

TECH 646 Analysis of Research in Industry and Technology

Ch 5. Clarifying the Research Questions through Secondary Data and Exploration

Based on the text book and supplemental materials from the text book:
Cooper, D.R., & Schindler, P.S., *Business Research Methods* (12th edition), McGraw-Hill/Irwin

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Chapter 5

- A Search Strategy for Exploration
 - Levels of Information
 - Types of Information Sources
 - Evaluating Information Sources
- Mining Internal Sources
 - Evolution of Data Mining
 - Data Mining Process
- The Question Hierarchy: How Ambiguous Questions Become Actionable Research
 - The Management Question
 - The Research Question
 - Investigative Questions
 - Measurement Questions

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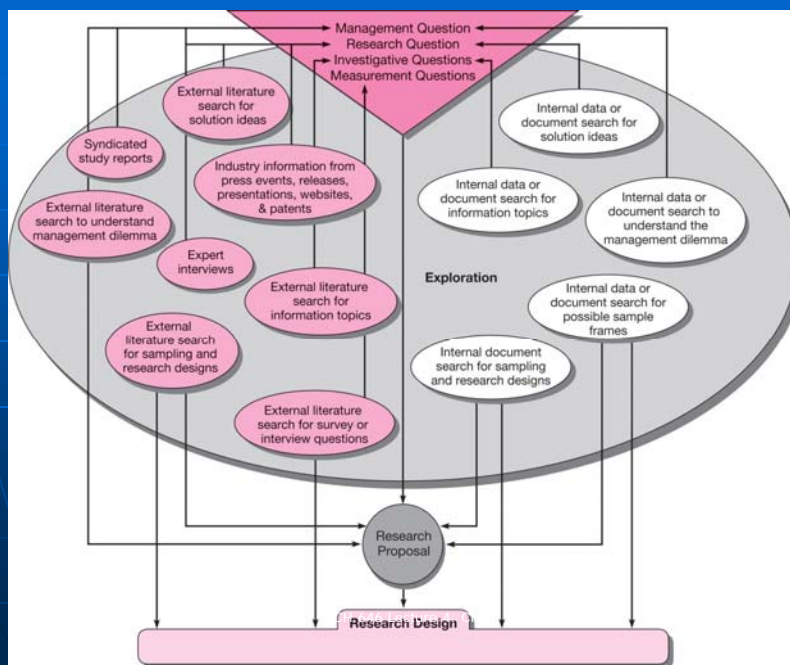
A Search Strategy during Exploratory Phase

- **Exploration - when lack of clear idea of the problem**
 - Develop concepts more clearly
 - Establish priorities
 - Develop operational definitions
 - Improve the final research design
 - Help to decide if the formal research is needed (save time/money)

Exploratory Phase: Search Strategy

- **Discovery & Analysis of Secondary sources**
 - Published studies
 - Documents analysis
 - Organization's Database(s)
- **Expert Interviews (who had knowledge about the problem)**
- **Individual Depth Interviews (individual involved with problems)**
- **Group Discussions (focus groups or brainstorming)**

Exhibit 5-1 Integration of Secondary Data into the Research Process



Objectives of Secondary Researches

- **Expand understanding** => looking for ways others have addressed and/or solved similar to our research question
- **Gather Background Info** => Refine research question
- **Identify info to Gather** => Formulate investigative questions
- **Identify Sources for and Actual Questions** => Measurement questions
- **Identify Sources for and Actual Sample Frames** => Sample design

The Exploration Begin with

- Literature Search/Review (1st step of exploration) includes
 - Book reviews
 - Article in journals/transactions/professional literature
 - High-quality Web-published materials
 - Handbook or specialized encyclopedia: key terms, people, or events

Five Steps of Literature Search/Review

1. **Define management dilemma** or question reviews
2. **Identify “key terms, name of people, or events”**: relevant to dilemma/question: consult encyclopedia, dictionaries, handbooks, text books, journals, transactions, professional articles
3. **Use terms to search** secondary sources: searching indexes, bibliographies, and the Web
4. **Locate & review** specific secondary sources
5. **Evaluate the value** of each source and content

Using Whiteboard Technology

- Makes an easier discussion of symptoms relevant to the management-research question hierarchy



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A Search Strategy for Exploration

- **Levels of Information (3-levels)**

Primary Sources:

Memos
Letters
Interviews
Speeches
Laws

Internal records:
Sales analysis
summary,
Investor annual
reports

Secondary Sources:

Encyclopedias
Textbooks
Handbooks
Magazines
Newspapers
Newscasts

Tertiary Sources:

