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# Megatrends as perceived in Turkey in comparison to Austria and Germany

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## Abstract

Countries and companies use foresight studies to manage uncertainty. Environmental scanning and trend analyses are important tools for identifying and monitoring change. Trend analysis requires more than simply extrapolating to the future. The content of communication serves as the basis of inference so those trends could be explored.

This research uses an interdisciplinary approach combining media content analysis and factor analysis to discover many ways Turkey and the world may restructure and what the new society may look like as perceived by the individuals who participated in the survey. It determines six types of individuals in Turkey with different personal attitudes towards megatrends. Similarities and dissimilarities with previous studies in Austria and Germany are identified and discussed.
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## 1. Introduction

Many people in Turkey as well as in other countries are concerned over the direction in which the society may be moving. As the pace of change accelerates, this need is becoming more urgent for all to concentrate individually and as a nation on accounting of what major options may be available. A thorough awareness of such options and of the courses of actions that might be pursued to attain them would give a larger fraction of the public a new chance to participate in the formation of its own future and to provide decision-makers with a more rational planning basis.

Foresight is equivalent to a bundle of integrated [1,2] and systemic [3] efforts to look ahead in order to choose more effectively. Thereby, foresight takes into account that there is not a single possible future. Depending on action or non-action at present, many futures are possible, but only one of them will happen. To select a desirable future and to facilitate its realization is one of the aims of technology policy [4]. OECD defines foresight as "*the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits*" [5,6].

Foresight studies have become increasingly important as national approaches in Europe since the beginning of the 1990s [7–10]. Germany started learning from Japan so that, meanwhile, a series of Delphi studies are available in Germany [11]. Delphi'98, the second comprehensive foresight study of Germany, started in 1996. In the first round of the Delphi'98, the experts were additionally asked to reveal their personal opinion about the chances of occurrence of some 19 megatrends and their probable influence on the general development of science and technology in the future [11–13].

The Austrian Delphi Study in 1996 included 17 megatrends and the participants were asked for their opinion on the trends–whether they agreed or not–and a time horizon divided into two–trends will be realized before the end of 2015 and later than 2015. The participants have assessed the impact of trends on science and technology on four different categories as in the German megatrend questionnaire [14].

In this paper, we aim to assess the Turkish individual's perceptions of developing megatrends and compare the findings with the results of megatrend studies done in Germany and Austria in 1996. The present study is the first study in Turkey aimed at determining evolving megatrends. It is a pilot study in scope. We carried out this research as an exploratory and demonstrative project.

In the next section, we review literature on foresight, trends and content analysis. Section 3 gives the methodology. Section 4 gives the results. Section 5 reports personal opinions for similar scenarios on future. Section 6 concludes the paper.

## 2. Literature review

### 2.1. Trends and foresight

Several leading social theorists have pointed out that one of the most significant features of modernity is its attitude to time in general and the future in particular. For modern societies, the future is something to be carefully thought about, influenced and, ideally, planned. The future may not be known ex-ante, but it is useful to remind ourselves that the future is created by human beings and, insofar as this happens, the question of foresightful action–action that aims at influencing what will be–becomes relevant and important to explore [15].

Trends, defined generally as "general inclinations or tendencies", are in analytical usage directions of change in one variable over time. Trend analysis monitors changes in chosen variables from the past into the present, focusing on the cumulative tendency of the change over and above any seasonal cycles or statistical "noise" generated by unique events. In addition, trend extrapolation (i.e., mathematically modeling the continuation of a trend past our last current data point out into the future) allows us to speculate on the extremes of change possible for the variable in question. Identifying and monitoring trends require us to investigate the current and past states of any phenomenon whose possible futures we wish to consider.

Not being a tool of forecast; none of the varieties of trend extrapolation are likely to "predict the future". One of the alternatives may picture the future accurately. All of them can augment how well and widely we question patterns of change. Trend analysis is one of the methods based on empirical examination of a phenomenon with repeated measurements taken across time. Trend analysis links our ability to observe change with our ability to plan it [16–19].

While not claiming to be predictive, futures research can develop intelligent forecasts concerning what is possible while indicating strategies for working toward desired goal [20]. Although, no single authoritative account of the world is possible and organizations would be better served by custom-designing their own trend-analysis program, i.e., building up their own interpretative criteria, creating their own models and deriving their own views of the dynamics of change [19].

The answers to the two questions of Tsoukas and Shepherd [15]:

1. To what extent is there a knowledge base for anticipating important events?
2. To what extent is there a stock of knowledge on which to draw for undertaking action?

lead us to different methods as given in Table 1. Lower-left quadrant emphasizes scenarios as a part of foresight study. Results of megatrends studies help us to formulate different scenarios on the future.

Organizational (*national*)[2] awareness is enhanced by the extent to which members (*citizens*) of an organization (*a nation*) collectively becomes skillful perceivers of the business (*world*) environment. The ability to perceive is sharpened through increasing the individual and organizational (*and national*) capacity to see differences [15].

Incipient discontinuities in the business (*world*) system tend to be spotted by individuals who have a deep understanding of an industry (*the world*) and its context. An organization (*nation*) becomes perceptive by sharpening its members' attention through helping those spot differences between how things canonically and routinely should be, on the one hand, and how they actually are and/or might be,

Table 1
Types of future studies [15]

|  |  | The extent to which there is a knowledge base for anticipating important events | |
|  |  | Low | High |
| The extent to which there is a stock of knowledge on which to draw for undertaking action | High | Contingency planning, e.g., man-made catastrophes, natural calamities | Forecasting techniques, e.g., seasonal demand |
|  | Low | Scenario-based learning, e.g., disruptive technologies, abrupt political changes | Analogical reasoning, e.g., nation building |

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[2] The terms in parentheses are added by the authors of the present study to draw analogy between Tsoukas and Shepherd's [15] arguments for organizations and the case of country/nation.

on the other. Maintaining the difference–the tension–between "what should be" and "what is" as well as between "what is" and "what might be" activates the organizational sensory system. It is in that sense that scenario-based organizational learning creates "memories of the future". Through preparing scenarios about different futures, an organization (*a nation*) can see plausible changes in the environment and how they will probably impact the organization [15].

van der Heijden [21] points to the distinction between events, *trends* (emphasis added) and structure in mapping out views about uncertainties as most aspects of the future are subject to overwhelming uncertainty. *Trends* and structures are the invisible part of the iceberg under the waterline. A *trend* is a pattern that one reads in a series of events. If a *trend* is persistent, one believes one can extrapolate it and make some prediction about the future. When forecasting fails, these situations are called *trend breaks*. Since in an infinite world all *trends* can be argued to break at some time, the way we deal with this is observing patterns among *trends*. We impute causal relationships between variables and turn the world around us into a mesh of interrelated causes and effects. This is the underlying structure that explains the *trends* we see and which, in turn, explain why we see certain events taking place. If we want to understand breaks in *trends* as part of our interest in foresight we need to figure out this structure. Making the distinction between events, *trends* and structure helps practitioners to become aware of the sources of their effectiveness. Scenario writer has to delve into the underlying structure of the situation and develop a mental model of the causal relations that give rise to the *trends* and patterns seen in history. The next step involves querying this model to find where causality could force *trends* into a new direction.

