WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

Research Program on the Management of Science and Technology

Technological Forecasting Bibliography 1:
An Annotated Listing of Associated TF References

#448-70 Alan R. Fusfeld* Feb., 1970

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The following lists of references have been arranged as follows:

1. published books..................2
2. published articles..............4
3. unpublished articles, includes company reports that are not readily available to the public.............12

Each listing includes as much useful information as possible.

Author, title of work, publisher, reference code, or file code, place, date.

Comments: philosophical discussion/description of techniques/case study application of techniques/potential for integration with advanced concepts/examples/useful reference listings.

The codes used in this reference are:


2. TF V.1,2,3.=Technological Forecasting Notebook. Vol. 1,2,3.(unpublished files of author)

3. TF = technological forecasting or technological forecast, depending on context.

Please note that this reference listing is intended as a summary of selected material and not as an exhaustive catalogue.
Technological Forecasting

-Books-


Most cohesive text on TF methods and applications (written entirely by author/contains definitions of terms/references for additional information at end of each chapter/contains material that is easily linked to O.R. and economic analyses.


Discussion and presentation of data relating to MEPF/contains strong potential for additional TF research re: the technological progress function/data on solid state components, TV receivers, electric power, plastics, metals.


A collection of articles on all major TF topics and techniques, written by all major contributors/based on papers presented at early TF conference, (May '67)/includes work by Ayres, Bright, Cetron, Darracott, Gordon, Helmer, Isenson, Jantsch, Lenz, Linstone & Martino.


A comprehensive and encyclopedic discussion of TF in its broadest sense/includes excellent lists of bibliographies and sources contacted for research/full discussion of TF work as an international concern.


An overview of the integration of the processes of R&D, innovation, economics, and education.


Considers equations derived and cases from a managerial economics point of view of R&D innovation, rate of diffusion, size of firm, market structure/large amounts of R&D -- innovation data.


A useful book length collection of the various methods and
techniques used by Cetron in his technological forecasting work for the U.S. Navy/ summarizes his articles on TF and resource allocation/ considerable detail re: examples of TF and the integration of methods into planning structures/ includes an extensive bibliography on TF and related OR areas/ includes examples of TF for lubricants, computers, materials, aircraft, nuclear weapons, solid state components, propellants, communications and lamps.
Technological Forecasting

-Published Articles-


Envelope trend forecasting/includes high energy particle accelerators, computers, external combustion engines, batteries/rules, methods, and limiting variables in TF.


O.R. type of cross-impact analysis.


Trend analysis.

Bright, James R. The Manager and Technological Forecasting. Bright. 1968.

Whys and wherefores of TF/trends of lift technology.


Cross-impact of needs and effects.


Summary of proposed organization and formalized procedure for making and using TF/basically, an outline of a TF.


Excellent document discussing uses and format of a possible TF procedure/materials and electronic components trend forecasts.


Review of philosophy and TF techniques, utility of TF, role of TF in military and industrial planning/Delphi on scientific breakthroughs.


Elements of a quantitative resource allocation technique for exploratory development funds.
-Published Articles-


TF and resource allocation.


Overview of TF, planning and resource allocation/includes Delphi of 'social technology'.


Trends/delphi/relevance trees


Discussion of techniques/trend analysis for strengths of materials; fuels, communication band width, hovercraft, microwave tubes/full discussion of normative technology.


Monitoring/goal setting/ identification of aviation forecasting articles/ discussion integrates issues of technological, social, and economic importance with the necessity for long range planning.


Discussion of system, trends for frequency standards, solid state amplifiers, metals.


Multiple trend forecasts/good discussion/excellent bibliography.
-Published Articles-


A description of one form of economic planning network.


Pure economic planning.


Discussion.


Summary report of TPF/ cases included are jet engines, electric lamps/ a computer program development/ production, progress, learning curves. (TPF = technological progress function)


Description.


U.K. TP data/ trend forecasting.


TF planning structure.


Process of innovation/ roots of monitoring as a TF.


Procedure of Delphi/ transportation Delphi/ cross-impact

Summary view of forecasting.


Description/ no data.


Discussion of cross-impact theme.


Discussion.


Process of innovation as seen in evaluation of hundreds of R&D projects (PROJECT HINDSIGHT).

Isenson, R.S. Technological Forecasting Lessons from Project Hindsight. Bright. 1968.

Micro-factors in analysis of R&D/considers needs and R&D environment as prime stimuli of technological growth.


Relevance trees/ industrial dynamics/ philosophy of planning


TF aspects of USSR economic planning structure.


Excellent review article of what? why? how? and who?


Trend analysis of government R&D funds by functional areas.
-Published Articles-


Trend Forecasts of automobiles, aircraft.


