Decision EXpert, (E): hydropower, (F): investment, (G): plant, (H): private, (I): hydropower & plant, (J): private & hydropower & plant, (K) private & hydropower & plant & investment, (L): hydropower & investment, (M): hydropower & cluster, (N): hydropower & DEX, (O): hydropower & DEXi (P): hydropower & cluster & DEXi (Q): hydropower & Decision Expert, (R): hydropower & plant & multi attribute, (U): hydropower & plant & multi criteria, (V): hydropower & plant & MADM, (W): hydropower & plant & MCDM, (Y): hydropower & plant & investment & MADM, (Z): hydropower & plant & investment & MCDM, (AA): private & hydropower & plant & investment & DEXi. *Data & Source:* ACMDL, ASCEOR, ASME, CJO, DOAJ, EI, IJTIETAP, JIEM, SD, TFJ, WB, WSP



## LITERATURE REVIEW



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(E)	663	2020	185	666	307	223	0	0	594	4531	5448	550
(F)	41337	9484	1174	1629	7392	55206	5	48	14248	291982	266649	20427
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(H)	84520	8898	871	144807	13569	51523	2	30	25260	410243	496297	18938
(I)	265	963	48	475	51	88	0	0	408	2761	3214	343
(J)	25	190	4	475	2	48	0	0	143	1324	991	160
(K)	14	91	3	272	0	38	0	0	116	1051	707	143
(L)	89	359	7	397	12	113	0	0	263	2199	1735	337
(M)	71	95	76	107	2	14	0	0	45	398	652	102
(N)	7	3	72	5	0	0	0	0	20	5	23	0
(O)	0	0	72	1	0	0	0	0	0	0	0	0
(P)	0	0	72	0	0	0	0	0	0	0	0	0
(Q)	130	281	73	250	1	35	0	0	85	1382	0	177
(R)	0	17	1	4	0	5	0	0	89	11	8	2
(U)	11	14	3	4	3	5	0	0	412	42	59	2
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(Y)	1	3	0	0	0	0	0	0	11	2	0	0
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Search results of keywords on scientific online database and journal websites *Keywords:* (A): cluster, (B): DEX, (C): DEXi, (D): Decision EXpert, (E): hydropower, (F): investment, (G): plant, (H): private, (I): hydropower & plant, (J): private & hydropower & plant, (K) private & hydropower & plant & investment, (L): hydropower & investment, (M): hydropower & cluster, (N): hydropower & DEX, (O): hydropower & DEXi (P): hydropower & cluster & DEXi (Q): hydropower & Decision Expert, (R): hydropower & plant & multi attribute, (U): hydropower & plant & multi criteria, (V): hydropower & plant & MADM, (W): hydropower & plant & MCDM, (Y): hydropower & plant & investment & MADM, (Z): hydropower & plant & investment & MCDM, (AA): private & hydropower & plant & investment & DEXi. *Data & Source:* ACMDL, ASCEOR, ASME, CJO, DOAJ, EI, IJITAP, JTEM, SD, TFJ, WB, WSP

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### LITERATURE REVIEW

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The image shows a screenshot of the Wiley Online Library search results page. The search results list the article "The Frequency of Common Progenitors for Adipocytes and Osteoblasts and of Committed and Restricted Adipocyte and Osteoblast Progenitors in Fetal Rat Calvaria Cell Populations" by C.G. Bellows and J.N.M. Heersche. A red box highlights the article title and authors. A red arrow points from this box to the full article page below. The full article page shows the title, authors, journal information (Journal of Bone and Mineral Research, Volume 16, Number 11, 2001), and the abstract. The abstract text is as follows:

**ABSTRACT**

In fetal rat calvaria (RC) cell populations, adipocyte differentiation is stimulated by both dexamethasone (Dex) and 1,25 dihydroxyvitamin D<sub>3</sub> [1,25(OH)<sub>2</sub>D<sub>3</sub>], whereas osteoblast differentiation is stimulated by Dex but inhibited by 1,25(OH)<sub>2</sub>D<sub>3</sub>. We examined whether the osteoblastic and adipogenic colonies were derived from a common progenitor, from committed adipocyte and osteoblast progenitors, or from both and whether the adipocyte progenitors stimulated by 1,25(OH)<sub>2</sub>D<sub>3</sub> constitute a population of progenitors that is different from that stimulated by Dex. RC cells were isolated by sequential enzyme digestion yielding five populations designated I-V. In population I the effect of Dex on adipocyte formation was greater than that of 1,25(OH)<sub>2</sub>D<sub>3</sub>, whereas the effect of 1,25(OH)<sub>2</sub>D<sub>3</sub> was greater than that of Dex in populations II-V. We next applied replica plating techniques to further investigate the response characteristics of individual osteoprogenitors and adipocyte progenitors by looking at the fate of duplicate colonies derived from the same progenitor under different culture conditions. RC cells were plated at 1000-1500 cells/100 mm culture dish and a 17-µm mesh polyester membrane overlaid onto master dishes on day 4 or day 5 and removed on day 11 or day 12. Then, replicas and master dishes were cultured separately in

The impropriety situation with the subject of the current study because of the acronym similarity (DEX: Decision EXpert and Dex: dexamethasone)

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The image displays two screenshots from the Wiley Online Library website. The top screenshot shows the search results for the keyword "DEX". There are 40308 results. The search results are sorted by "Best Match". A red box highlights the article titled "The Frequency of Common Progenitors for Adipocytes and Osteoblasts of Committed and Restricted Adipocyte and Osteoblast Progenitors in Fetal Rat Calvaria Cell Populations". The article is from the Journal of Bone and Mineral Research, Volume 16, Issue 11, November 2001, Pages: 1983-1993, C. G. Bellows and J. N. M. Heersche. The article first published online: 1 NOV 2001, DOI: 10.1359/jbmr.2001.16.11.1983. The article is available in Abstract, Full Article (HTML), PDF (1251K), and References. The bottom screenshot shows the full article page for the same article. The article is titled "The Frequency of Common Progenitors for Adipocytes and Osteoblasts of Committed and Restricted Adipocyte and Osteoblast Progenitors in Fetal Rat Calvaria Cell Populations". The article is from the Journal of Bone and Mineral Research, Volume 16, Issue 11, November 2001, Pages: 1983-1993, C. G. Bellows and J. N. M. Heersche. The article first published online: 1 NOV 2001, DOI: 10.1359/jbmr.2001.16.11.1983. The article is available in Abstract, Full Article (HTML), PDF (1251K), and References. A red arrow points from the highlighted article in the top screenshot to the full article page in the bottom screenshot.

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**The Frequency of Common Progenitors for Adipocytes and Osteoblasts and of Committed and Restricted Adipocyte and Osteoblast Progenitors in Fetal Rat Calvaria Cell Populations\***

C. G. Bellows, J. N. M. Heersche\*

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\* Presented in part at the 19th annual meeting of the American Society of Bone and Mineral Research, Cincinnati, Ohio, USA, September 1997.

**Abstract**

In fetal rat calvaria (RC) cell populations, adipocyte differentiation is stimulated by both dexamethasone (Dex) and 1,25 dihydroxyvitamin D<sub>3</sub> [1,25(OH)<sub>2</sub>D<sub>3</sub>], whereas osteoblast differentiation is stimulated by Dex but inhibited by 1,25(OH)<sub>2</sub>D<sub>3</sub>. We examined whether the osteoblastic and adipocyte colonies were derived from a common progenitor, from committed and restricted adipocyte and osteoblast progenitors, or from both and whether the adipocyte progenitors stimulated by 1,25(OH)<sub>2</sub>D<sub>3</sub> constitute a population of progenitors that is different from that

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C.G. BELLOWS and J.N.M. HEERSCHÉ