According to Chia [22], foresight is a unique and highly valued human capacity that is widely recognized as a major source of wisdom, competitive advantage and cultural renewal within nations and corporations. The sometimes seemingly uncanny ability of great leaders, visionaries, and captains of industry to "foresee", "read" and then act pre-emptively to forestall disastrous outcomes is a quality much envied by those of us far too often caught up in the immediacy of daily life. The following points are reported as vital capabilities that no forward-looking nation or organization can afford to ignore:

1. To be able to remain finely tuned into the undercurrents of ideological and political debates,
2. To detect subtle shifts in cultural moods and attitudes towards societal concerns such as the representative democracy, the problem of public accountability, the effects of technological developments on issues as diverse as ethics, ecology and biogenetics,
3. To be well tuned into the contemporary problems of plurality, diversity and change that may have important implications for policy formulations and corporate decision-making,
4. To accurately register subterranean drifts in the collective psyche of the developed economies and to understand their wider importance for business, profit, growth and capitalism,
5. To detect the changing composition of international markets and the ongoing reconfiguring of global business sectors.

From the above literature review, we conclude that formulating and assessing megatrends form an important part of the uncertainty management process.

## 2.2. Content analysis

The study of texts (genre, styles and symbolic content) is one of the oldest and most widely used methods of intellectual inquiry; for many years, it was regarded as the distinctive method for the study of

communications. In time, content analysis became a more refined and more rigorous method and acquired greater analytic power, while the knowledge became progressively more abstract and prepositional in structure.

Starting from the 1920s, content analysis became a major form of research methodology with particular relevance to the interdisciplinary study of the mass media of communications [23]. Media content analysis is widely used to provide an effective tool for evaluating communication outputs; data obtained from archival records and documents can be analyzed more systemically through content analysis [24].

Content analysis is a method of data analysis as well as a method of observation [25]. The content of communication serves as the basis of inference [14]. Economic, social and political currents in the United States have been analyzed to forecast new trends and directions [26]. It is reported [27] that the Naisbitt Group's content analysis of 2 million local newspaper articles compiled over a 12-year period resulted in the publication of *Megatrends*.

## 3. Methodology

Research reported in the paper was carried out by the following steps:

1. Content analysis of selected Turkish press using the software tool MORN [28,29] to speed up the content analysis work,
2. Comparison of megatrends analysis of Austrian, German and Turkish foresight studies,
3. Factor analysis of participants in Turkish megatrends study.

Table 2
Subject–keyword list

| 2010 | Energy | Computer |
|---|---|---|
| | Nuclear energy | Hardware |
| | Hydro energy | Software |
| | Geothermal energy | Cyber-space |
| | Wind energy | Virtual and reality |
| | Hydro-engines | Artificial intelligence |
| | Energy saving | |
| | Alternative energy | |
| | Natural gas | |
| | Electric energy | |
| | Solar energy | |
| 2023 | Transportation | IT–telecommunications |
| | Airways | Internet–intranet |
| | Railways | Telephone, ISDN, fax, wireless |
| | Highways | Tele-working |
| | Maritime lines | Multimedia |
| | Control systems | Distance learning |
| | | Electronic banking |
| 21st century | | E-commerce |

## 3.1. Content analysis

### 3.1.1. Data collection

The data were collected from the Internet sites of the newspapers and media corporations partially; the other source was a private company Internet Securities, Inc., a provider of electronically delivered emerging markets business information.

The four newspapers analyzed for 9-month period (December 1st, 1999–August 31st, 2000) were Milliyet, Hürriyet, Finansal Forum and Turkish Daily News. The data of the first two papers Hürriyet and Milliyet were collected through the archive on their main page of web sites. The data in the latter two newspapers were collected in a short duration compared to the first two since Internet Securities site (www.securities.com.tr) provided a powerful search engine and delivered the items with abstracts.

To construct a framework of the forces at play, we developed a subject index comprising keywords of the content analysis done with Delphi panels in Austria in 1996 [30]. The four main areas of interest are "computer", "telecommunications", "energy" and "transportation" sectors. After deciding on the major themes, we asked the help of university library catalogue experts. In the beginning, we worked on a sample of articles collected during 1 week and produced a list of keywords. One of the three members of the team functioned as principal analyst, cataloging the texts utilizing the established keywords. After reading some new articles, the keyword list had been slightly modified under the management of experts.

Main category of items were chosen according to the previous "Austrian content analysis", but only four of specific investigation fields were taken into consideration as depicted in Table 2. These fields were energy, IT, computer and transportation topics and their subheadings as listed. Besides the specific areas inquired, additional items for the subjects "2010", "2023" and "21st century" have been collected
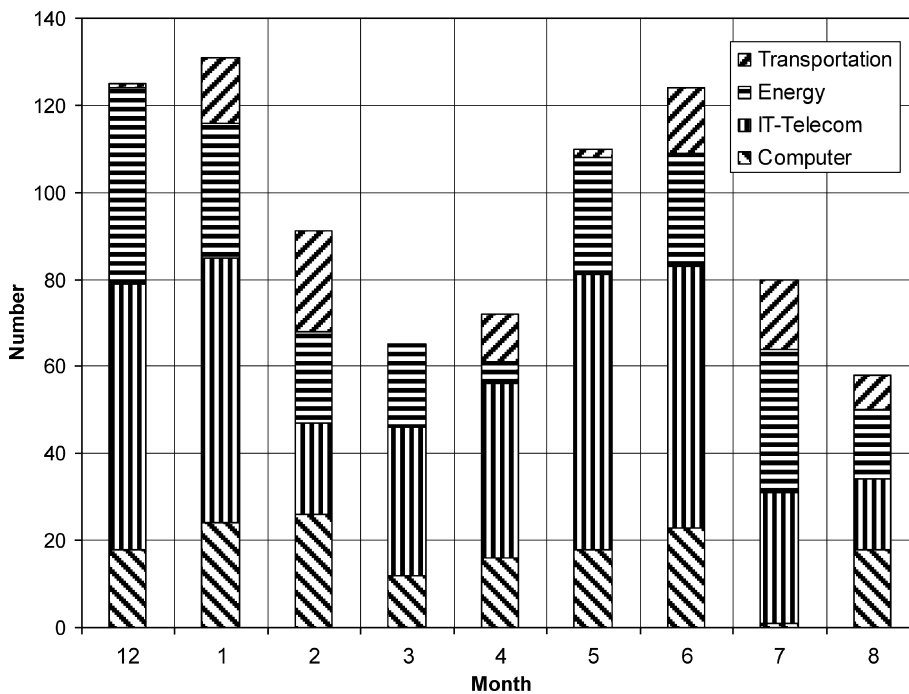


Fig. 1. Monthly distribution of text under four headings.

through the archive search of the news sources. Items were categorized under six categories: news, column, article, article magazine, interview and person (letters of two experts in energy sector). "Article–magazine" contained controlled conjectures/extrapolations for Turkey by the authors who were not regular columnists.