Aerospace examples of trend forecasting.


Good short over view of TF/descriptions of techniques and needs for such information/ good schematic of TF relation to other elements of firm's planning and operational structure.


Framework for environmental analysis.


Framework for long-range planning.


A view of Soviet forecast procedure.


Discussion of decision process.


Discussion of feedback effects of TF.
Martino, Joseph P. *The Use of Technological Forecasts for Planning Research*. Bright. 1968.

Description of an R&D planning structure.


Success and cost information that has potential for interface with TF.

Mottley, Charles M. *The Application of Strategic Forecasting to the Coal Industry*. Bright. 1968.

Trends of coal industry.


Trend analysis/discussion of case.


Overview of TRW Delphi technique/includes detailed logic development tree for 3-D TV or Holographic movies.


Process of planning goals and optimizing R&D.


Trend forecasts for electrical propulsion, thermal protective materials.

Pyke, Donald L.; H.Q. North. *Technology, the Chicken--Corporate Goals, the Ess*. Bright. 1968.

TRW Delphi on solid state physics.


Brief overview/cases discussed include U.S. highways, television.
-Published Articles-

Rea, R.H.; P.S. Miller. The Multiple Contingency Concept of Long-Range Technological Planning. Bright. 1968.

O.R. type of stochastic planning model.


Brief description of trend and resource allocation TF/ describes R&D dynamics approach to TF/ describes possible use of more sophisticated methods to upgrade TF.

Rohan, T.M. Crystal Ball Gazing is a New Corporate Game. Iron Age, June, 1969.

Sketchy review of TRW and Delphi.


Network planning.


Cross-impact, relevance tree trend forecasts/ includes trends of gas turbines.


Descriptive approach emphasizing progress through competition.


Basic economic discussion of a theory relating progress, capital, labor, and growth/ revolves primarily around economic growth.


Economic growth discussion of technical change related to production function, \( Q = F(k, L, t) \)/his "technical change" includes many economic types of change in addition to those usually understood as representing technological progress.
-Published Articles-


Delphi plus cross-impact.


Discussion.


Analytic product resource allocation.
Technological Forecasting

-Unpublished Materials-


Progress function work book/examples, techniques/leads for link up with TF.


Costs, R/D planning, jet engine forecasts.


Discussion and examples of monitoring.


Process of innovation.


Costs, characteristic data development/learning curves, MEFP.

Cardullo, Mario W. Technological Forecasting in a Social System. TF V.2. September 1969.

Analysis of long range planning in the Catholic Church.


Materials trend forecast, strength, heat steel, concrete, social-political forecast.


General TF discussion, U.S. Navy trend forecasting examples.


Delphi and trends on fabrics.

Philosophy of monitoring political spheres of interest and considering cross-impact effects.


Sophisticated discussion of relevance trees.


Discussion


Complete documented report re: TPF as part of TF and MEFP/contains survey of current TF methods/cases include aircraft speed, aircraft engines, electric lamps, automobiles, hovercraft, and a computer program. (MEFP= micro-economic progress function)


Use of Cross-impact with Delphi and trends on social issues


Description of Institute for the Future's methodology.


Costs, characteristic data development/learning curves, MEFP.


Integration of TF with business planning/food industry example discussed in detail.'


Philosophical overview of TF and planning viewed in perspective of needs and goals.
-Unpublished Materials-


Product growth as reviewed in glass industry trends.


Delphi on management education.


Discussion of needs, goals, and TF.


Good description/contains Videophone exercise.


Good description.


90 Delphi forecasts of a general nature/brief description of production life cycles.


Good case study analysis of aircraft industry.


Detailed Discussion.


Presents finding that Delphi responses when statistically analyzed have consistent lognormal patterns.


Multiple trend analyses/detailed discussion/examples - aircraft, artificial light sources, rocket engines, low temperature capabilities.


LTV Dephi and Scenario techniques/includes full discussion on food.

Trends and Delphi for machine industry.


Electronics Forecast.


Description of 1st and 2nd generation attempts with Delphi as a management tool.


Detail of TRW Delphi.


Discussion, explanation of application.


Good discussion of FIFO, LIFO effects on MEFP/computer simulation of MEFP/material may be applied in analysis of TF.


Initial trend forecast analysis of printers.


Aircraft engine TF.


Discusses progress with respect to managerial cycles, price behavior, and time/examples include oil tankers, aircraft, and chemicals.

Contains seeds of material for a TF/ describes an example of current educational technology research.


Discussion.


Market share analysis.


Discussion.


Discussion of general pollution problems and trends.


Listing/ includes names and addresses of contacts.


GE cross impact study of social-political trends.