### ABSTRACT

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## A QUALITATIVE MULTI-ATTRIBUTE MODEL FOR SELECTION OF PRIVATE HYDROPOWER PLANT INVESTMENTS IN TURKEY: BY FOUNDATION OF SEARCH RESULTS CLUSTERING ENGINE (Carrot<sup>2</sup>), HYDROPOWER PLANT CLUSTERING, DEXi AND DEXiTtree

### LITERATURE REVIEW

Permissions Advertise Contact  <b>SPECIAL FEATURES</b> ASBMR Primer ASBMR Annual Meeting Cover Gallery Access Chinese Articles now online	<b>Keywords:</b> plating; 1,25-dihydroxyvitamin D <sub>3</sub> ; dexamethasone; adipocytes; osteoblasts; glycerol-3-phosphate dehydrogenase; bone nodules  <b>Abstract</b> In fetal rat calvaria (RC) cell populations, adipocyte differentiation is stimulated by both dexamethasone (Dex) and 1,25 dihydroxyvitamin D <sub>3</sub> [1,25(OH) <sub>2</sub> D <sub>3</sub> ], whereas osteoblast differentiation is stimulated by Dex but inhibited by 1,25(OH) <sub>2</sub> D <sub>3</sub> . We examined whether the osteoblastic and adipocytic colonies were derived from a common progenitor, from committed and restricted adipocyte and osteoblast progenitors, or from both and whether the adipocyte progenitors stimulated by 1,25(OH) <sub>2</sub> D <sub>3</sub> constitute a population of progenitors that is different from that
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### ABSTRACT

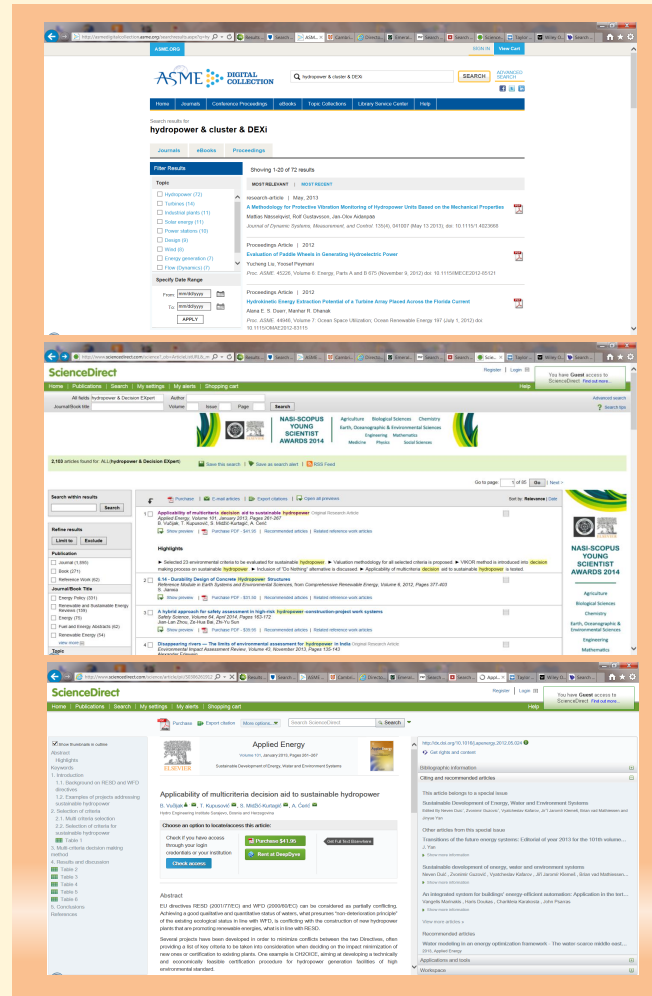
In fetal rat calvaria (RC) cell populations, adipocyte differentiation is stimulated by both **dexamethasone (Dex)** and 1,25 dihydroxyvitamin D<sub>3</sub> [1,25(OH)<sub>2</sub>D<sub>3</sub>], whereas osteoblast differentiation is stimulated by Dex but inhibited by 1,25(OH)<sub>2</sub>D<sub>3</sub>. We examined whether the osteoblastic and adipocytic colonies were derived from a common progenitor, from committed and restricted adipocyte and osteoblast progenitors, or from both and whether the adipocyte progenitors stimulated by 1,25(OH)<sub>2</sub>D<sub>3</sub> constitute a population of progenitors that is different from that stimulated by Dex. RC cells were isolated by sequential enzyme digestion yielding five populations designated I–V. In population I the effect of Dex on adipocyte formation was greater than that of 1,25(OH)<sub>2</sub>D<sub>3</sub>, whereas the effect of 1,25(OH)<sub>2</sub>D<sub>3</sub> was greater than that of Dex in populations III–V. We next applied replica plating techniques to further investigate the response characteristics of individual osteoprogenitors and adipocyte progenitors by looking at the fate of duplicate colonies derived from the same progenitor under different culture conditions. RC cells were plated at 1000–1500 cells/100 mm culture dish and a 17-μm mesh polyester membrane overlaid onto master dishes on day 4 or day 5 and removed on day 11 or day 12. Then, replicas and master dishes were cultured separately in