### 3.1.2. Data analysis

MORN [28,29] was utilized practically for electro-text content analysis of newspapers to speed up the content analysis work. Computer-assisted content analysis provided the lists of

1. Producers of the publications,
2. Page of locations on the Internet sites of the papers in subject–keyword basis,
3. Type of publications (articles, article–magazines, etc.) in subject–keyword basis,
4. Distribution of the items on the time scale (see Fig. 1),
5. Average text sizes of subjects–keywords in characters and their percentages in total.

Moreover, an evaluation of assessments in the publications was available. The analysis was conducted in "themes" for the sub-keywords to determine the direction of assessment in the items.

### 3.2. Megatrend analysis

The questionnaire "Megatrends-Turkey" was prepared after examining the former Austrian and German studies. In the German megatrend questionnaire, there were 19 items, while the Austrian study included 17, 10 of which were just the same with the Germans; our questionnaire consists of 19 trends

Table 3
List of megatrends

1. The globalization of the economy will make national economic policy almost insignificant.
2. Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries.
3. After reforms being realized, Turkey will become an attractive location for investment.
4. The worldwide scarcity of fossil fuels will enforce the rationing of energy consumption for private households.
5. Women will occupy at least one-third of all executive positions in business.
6. Technological development will give two-thirds of all employees the opportunity of working at home.
7. The severe changes in climate cause migration in vast areas.
8. Increasing environmental problems will negatively affect the health of most people.
9. Electronic-distance learning becomes core concept of the education system.
10. Transportation concepts become more important than transportation techniques.
11. Biotechnological production is settled in agriculture sector.
12. Respect for the environment becomes main principle in civil engineering sector.
13. There will be violent conflict between the rich and poor states.
14. World population surpasses 10-billion border.
15. Decreasing birth rates and prolonged life spans result 1/3 people over 60 years old in industrialized countries.
16. A world government is an effective institution for preventing and resolving violent conflicts.
17. Water sources used as an economic and geopolitics component of national power.
18. Usage of alternative energy sources gets compulsory.
19. Transition from hierarchical organization to network structure.

(Table 3). The participants were asked to assess the influence of each megatrend on economy, education and quality of life in Turkey when realized. The impact of megatrends is measured on a 0–5 Likert scale representing '0' no influence and '5' high influence.

The time horizon choices were 2001–2005, 2006–2010, 2011–2015, 2016–2023, 'later than 2023' and the last option was "never", implying that the megatrend would never be realized.

The trends studied in the present work (Table 3) were classified according to the relevance with the foresight areas (according to Table 2 headings). The two trends "After reforms being realized, Turkey will become an attractive location for investment" and "Women will occupy at least one-third of all executive positions in business" were not related to any foresight areas. The trends "Climatic changes will lead to depopulation in wide regions" and "Increasing environmental problems will negatively affect the health of most people" are related to both "transportation" and "energy", while "Transition to the biotechnological production in agriculture sector" is assumed to be related to IT and energy foresight areas.

Our megatrends survey was responded by 138 participants from three groups: 37 candidate staff officers in Army War Academy, 56 BA/BS and MA/MS students, and 45 e-mail responses of academicians, 10 of whom have PhD degrees, managers, engineers, executives working in public and private sector, and members of many subgroups in Egroups.com—a discussion platform on the Internet −0.20% of the participants were female (in the German study 5%).

Tables 5–9 show the results of their assessments.

## 4. Results

### 4.1. Content analysis of Turkish daily newspapers

223 of the collected items (23.52%) belonged to subjects–keywords about *energy*, 541 of the items were related to *computer–telecommunications* comprising 63% and finally *transportation* was dealt in 10.73% of the total 858 accumulated entities.

The trends in the megatrends survey were distinguished into three categories: *energy*, *computer–telecommunications* and *transportation* with the percentages 45, 40 and 15, respectively. The target years 2010, 2023 and 21st century were excluded when categorizing the publications. The interaction of three foresight areas in the "megatrend" survey and the total number of publications collected are compared (Table 4).

The content analysis shows an overemphasis on *computer–IT–telecommunications* compared to energy during the December 1999–August 2000 period in the Turkish press.

Table 4
Distribution of topics—megatrends analysis and media content analysis

| Trends | Foresight megatrends analysis | | Media content analysis | |
|---|---|---|---|---|
| | # of megatrends | % | # of texts | % |
| Energy | 9 | 45 | 223 | 26 |
| Computer–IT–telecommunications | 8 | 40 | 541 | 63 |
| Transportation | 3 | 15 | 94 | 11 |
| Total | 20 | 100 | 858 | 100 |

Subjects—2010, 2023 and 21st century—excluded.