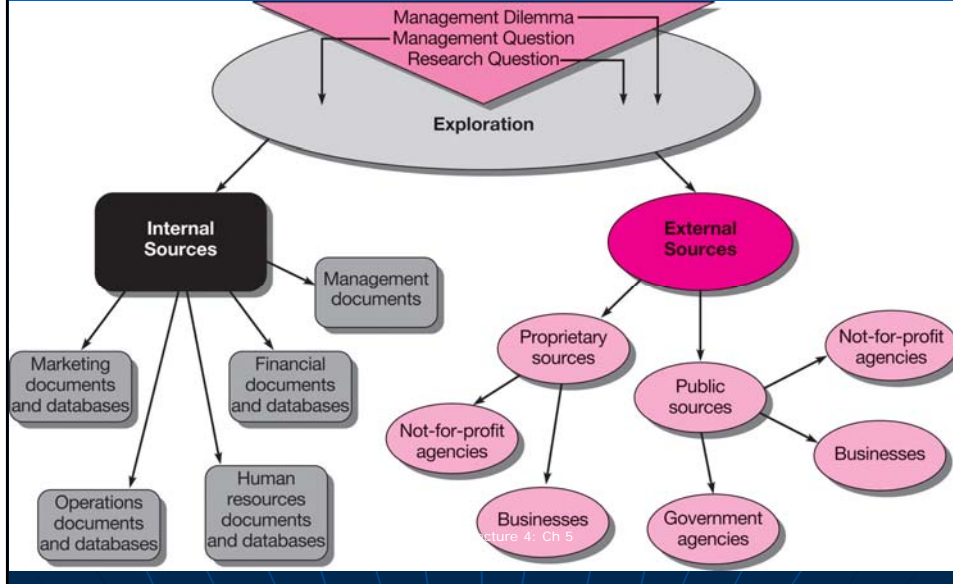
Indexes
Bibliographies
Internet
Search engines

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Exhibit 5-2 Secondary Sources for Developing the Question Hierarchy

■ Integrating Secondary Data



U.S. Department of Commerce
United States Census Bureau

People | Business | Geography | Data | Research | Newsroom

The 2012 Economic Census
The Economic Census is the U.S. Government's official five-year measure of American business and the economy. It is conducted by the U.S. Census Bureau for years ending in '2' and '7'. The Economic Census is the most comprehensive source of information about American businesses from the national to the local level.

YOUR RESPONSE MAKES A DIFFERENCE FOR YOUR COMMUNITY

U.S. Census Bureau Economic Indicators

New Residential Construction April 2013 Report Released 8:30 AM EDT, 5/16/13	\$53,000 Housing starts -16.5%
Business Inventories March 2013 Report Released 10:00 AM EDT, 5/13/13	\$1,640.9 B 0.0%
Advance Monthly Retail Sales April 2013 Report Released 8:30 AM EDT, 5/13/13	\$419.0 B 0.1%
Monthly Wholesale Inventories March 2013 Report Released 10:00 AM EDT, 5/8/13	\$503.1 B 0.4%

QuickFacts
Quick, easy access to facts about people, business, and geography. To begin, select a state from this list or use the map.

Census News
Per Student Public Education Spending Decreases in 2011 for First Time in Nearly Four Decades, Census Bureau Reports
3/21/2013
Fiscal year 2011 marked the first decrease in per student public education spending since the U.S. Census Bureau ... Read More

2010 Census Congressional District Summary (Congress)
5/16/2013
This update to the 2010 Census Congressional District Summary File released in April includes demographic profiles, quic ... Read More

International Migration is Projected to Become Primary Driver of U.S. Population Growth for First Time in Nearly Two Centuries
5/15/2013
International migration is projected to surpass natural increase (births minus deaths) as the principal driver of U.S. population growth for the first time in nearly two centuries.