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### LITERATURE REVIEW

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The screenviews of the investigation of the studies by their title, abstract and keywords

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### LITERATURE REVIEW

The screenshot shows the ASME Digital Collection search results page. The browser address bar displays the URL: <http://asmedigitalcollection.asme.org/searchresults.aspx?q=hy>. The ASME logo and 'DIGITAL COLLECTION' text are visible. A search bar contains the query 'hydropower & cluster & DEXi'. Below the search bar, a navigation menu includes links for Home, Journals, Conference Proceedings, eBooks, Topic Collections, Library Service Center, and Help. The search results are displayed under the 'Journals' tab, showing 72 results. The first result is a research article titled 'A Methodology for Protective Vibration Monitoring of Hydropower Units Based on the Mechanical Properties' by Mattias Nässelqvist, Rolf Gustavsson, and Jan-Olov Aidanpää, published in the Journal of Dynamic Systems, Measurement, and Control, Volume 135(4), May 2013. The second result is a proceedings article titled 'Evaluation of Paddle Wheels in Generating Hydroelectric Power' by Yucheng Liu and Yoosef Peymani, published in the Proceedings of ASME, Volume 6, November 2012. The third result is a proceedings article titled 'Hydrokinetic Energy Extraction Potential of a Turbine Array Placed Across the Florida Current' by Alana E. S. Duerr and Manhar R. Dhanak, published in the Proceedings of ASME, Volume 7, July 2012. A sidebar on the left allows filtering results by topic (Hydropower, Turbines, Industrial plants, Solar energy, Power stations, Design, Wind, Energy generation, Flow) and specifying a date range.

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### LITERATURE REVIEW

The screenshot displays the ScienceDirect website interface. At the top, the ScienceDirect logo is visible, along with navigation links for Home, Publications, Search, My settings, My alerts, and Shopping cart. A search bar is present with the text 'All fields hydrowave & Decision EXpert'. Below the search bar, there are filters for Author, Volume, Issue, and Page. A search button is also visible. The main content area shows 2,103 articles found for the search term. A sidebar on the left allows for refining results by publication type (Journal, Book, Reference Work) and journal/book title. The main list of results includes four articles, each with a title, author, and publication details. The first article is 'Applicability of multicriteria decision aid to sustainable hydrowave' by B. Vučijak, T. Kupusović, S. Midžić-Kurtagić, and A. Čenić. The second article is '6.14 - Durability Design of Concrete Hydrowave Structures' by S. Jianxia. The third article is 'A hybrid approach for safety assessment in high-risk hydrowave-construction-project work systems' by Jian-Lan Zhou, Ze-Hua Bai, and Zhi-Yu Sun. The fourth article is 'Disappearing rivers — The limits of environmental assessment for hydrowave in India' by Alexander Erlwein. The right sidebar features the NASI-SCOPUS YOUNG SCIENTIST AWARDS 2014 logo and a list of scientific disciplines: Agriculture, Biological Sciences, Chemistry, Earth, Oceanographic & Environmental Sciences, Engineering, Mathematics, Medicine, Physics, and Social Sciences.