Table 5
Realization times of megatrends—Turkey

| No. | Megatrends | Mean time of realization | 2001–2005 | 2006–2010 | 2011–2015 | 2016–2023 | 2023– | Never |
|-----|-----------|------------------|-----------|-----------|-----------|-----------|-------|-------|
| 3 | After reforms being realized, Turkey will become an attractive location for investment. | 2015.7 | 8.70 | 33.33 | 30.43 | 7.97 | 12.32 | 7.25 |
| 12 | Transportation concepts become more important than transportation techniques. | 2016.2 | 10.14 | 21.74 | 23.19 | 19.57 | 9.42 | 15.94 |
| 16 | Electronic-distance learning becomes core concept of the education system. | 2016.6 | 9.49 | 29.93 | 24.09 | 21.17 | 12.41 | 2.92 |
| 11 | Water sources are used as an economic and geopolitics component of national power. | 2016.9 | 14.49 | 28.26 | 19.57 | 18.12 | 14.49 | 5.07 |
| 1 | The globalization of the economy will make national economic policy almost insignificant. | 2017.6 | 12.32 | 27.54 | 29.71 | 10.14 | 17.39 | 2.90 |
| 2 | Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries. | 2017.7 | 12.32 | 22.46 | 22.46 | 7.97 | 15.22 | 19.57 |
| 5 | Women will occupy at least one-third of all executive positions in business. | 2018.2 | 9.42 | 23.19 | 21.01 | 19.57 | 14.49 | 12.32 |
| 10 | Transition from hierarchical organization to network structure. | 2019.4 | 5.07 | 20.29 | 26.81 | 24.64 | 15.94 | 7.25 |
| 15 | Usage of alternative energy sources gets compulsory. | 2019.5 | 13.04 | 20.29 | 28.99 | 16.67 | 21.01 | 0.00 |
| 9 | There will be violent conflict between the rich and poor states. | 2020.3 | 10.87 | 18.12 | 21.01 | 19.57 | 19.57 | 10.87 |
| 18 | Transition to the biotechnological production in agriculture sector. | 2020.6 | 5.80 | 13.77 | 29.71 | 30.43 | 18.12 | 2.17 |
| 8 | Increasing environmental problems will negatively affect the health of most people. | 2021.4 | 11.59 | 17.39 | 23.91 | 18.12 | 23.91 | 5.07 |
| 19 | Respect for the environment becomes main principle in civil engineering sector. | 2024.4 | 4.35 | 10.87 | 19.57 | 24.64 | 23.91 | 16.67 |
| 6 | Technological development will give two-thirds of all employees the opportunity of working at home. | 2025.3 | 4.35 | 10.14 | 23.91 | 26.09 | 28.99 | 6.52 |
| 14 | World population surpasses 10-billion border. | 2028.9 | 3.62 | 8.70 | 18.84 | 25.36 | 38.41 | 5.07 |
| 4 | The worldwide scarcity of fossil fuels will enforce the rationing of energy consumption for private households. | 2032.8 | 0.72 | 5.80 | 10.14 | 19.57 | 36.23 | 27.54 |

Table 5 (*continued*)

| No. | Megatrends | Mean time of realization | 2001–2005 | 2006–2010 | 2011–2015 | 2016–2023 | 2023– | Never |
|-----|------------|--------------------------|-----------|-----------|-----------|-----------|-------|-------|
| 17 | Low birth rates and a constantly increasing life expectancy will in industrialized countries lead to over one-third of the population being more than 60 years old. | 2033.3 | 0.00 | 4.35 | 19.57 | 21.74 | 48.55 | 5.80 |
| 7 | Climatic changes will lead to de population in wide regions. | 2034.7 | 0.73 | 5.84 | 9.49 | 18.25 | 43.07 | 22.63 |
| 13 | A world government is an effective institution for preventing and resolving violent conflicts. | 2039.9 | 1.45 | 1.45 | 2.17 | 7.25 | 30.43 | 57.25 |

## 4.2. Time of realization of megatrends

The "weighted expected year" corresponds to the value of arithmetic mean of the time intervals multiplied by frequency percentage of the intervals. In the calculations, the arithmetic mean of the time interval ⟨later than 2023⟩ was assumed to be 2050. The last option "never" was not included in the calculations, because in the previous Delphi studies (Austria, Germany) the disagreement on the trends was not taken into consideration. The total realization time of the trends is presented in Table 5.

In the survey, the expected realization times of the trends were calculated. The participants expected that "3. After reforms being realized, Turkey will become an attractive location for investment" as the first megatrend to realize. This megatrend was the second trend to realize in the German survey (clearly "Germany" substituted for "Turkey").

The trends "10. Transportation concepts become more important than the techniques", "9. Electronic-distance learning becomes core concept of the national education system" and "17. Water used as an economic and geopolitics component of national power" were the other three trends expected to come true in the year 2016. Although megatrend #9 is foreseen to take place before 2015 with a 63% agreement, the media content analysis showed little coverage (4 out of 948 keyword entries) of distance education in Turkish press.

In assessing megatrend "6. Technological developments will give two-thirds of all employees the opportunity of working at home", we see that 38% of participants think that it will materialize before 2015 and media content analysis shows negligible coverage of this topic in the press.

The latest trend expected to realize was "16. A world government is an effective institution for preventing and resolving violent conflicts", and 57% of the respondents argued that there would never be a world government. Nine trends, almost half of the list, were predicted to be realized before 2020 according to the calculated mean years of realization.

## 4.3. Influence of megatrends on economy, education and quality of life

The former studies investigated the impact of trends on science and technology. We aimed to examine the trends fields according to their influence on economy, education and quality of life. The results are collated in Table 6. The bold numbers indicates the area on which the megatrends have the highest impact.

Table 6
Impact of megatrend on economy, education and quality of life in Turkey

| Megatrends | Economy | | Education | | QoLife | | Total |
|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean |
| 1. The transition from national economy to global economy. | **4.39** | 1.04 | 3.55 | 0.98 | 3.88 | 1.01 | 11.82 |
| 14. World population exceeds 10 billion. | **4.07** | 1.32 | 3.69 | 1.54 | 3.91 | 1.42 | 11.67 |
| 9. Electronic-distance learning becomes core concept of the education system. | 3.09 | 1.30 | **4.63** | 0.86 | 3.66 | 1.21 | 11.38 |
| 3. Turkey becoming an attraction center for investments in case the reforms applied appropriately. | **4.27** | 1.30 | 3.22 | 1.43 | 3.75 | 1.37 | 11.24 |
| 18. Usage of alternative energy sources gets compulsory. | **4.48** | 0.78 | 2.28 | 1.43 | 3.88 | 1.15 | 10.63 |
| 13. Severe interest conflicts arise between the rich and poor states. | **4.07** | 1.29 | 2.81 | 1.58 | 3.64 | 1.39 | 10.52 |
| 6. Two-thirds of the employed could do his/her job working at home. | 3.36 | 1.29 | 3.14 | 1.55 | **3.73** | 1.26 | 10.24 |
| 2. Increase in the number of the unemployed due to the current technological developments. | **3.68** | 1.40 | 2.99 | 1.43 | 3.54 | 1.43 | 10.22 |
| 15. Decreasing birth rates and prolonging life spans result 1/3 people over 60 years old. | **3.83** | 1.10 | 2.84 | 1.49 | 3.54 | 1.24 | 10.21 |
| 8. Environmental problems cause many people health problems. | 3.19 | 1.35 | 2.67 | 1.42 | **4.14** | 1.25 | 10.00 |
| 19. Transition from the hierarchical organization to network structure. | **3.41** | 1.35 | 3.14 | 1.50 | 3.27 | 1.41 | 9.82 |
| 11. Transition to the biotechnological production in agriculture sector. | **4.14** | 1.01 | 2.01 | 1.44 | 3.28 | 1.32 | 9.43 |
| 7. The severe changes in climate cause migration in vast areas. | 3.38 | 1.53 | 2.44 | 1.53 | **3.44** | 1.58 | 9.27 |
| 12. Respect for the environment becomes main principle in civil engineering sector. | 2.86 | 1.56 | 2.26 | 1.55 | **3.99** | 1.46 | 9.11 |
| 17. Water sources used as an economic and geopolitics component of national power. | **4.12** | 1.26 | 1.83 | 1.41 | 2.94 | 1.51 | 8.88 |
| 16. A foundation of world government preventing strife and resolving conflict. | 2.89 | 2.13 | 2.64 | 2.08 | **2.92** | 2.12 | 8.46 |
| 4. The diminishing fossil fuel causes consumption in private dwellings on ration cards. | **3.46** | 1.58 | 1.55 | 1.40 | 3.27 | 1.69 | 8.28 |
| 10. Transportation concepts get more important than transportation techniques. | **3.11** | 1.62 | 1.96 | 1.48 | 3.09 | 1.64 | 8.17 |
| 5. Women will occupy at least one-third of all executive positions in business. | 2.35 | 1.41 | 2.41 | 1.64 | **2.67** | 1.61 | 7.43 |