The Week Ahead
Wed, Thurs, Fri, Mon, Tues

The U.S. Government is the world's largest source of data

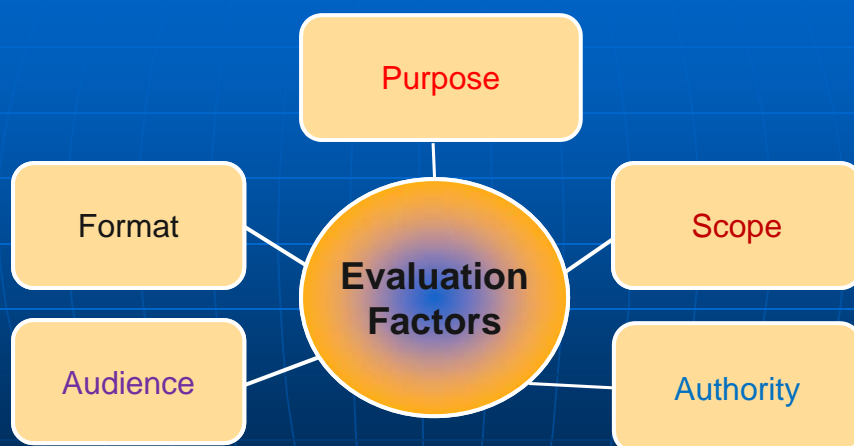
Five Types Information Sources

1. **Indexes and Bibliographies** => identify books & journal articles
2. **Dictionaries** => define words, terms, and jargon
3. **Encyclopedias**
 - Provide background or history info about the topic
 - Online TDM (Transportation Demand Management) Encyclopedia, etc
4. **Handbooks**
 - Identify relevant key terms, people, or events
 - Statistics, directory info, glossary of terms, laws and regulations
 - The statistical Abstract of the United States
 - Occupational outlook handbook, North American Industry Classification System United States (NAICS)
5. **Directories** => identify contact info (names, addresses, etc)

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Evaluating Information Source



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Mining Internal Sources

- **Data Mining**
 - The process of discovering knowledge from database in data marts or data warehouses
- **Data Warehouse**
 - An electronic repository for databases that organizes large volumes of data into categories to facilitate retrieval, interpretation, and storing by end users
- **Data Marts**
 - Data available to departments or cross-functional teams for direct analysis or through intermediate storage facility
 - Data compiled locally required information

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Exhibit 5-4 The Evolution of Data Mining

Evolutionary Step	Investigative Question	Enabling Technologies	Characteristics
Data collection (1960s)	"What was my average total revenue over the last five years?"	Computers, tapes, disks	Retrospective, static data delivery
Data access (1980s)	"What were unit sales in California last December?"	Relational databases (RDBMS), structured query language (SQL), ODBC	Retrospective, dynamic data delivery at record level
Data navigation (1990s)	"What were unit sales in California last December? Drill down to Sacramento."	Online analytic processing (OLAP), multidimensional databases, data warehouses	Retrospective, dynamic data delivery at multiple levels
Data mining (2000)	"What's likely to happen to Sacramento unit sales next month? Why?"	Advanced algorithms, multiprocessor computers, massive databases	Prospective, proactive information delivery

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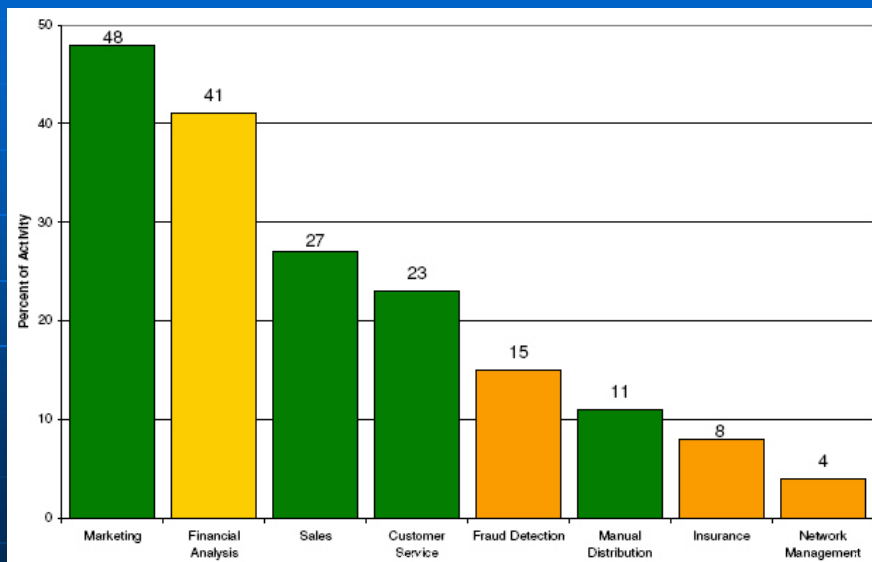
Data Mining Software & Applications