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1 ☐ **Applicability of multicriteria decision aid to sustainable hydrowave** Original Research Article  
*Applied Energy, Volume 101, January 2013, Pages 261-267*  
 B. Vučijak, T. Kupusović, S. Midžić-Kurtagić, A. Čenić  
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Highlights

► Selected 23 environmental criteria to be evaluated for sustainable hydrowave. ► Valuation methodology for all selected criteria is proposed. ► VIKOR method is introduced into decision making process on sustainable hydrowave. ► Inclusion of "Do Nothing" alternative is discussed. ► Applicability of multicriteria decision aid to sustainable hydrowave is tested.

2 ☐ **6.14 - Durability Design of Concrete Hydrowave Structures**  
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Abstract  
Highlights  
Keywords

1. Introduction

1.1. Background on RESD and WFD directives

1.2. Examples of projects addressing sustainable hydropower

2. Selection of criteria

2.1. Multi criteria selection

2.2. Selection of criteria for sustainable hydropower

Table 1

3. Multi-criteria decision making method

4. Results and discussion

Table 2  
Table 3  
Table 4  
Table 5  
Table 6

5. Conclusions

References

**Applied Energy**  
Volume 101, January 2013, Pages 261–267  
Sustainable Development of Energy, Water and Environment Systems

**Applicability of multicriteria decision aid to sustainable hydropower**  
B. Vučijak, T. Kupusović, S. Midžić-Kurtagić, A. Čerić  
Hydro Engineering Institute Sarajevo, Bosnia and Herzegovina

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**Abstract**

EU directives RESD (2001/77/EC) and WFD (2000/60/EC) can be considered as partially conflicting. Achieving a good qualitative and quantitative status of waters, what presumes "non-deterioration principle" of the existing ecological status in line with WFD, is conflicting with the construction of new hydropower plants that are promoting renewable energies, what is in line with RESD.

Several projects have been developed in order to minimize conflicts between the two Directives, often providing a list of key criteria to be taken into consideration when deciding on the impact minimization of new ones or certification to existing plants. One example is CH2OICE, aiming at developing a technically and economically feasible certification procedure for hydropower generation facilities of high environmental standard.

<http://dx.doi.org/10.1016/j.apenergy.2012.05.024>

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This article belongs to a special issue