The trends in general highly affect the Turkish economy, compared to the other two fields (education and quality of life). Probably one of the most important issues that will create conflict between the rich and poor states will be based on economic matters in the future. Increasing world population and progressing aging in industrialized countries are two crucial questions that should be assessed as the technical progress and technological developments accelerated the unemployment rate. Energy policy should be reviewed as the pioneering trend that affects economy according to responses of 138 respondents; infrastructure for global economy will prepare Turkey to attract entrepreneurs in investing Turkey.

It is hard to interpret the trends affecting education. The total influence of trends on education was the lowest. This may be due to the fact that technological developments attract people for economic utilization. The Internet, multimedia and other improvements in IT may be more exploited in tele-working, electronic banking or e-commerce instead in scholarly activities.

In all 57 (19 trends * 3 impact areas) interactions, the greatest was the impact of distance learning on education (mean 4.63). The new style of education would be supported by Internet-based education and self-learning by multimedia through emerging computer technology, which has already begun in the 1990s. Doubling Internet users every year may be the prominent indication of information technologies in daily life.

The highest impact on quality of life was on "environment"; ⟨8. Increasing environmental problems will negatively affect the health of most people⟩ and ⟨19. Respect for the environment becomes main principle in civil engineering sector⟩ according to the participants with means 4.14 and 3.99, respectively. Increasing world population and globalized economy followed the negative effects of environment on health problems and respect for environmental issues in civil engineering. Over-aging in industrialized countries was not significant for that was not a serious problem in our country compared to other industrialized west European countries.

The least influencing trend on the fields investigated has been "5. Women will occupy at least one-third of all executive positions in business" (7.4), which was followed by "10. Transportation concepts" (8.2) and "4. Rationing of energy consumption in private households" (8.3).

The above results may be used as an input to a full-scale foresight study by making a more detailed study of all megatrends with different perspectives, i.e., the megatrends with the highest impact could be analyzed in more detail, whereas the megatrends with the lowest impact could be studied in more detail with focus groups making qualitative exploratory studies.

## 4.4. Comparison of Austrian, German and Turkish megatrends results

Twelve megatrends in our survey were the same with the former German and Austrian studies. Eight global trends and four regional trends in each country's study made it possible to make comparisons of the realization year results.

## 4.5. Austria

The Austrian survey did not offer a detailed time horizon for realization time of the trends. The respondents were asked whether or not the trends would be realized up to 2015. Some results are:

1. ⟨Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries⟩: 96.7% of respondents in Austrian survey

anticipated "unemployment" problem by the year 2015, while 57% of the participants in our study expected unemployment caused from technical progress.

2. ⟨Climatic changes will lead to depopulation in wide regions⟩: climatic change is not expected to cause migration in vast areas in both countries: only 17% in Austria and 15.9% in Turkey of the participants forecasted population movements until 2015.

3. 83.4% of participants predicted that biotechnological production would be possible in Austria within 15 years, while the ratio is well below in the survey in Turkey, 49.2%.

4. ⟨Respect for the environment becomes main principle in civil engineering sector.⟩ The respect for environment in civil engineering will not be a principle until 2015 according to the responses in the Turkish survey (34.7%) compared to (63.3%) in the Austrian survey.

5. ⟨Women will occupy at least one-third of all executive positions in business⟩: 32.3% of responses in the Austrian study predicted that women would promote to managing careers, while that percentage in our survey is 53.6%.

6. In the Austrian survey, the trend "Transportation concepts become more important than the techniques" was the one with the highest agreement among the others (82%) and "Technological development will give two-thirds of all employees the opportunity of tele-working" was the weakest (26%). In our survey, 93% of the participants agreed on tele-working.

7. In our survey, the highest percentages of positive agreement on the megatrends to be realized before 2015 belonged to the trends

⟨After reforms, Turkey would become an investment center⟩ (72.4%),

⟨The globalization of the economy will make national economic policy almost insignificant⟩ (69.5%), and

⟨Electronic-distance learning becomes the core concept of the national education system⟩ (63.1%).

Table 7 shows both general agreement percentages on the 12 regional trends in Turkey and Austria and normalized values of the trends expected to come true before the end of the year 2015.

## 4.6. Germany

The Fraunhofer Institute published the German foresight study on the global development of science and technology in 1998 for Systems and Innovation Research (ISI) on behalf of the Federal German Ministry for Education, Research, Science and Technology. The 19 megatrends were added to each of the 12 questionnaires in the first round of Delphi'98, so every respondent had the same list of megatrends irrespective of her or his expertise and sector affiliation [11,12].

Further, these 19 trends were not iterated in the second round, but sent out only once as the hypotheses of gaining stability of S&T experts' assessments within their fields of expertise does not apply for personal opinions. Expressively, the respondents were advised to exclude their personal views when giving detailed S&T statements, but judging rather as citizens, and not as experts, when assessing the megatrends.

In the analysis, they did not include "never" responses in the "frequency plot", only the percentage of disagreement is stated. The realization time of the megatrends in this foresight study is obtained by lower and upper quartiles and medians calculated by the implemented method in 1996.

As in the Austrian study, 12 of the trends are the same in the Germany's survey (8 global, 4 regional); the realization time of the trends in the German study was determined by the quartiles, "median" for our

Table 7
General agreement percentages on the megatrends in Austria and Turkey

| Megatrends | Austria | | Turkey | | |
|---|---|---|---|---|---|
| | Realization | Before 2015 | Realization | Before 2015 | Mean time of realization |
| After reforms being realized, Turkey/Austria will become an attractive location for investment. | 57 | 48.0 | 92.8 | 72.5 | 2015.7 |
| **Transportation concepts become more important than transportation techniques.** | **82** | **60.0** | **84.1** | **55.1** | **2016.2** |
| Electronic-distance learning becomes core concept of the education system. | 71 | 43.7 | 97.1 | 63.5 | 2016.6 |
| The globalization of the economy will make national economic policy almost insignificant. | 38 | 28.2 | 97.1 | 69.6 | 2017.6 |
| Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries. | 69 | 66.6 | 80.4 | 57.2 | 2017.7 |
| Women will occupy at least one-third of all executive positions in business. | 55 | 17.8 | 87.7 | 53.6 | 2018.2 |
| **Transition to the biotechnological production in agriculture sector.** | **63** | **52.5** | **97.8** | **49.3** | **2020.6** |
| Increasing environmental problems will negatively affect the health of most people. | 65 | 41.1 | 94.9 | 52.9 | 2021.4 |
| Respect for the environment becomes main principle in civil engineering sector. | 76 | 48.1 | 83.3 | 34.8 | 2024.4 |
| Technological development will give two-thirds of all employees the opportunity of working at home. | 26 | 8.5 | 93.5 | 38.4 | 2025.3 |
| **The worldwide scarcity of fossil fuels will enforce the rationing of energy consumption for private households.** | **51** | **18.3** | **72.5** | **16.7** | **2032.8** |
| Climatic changes will lead to depopulation in wide regions. | 31 | 5.3 | 77.4 | 16.1 | 2034.7 |

trends are calculated to better understand time–trend relationships between the two countries. Table 8 lists the results of both surveys.

- In 1996 German study, 42% of the experts participating in the Delphi rounds expected "insignificant national economy" between lower and upper quartiles ⟨2005–2015⟩. That is almost the same in our study in 2000, but the difference is that 97.5% of the participants in the survey applied 4 years later believed in global economy between ⟨2007–2017⟩ (median 2010).
- Another similarity is about the *trend* ⟨Women will occupy at least one-third of all executive positions in business⟩: in the German study, the time horizon was ⟨2008–2020⟩ and the upper quartile in the Turkish study is the same, ⟨2007–2020⟩.

Table 8
Germany–Turkey—megatrends realization times comparison

| Megatrends | Germany | | | Turkey | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | Time of realization quartile (1 and 2) | No | Yes | Time of realization | | | No |
| | | | | | Q1 | Median | Q2 | |
| After reforms being realized, Turkey/ Germany will become an attractive location for investment. | 61 | 2003–2009 | 39 | 92.8 | 2007 | **2010** | 2015 | 7.2 |
| The globalization of the economy will make national economic policy almost insignificant. | 42 | 2005–2015 | 58 | 97.1 | 2007 | **2011** | 2017 | 2.9 |
| Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries. | 74 | 1999–2006 | 26 | 80.4 | 2006 | **2011** | 2018 | 19.6 |
| There will be violent conflict between the rich and poor states. | 30 | 2007–2019 | 70 | 89.1 | 2008 | **2012** | 2022 | 10.9 |
| Women will occupy at least one-third of all executive positions in business. | 57 | 2008–2020 | 43 | 87.6 | 2007 | **2012** | 2020 | 12.4 |
| Increasing environmental problems will negatively affect the health of most people. | 53 | 2003–2015 | 47 | 94.9 | 2008 | **2013** | 2023 | 5.1 |
| Technological development will give two-thirds of all employees the opportunity of working at home. | 31 | 2010–2024 | 69 | 93.5 | 2011 | **2017** | 2028 | 6.5 |
| World population will surpass the 10-billion border. | 72 | 2010–2025 | 28 | 94.9 | 2015 | **2020** | 2033 | 5.1 |
| The worldwide scarcity of fossil fuels will enforce the rationing of energy consumption for private households. | 54 | 2011–2025 | 46 | 72.5 | 2015 | **2023** | 2036 | 27.5 |
| Low birth rates and a constantly increasing life expectancy will in industrialized countries lead to over one-third of the population being more than 60 years old. | 89 | 2008–2019 | 11 | 94.2 | 2015 | **2023** | 2037 | 5.8 |
| Climatic changes will lead to depopulation in wide regions. | 37 | 2012–2025 | 63 | 77.5 | 2016 | **2026** | 2038 | 22.5 |
| A world government is an effective institution for preventing and resolving violent conflicts. | 16 | 2017–2025 | 84 | 43.7 | 2021 | **2031** | 2035 | 57.3 |
| Tendencies of increasing individualization and pluralization hamper the functioning of the classic decision-making organs of representative democracies. | 49 | 2003–2012 | 51 | | | | | |
| Due to low demand, more than half of the churches in Germany will be shut down. | 42 | 2008–2019 | 58 | | | | | |
| Massive migration will lead to riot in Germany. | 37 | 2003–2011 | 63 | | | | | |
| The Islamic nations are becoming the most dominant political alliance in the world. | 17 | 2007–2019 | 83 | | | | | |

Table 8 (*continued*)

| Megatrends | Germany | | | Turkey | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | Time of realization quartile (1 and 2) | No | Yes | Time of realization | | | No |
| | | | | | Q1 | Median | Q2 | |
| China's per capita income will surpass that of the European Union. | 28 | 2010–2025 | 72 | | | | | |
| The European Union is going to develop a European government that will substitute national sovereignty. | 52 | 2010–2024 | 48 | | | | | |
| Most people do not start a family anymore. | 16 | 2006–2017 | 84 | | | | | |

- ⟨There will be violent conflict between the rich and poor states⟩: Between the years ⟨2007–2019⟩, German experts forecast violent conflict between the rich and poor countries. The responses in Turkish study showed a parallelism in that topic within the years ⟨2008–2022⟩ (median 2012).
- ⟨Technological development will give two-thirds of all employees the opportunity of working at home⟩: The two periods for Germany and Turkey for tele-working is ⟨2010–2024⟩ and ⟨2011–2028⟩, respectively. Electronic commerce, electronic banking and developments in telecommunications have substantiated that tendency in recent years.
- In the German study, the first trend expected to realize ⟨1999–2006⟩ was the "increasing unemployment due to technical progress and global reallocation of employment" in our survey median was 2011 ⟨2006–2018⟩ for unemployment caused by technological developments.
- The latest realization time intervals of the trends in the German study were
    "A world government preventing conflict" ⟨2017–2025⟩,
    "Depopulation because of climatic change" ⟨2012–2025⟩ and
    "World population surpasses 10-billion border" ⟨2010–2025⟩.
- "Climatic changes will cause depopulation in wide regions" and "A world government preventing conflict" are the trends that have the latest realization times, their medians being 2026 and 2031 for Turkey and Germany, respectively.

In the German study, the participants were asked to give their estimation about the influence of each megatrend on the future development of science and technology. The most influences on the future development of science and technology were coming from the natural environment (scarcity of fossil fuels, environmental pollution and climatic changes) and from the human overpopulation in the world [11,12].