**Sustainable Development of Energy, Water and Environment Systems**  
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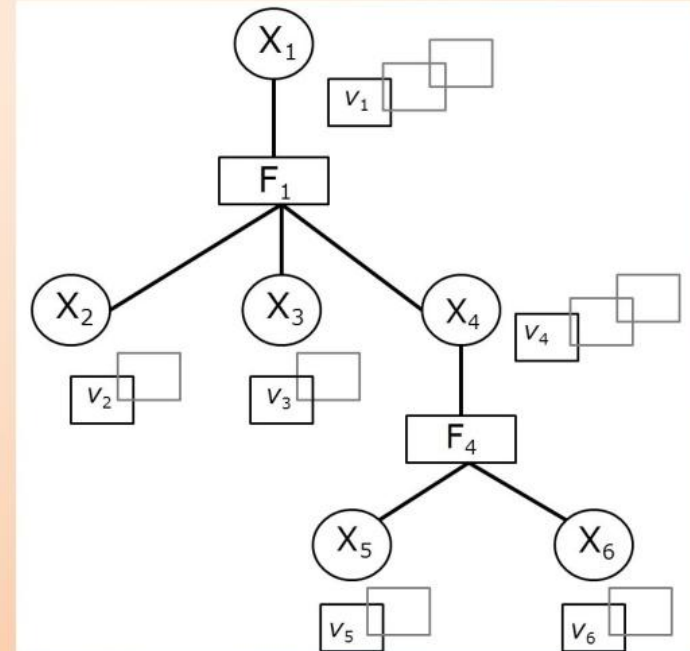
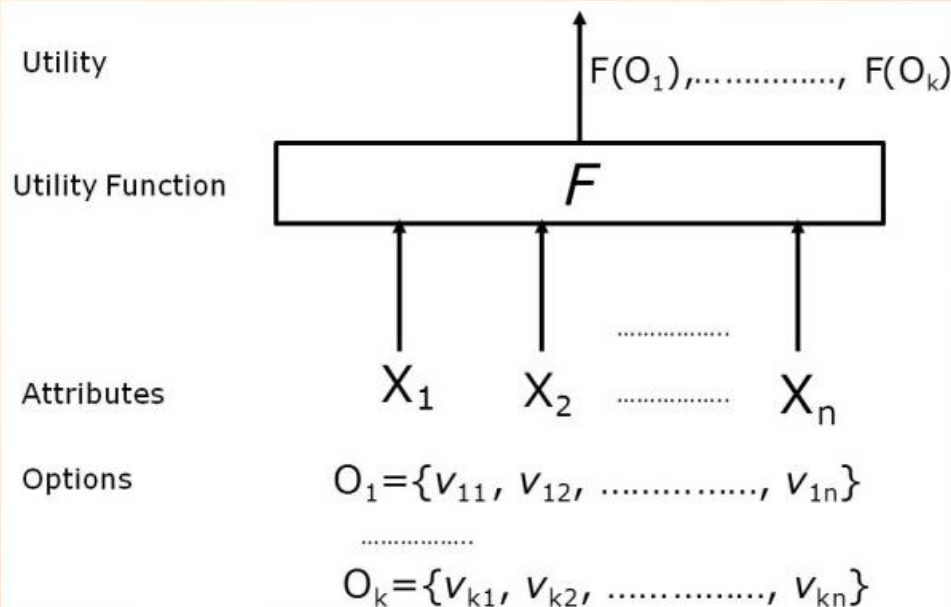


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### LITERATURE REVIEW

The general approach of the DEX and the DEXi is based on the decomposition of a given multi-attribute decision making problem into the smaller sub-problems as presented in the Figure.  $O$  represents the options.  $X$  represents the criteria.  $v$  is the values of the vectors of the corresponding attributes for options.  $F$  represents the utility function. The vectors are evaluated by the utility function.  $F(O)$  represents the evaluation of particular option according to the utility function.