12 common megatrends are compared (Table 8) with participation ratios on agreement/disagreement and their expected realization times. The medians in the German study could not be compared since they were not made clear.

## 5. Personal opinions for similar scenarios on future

Personal traits, attitudes and habitual behaviors may affect the decision-making process and the outcomes. Scott and Bruce [31] define decision-making style as learned habitual response pattern exhibited during decision-making. There are some numbers of studies that examine and develop

decision-making measuring instruments at different contexts, such as General Decision-Making Style (GDMS) inventory [31], Decision-Making Style Scale [32], Decision-Making Style [33] and Consumer Decision-Making Styles Instrument [34].

The German study identified personal patterns which would allow classifying the experts in research and development (R&D) into different clusters representing individuals with similar scenarios of the future. For this reason, the individual answers of the megatrends could be used as the statistical basis for factor analysis [12,19]. A similar analysis was carried out with the current data. Interested readers are referred to Ref [12] for details.

Factor analysis is used to uncover the latent structure (dimensions) of a set of variables. It reduces attribute space from a larger number of variables to a smaller number of factors. We used factor analysis to assess the dimensionality of the decision-making style instrument.

The present analysis was run with 19 megatrends, principal components analysis was performed with varimax rotation. Six factors with eigenvalues greater than 1.00 were found. Table 9 presents the results of factor analysis and the amount of variance explained by each factor on the varimax-rotated components. In total, 59.37% of the variance is explained by the six factors covered by 19 megatrends.

Table 9
Varimax rotated factor loadings

| Factor | Variance (%) | Important items | Factor loadings |
|---|---|---|---|
| 1 | 23.62 | There will be violent conflict between the rich and poor states. | 0.72 |
| | | Electronic-distance learning becomes core concept of the education system. | 0.62 |
| | | Transition from hierarchical organization to network structure. | 0.55 |
| | | Transition to the biotechnological production in agriculture sector. | 0.39 |
| 2 | 9.86 | World population will surpass the 10-billion border. | 0.78 |
| | | Water sources used as an economic and geopolitics component of national power. | 0.59 |
| | | Usage of alternative energy sources gets compulsory. | 0.58 |
| | | Low birth rates and a constantly increasing life expectancy will in industrialized countries lead to over one-third of the population being more than 60 years old. | 0.48 |
| 3 | 7.66 | Respect for the environment becomes main principle in civil engineering sector. | 0.80 |
| | | A world government is an effective institution for preventing and resolving violent conflicts. | 0.58 |
| | | Transportation concepts become more important than transportation techniques. | 0.47 |
| 4 | 6.84 | Women will occupy at least one-third of all executive positions in business. | 0.78 |
| | | Technological development will give two-thirds of all employees the opportunity of working at home. | 0.72 |
| 5 | 6.02 | The globalization of the economy will make national economic policy almost insignificant. | 0.76 |
| | | After reforms being realized Turkey will become an attractive location for investment. | 0.59 |
| | | Increasing environmental problems will negatively affect the health of most people. | − 0.55 |
| 6 | 5.37 | The worldwide scarcity of fossil fuels will enforce the rationing of energy consumption for private households. | 0.78 |
| | | Technical progress and the global reallocation of employment will increase permanently the unemployment rate in most of the developed countries. | 0.62 |
| | | Climatic changes will lead to depopulation in wide regions. | 0.62 |
| | 59.37 | | |

*Factor 1* is the most important factor, accounting for 23.62% of the variance of the total factor solution with four megatrends. The items in factor 1 are concerned with technological innovations in different sectors avoiding international social responsibility.

*Factor 2* accounted for 9.86% of the variance; the factor expresses a pessimistic view about over-aging—over population and skepticism about natural resource and energy problems in Turkey and all over the world.

*Factor 3*, consisting of three items and explaining 7.74% of total factor solution, shows an ethical optimism on environment and transportation issues. This optimism affects the international stability positively.

*Factor 4* accounts for 6.84% of total variance with two megatrends ⟨tele-working⟩ and ⟨emancipation of women in professions as executives⟩ with loadings 0.72 and 0.78, respectively; a progressive point of view for working at home is attained.

There are three items in *factor 5*; there is a great *optimism for Turkey* to be an attractive location for investment in case proper regulations for the new economic system and globalization have been introduced. Participants were optimist *for environmentally caused health problems* resulting with negative loading (−0.55).

Factor 6 is the least important of the interpretable dimensions with three megatrends. This factor draws a "humanist pessimist" worldview on the impact of usage and change of scarce natural resources on people's lives and unemployment due to technological progress.

In the German survey, 46.8% of the total variance was explained by five factors [12].

## 6. Conclusions

The results of the media contents analysis and megatrends survey revealed different levels of emphasis on different themes. The content analysis shows an overemphasis on computer–IT–telecommunications compared to energy during the December 1999–August 2000 period in the Turkish press. The emphasis on transportation in the two studies is almost the same. The involvement of media in the full-scale foresight study from the very beginning may prove useful in directing the attention of the public.

Factor analysis revealed differing views on Turkey and world. One of the worldviews believed in technological developments and was *optimistic* in economic potential of Turkey with the new innovations applied in daily life such as biotechnological production in agriculture, electronic-distance learning and tele-working.

The second worldview in Turkey was *pessimistic* about the increase in population-over-aging and scarcity of natural resources. The respondents believed that technological developments cause social problems such as unemployment and energy consumption rationing in private dwellings.

The third group of respondents accepting problems in environment, natural resources and between nations believed all these problems would be overcome through *ethical optimism*. There was a great optimism for national economic development.

An interesting result of the present study is that the median of realization time of the trend ⟨3. After reforms being realized, Turkey will become an attractive location for investment⟩ was estimated by the participants as 2010. The current EU accession talks of Turkey has actually speeded up this process and the trend may actually realize by the end of 2007, which is the first quartile Q1 in Table 5.

Another noticeable result of the study was that while there were many respondents disagreeing on the trends in the previous studies (Germany and Austria), the disagreement ratio on megatrends was quiet low in the pilot study in Turkey if we exclude the item claiming a "world government resolving conflicts". This may be the result of the smaller, perhaps more homogeneous participant group of the present study.

In the previous studies, the disagreement ratio on the trends was quite high in 1996. Four years later, in 2000 in Turkey, there seem to be a consensus for most of the trends. There are similarities between the realization times of many trends found in the German study and in the present study in Turkey: *importance of global economy over national economy* ⟨2005–2015⟩, *women in executive positions in business* ⟨2008–2020⟩ and *violent conflicts between the rich and poor states* ⟨2007–2019⟩ almost within the same time intervals. This may be taken as a sign of globalization of values and expectations.