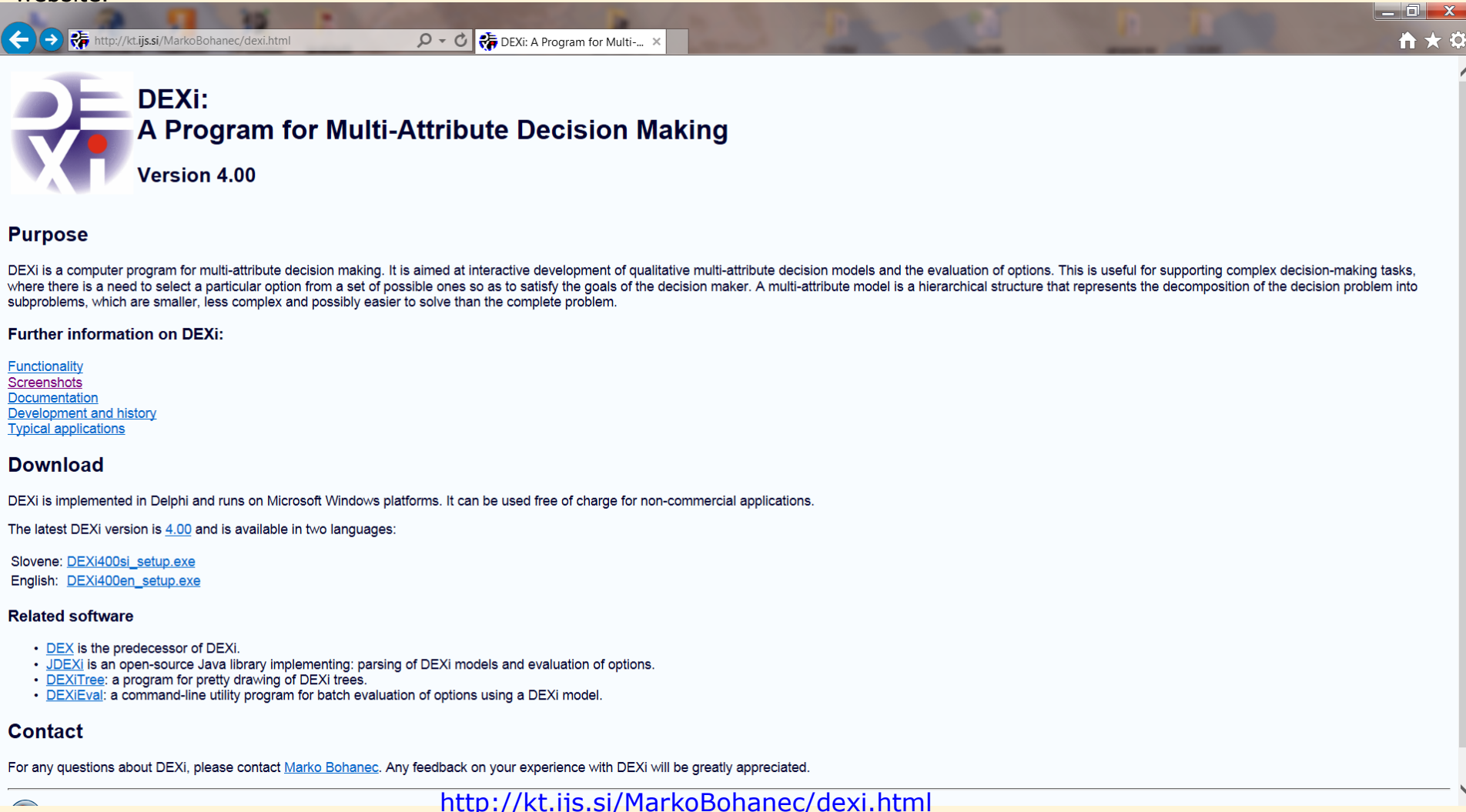
The main important features of the DEX and the DEXi's knowledge are as following: 1-) The attributes of the DEX and the DEXi are purely qualitative (tree of attributes). 2-) The utility functions of the DEX and the DEXi are defined by the sets of some rules (elementary decision rules) (see Figure ). The general elementary decision rule is if  $X_1 = x_1$  and.....and  $X_k = x_k$  then  $Y = y_m : y_M$ , where  $x_i$  ( $x_1, \dots, x_k$ ),  $y_m$  and  $y_M$  are the values of the corresponding attributes (Arh and Blažič, 2007; Bohanec and Rajkovič, 1990).



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The DEXi software was free (Credits: Marko Bohanec, Vladislav Rajkovic, Eva Jereb, Uros Rajkovic, Zarja Vintar) on its official website.



The screenshot shows a web browser window with the address bar displaying <http://kt.ijs.si/MarkoBohanec/dexi.html>. The page title is "DEXi: A Program for Multi-Attribute Decision Making" and the version is "Version 4.00". The page content includes a "Purpose" section, a "Further information on DEXi:" section with links to "Functionality", "Screenshots", "Documentation", "Development and history", and "Typical applications", a "Download" section, a "Related software" section, and a "Contact" section.