The present study is the first study in Turkey aimed at determining evolving megatrends as perceived in Turkey. We carried out this research as an exploratory and demonstrative project, the results of which could prove useful in a full-scale foresight study in Turkey. One might expect that optimism/pessimism with regard to future may influence the participants assessment of Delphi statements in a full-scale foresight study. It would be useful to carry out a megatrends survey similar to the one presented in the current study together with the Delphi questionnaires in order to be able to study the impact of individual pessimism/optimism on foresight results. Other attitudinal diagnostic tools may also prove useful in assessing the personal traits of individuals participating in the foresight study.

# References

[1] Alper Alsan, M. Atilla Öner, An integrated view of foresight: integrated foresight management model, Foresight 55 (3) (2003) 33–55.

[2] Alper Alsan, M. Atilla Öner, Comparison of national foresight studies by integrated foresight management model, Futures 36 (8) (2004) 889–902.

[3] Özcan Sarıtaş, M. Atilla Öner, Systemic analysis of UK technology foresight results—joint application of integrated management model and roadmapping, Technol. Forecast. Soc. Change 71 (2004) 27–65.

[4] ASTC, Matching Science and Technology to Future Needs, Australian Science and Technology Council, Background Report. Available: http://www.isr.gov.au/science/astec/astec/future/ backgrnd/future%5Fn.html, 1994.

[5] H. Grupp, H. Linstone, National technology foresight activities around the globe—resurrection and new paradigms, Technol. Forecast. Soc. Change 60 (1) (1999) 85–94.

[6] B.R Martin, Foresight in science and technology, Technol. Anal. Strateg. Manag. 7 (2) (1995) 139–168.

[7] L. Georghiou, The UK technology foresight programme, Futures 28 (4) (1996) 359–377.

[8] E. Masood, UK eyes social goals for next foresight, Nature 393 (1998) 7–9.

[9] K. Blind, K. Cuhls, H. Grupp, Current foresight activities in Central Europe, Technol. Forecast. Soc. Change 60 (1999) 15–35.

[10] J.-A. Heraud, K. Cuhls, Current foresight activities in France, Spain and Italy, Technol. Forecast. Soc. Change 60 (1999) 55–70.

[11] K. Blind, K. Cuhls, The German Foresight Study '98 on the Global Development of Science and Technology, Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Germany, 1998.

[12] K. Blind, K. Cuhls, H. Grupp, Personal attitudes in the assessment of the future development of science and technology: a factor analysis approach, Technol. Forecast. Soc. Change 68 (2001) 131–149.

[13] BMBF, Delphi '98 Umfrage-Studie zur Globalen Entwicklung von Wissenschaft und Technik, Zusammenfassung der Ergebnisse, Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie, Karlsruhe, Germany, 1998.

[14] F. Lee, C. Peterson, Content analysis of archival data, J. Consult. Clin. Psychol. 65 (6) (1997) 959–969.

[15] H. Tsoukas, J. Shepherd, Introduction: organizations and the future, from forecasting to foresight, in: H. Tsoukas, J. Shepherd (Eds.), Managing the Future—Foresight in the Knowledge Economy, Blackwell Publishing, 2004, pp. 1–17.

[16] M. Cetron, An American renaissance in the year 2000-trends that will affect America's future and yours, IEEE Eng. Manage. Rev. 22 (3) (1994) 4–12.

[17] W. Shultz, Defining Futures Fluency: Thinking, Intuiting, and Imagining the Future. Available: http://www.anbar.co.uk/courseware/futures/part1/_vti_cnf/14_wendy.htm, 1995.

[18] W. Shultz, D. Ayesha, "Health futures: tools to create tomorrow's health system," Workshop, Part of the King's Fund European Symposium, 10–11 November 1997, London. Available: http://www.wolfson.ox.ac.uk/~ wendy/resources/nhsforesight.html, 1997.

[19] R.A. Slaughter, Looking for the real megatrends, IEEE Eng. Manage. Rev. 22 (2) (1994) 5–18.

[20] D.E. Weingand, "Futures research methodologies: linking today's decisions with tomorrow's possibilities" 61st IFLA (International Federation of Library Associations) General Conference—Conference Proceedings—August 20–25, 1995. Available http://www.ifla.org /IV/If 1 a61/61-weid.htm, 1995.

[21] K. van der Heijden, Afterword; insights into foresight, in: H. Tsoukas, J. Shepherd (Eds.), Managing the Future—Foresight in the Knowledge Economy, Blackwell Publishing, 2004, pp. 204–211.

[22] R. Chia, Re-educating attention: what is foresight and how is it cultivated? in: H. Tsoukas, J. Shepherd (Eds.), Managing the Future—Foresight in the Knowledge Economy, Blackwell Publishing, 2004, pp. 21–37.

[23] T. McCormack, Content analysis: the social history of a method, Cult. Code Content Anal. 2 (1982) 143–178.

[24] M. Janowitz, Content analysis and the study of sociopolitical change, J. Commun. 26 (4) (1976) 10–21.

[25] C.F. Nachmias, D. Nachmias, Research Methods in the Social Sciences, Fourth edition, St. Martin's Press, 1992, pp. 311–317 (London).

[26] C.F. Nachmias, D. Nachmias, "An Abiding Curiosity: John Naisbitt's World", abridged version in the February 1997 issue of Asian Business Magazine. Available: http://web3.asia1.com.sg /timesnet/data/live/naisbitt.html (15 September 2000), 1997.

[27] D.R. Cooper, P.S. Schindler, Business Research Methods, 7th ed., McGraw-Hill International Edition, Singapore, 2001, p. 428.

[28] A. Nuri Başoğlu, M. Atilla Öner, MORN: Multimedia Object Relation Network: a knowledge system to support research projects, Proceedings-PICMET' 99 Portland International Conference on Management of Engineering and Technology, 25–29 July 1999, Portland, Oregon, USA, 1999.

[29] Mete Özkan, Nuri Başoğlu, M. Atilla Öner, Web-based knowledge management systems: a field study of "MORN" in R&D project management, Def. Sci. J. 1 (1) (2002) 29–75.

[30] BMFT, (Bundesministerium für Wissenschaft und Verkher), Delphi Report Austria 1, Wien, 1996.

[31] S.G. Scott, R.A. Bruce, Decision-making style: the development and assessment of a new measure, Educ. Psychol. Meas. 55 (5) (1995) 818–831.

[32] Jeffrey G. Covin, Dennis P. Slevin, Michael B. Heeley, Strategic decision making in an intuitive vs. technocratic mode: structural and environmental considerations, J. Bus. Res. 52 (1) (2001) 51–67.

[33] M.J. Driver, J. Mock, Human information processing, decision style theory, and accounting information systems, The Account. Rev. 50 (1975) 490–508.

[34] G.B. Sproles, E.L. Kendall, A methodology for profiling consumer's decision making styles, J. Consum. Aff. 20 (2) (1986) 267–279.

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