### Purpose

DEXi is a computer program for multi-attribute decision making. It is aimed at interactive development of qualitative multi-attribute decision models and the evaluation of options. This is useful for supporting complex decision-making tasks, where there is a need to select a particular option from a set of possible ones so as to satisfy the goals of the decision maker. A multi-attribute model is a hierarchical structure that represents the decomposition of the decision problem into subproblems, which are smaller, less complex and possibly easier to solve than the complete problem.

### Further information on DEXi:

- [Functionality](#)
- [Screenshots](#)
- [Documentation](#)
- [Development and history](#)
- [Typical applications](#)

### Download

DEXi is implemented in Delphi and runs on Microsoft Windows platforms. It can be used free of charge for non-commercial applications.

The latest DEXi version is [4.00](#) and is available in two languages:

Slovene: [DEXi400si\\_setup.exe](#)  
 English: [DEXi400en\\_setup.exe](#)

### Related software

- [DEX](#) is the predecessor of DEXi.
- [JDEXi](#) is an open-source Java library implementing: parsing of DEXi models and evaluation of options.
- [DEXiTree](#): a program for pretty drawing of DEXi trees.
- [DEXiEval](#): a command-line utility program for batch evaluation of options using a DEXi model.

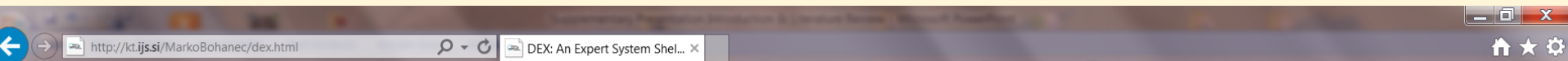
### Contact

For any questions about DEXi, please contact [Marko Bohanec](#). Any feedback on your experience with DEXi will be greatly appreciated.

<http://kt.ijs.si/MarkoBohanec/dexi.html>

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### DEX: An Expert System Shell for Multi-Attribute Decision Making

#### Purpose

DEX is an interactive computer program for the development of qualitative multi-attribute decision models and the evaluation of options. It is aimed at the support of decision-makers in complex decision-making problems: given a set of options (alternatives), the task is to select the option that best satisfies the goals of the decision maker.

DEX facilitates the following:

1. acquisition of decision models, which are composed of:
  - a hierarchy of attributes, and
  - the corresponding utility functions that are defined by decision rules;
2. consistency checking of decision rules;
3. acquisition, evaluation and analysis of (possibly incompletely defined) options;
4. explanation of the evaluation results;
5. group decision-making support.

#### Applied Methods

DEX is based on multi-attribute decision making. In this approach, the decision problem is decomposed into smaller, less complex subproblems. The decomposition is represented by a hierarchy (i.e., directed acyclic graph or, most commonly, a tree) of attributes. Options are evaluated by an aggregation that is gradually performed from the leaves towards the root of the hierarchy.

DEX differs from other multi-attribute decision support systems in that it uses qualitative (symbolic) attributes instead of quantitative (numeric) ones. Also, aggregation (utility) functions in DEX are defined by *if-then* decision rules rather than numerically by, for instance, the weighted sum. To evaluate incompletely or inaccurately defined options, DEX employs fuzzy or probabilistic distributions of values. For the explanation of option evaluation, DEX primarily uses the method known as "selective explanation".

#### Availability

DEX runs under MS-DOS operating system on IBM PC and compatible computers. The program is implemented in Borland Pascal 7.0 and has approximately 15,000 lines of code.

The so-called "student version" of DEX is freely available for non-commercial applications. This version is fully functional, but limited to 25 attributes and 10 options. To install it, download the [ZIP archive](http://kt.ijs.si/MarkoBohanec/dex.html) and unpack it to a directory of your choice. Also, see the READ\_ME.TXT file contained in the archive.

#### Status

DEX was developed at the Department of Knowledge Technologies, Jožef Stefan Institute, Ljubljana, Slovenia. The development started in 1987 and was, apart from very minor later revisions, completed in 1990.

<http://kt.ijs.si/MarkoBohanec/dex.html>