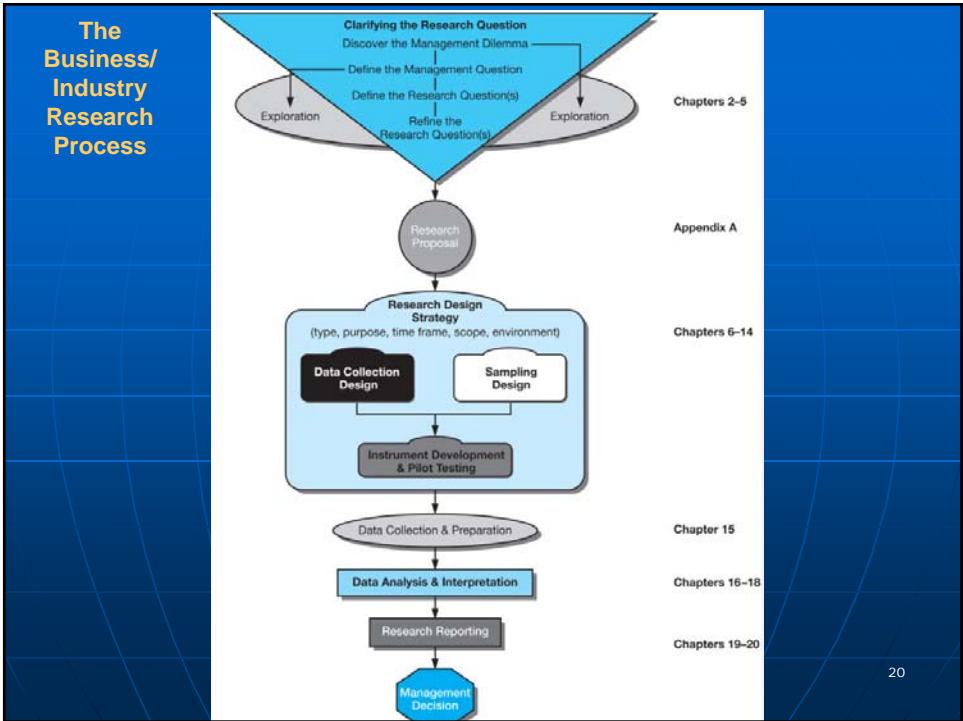
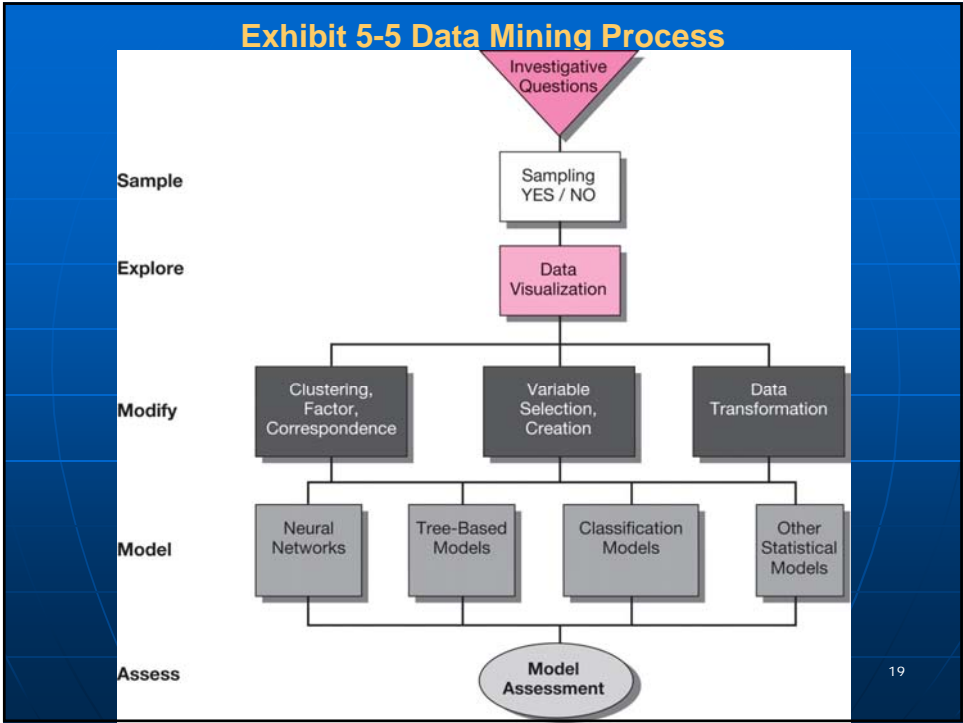
- Intelligent Algorithm/Software (Artificial Intelligent)
 - Neural network
 - Fuzzy logic
 - Clustering
 - Generic algorithms
 - Decision trees
 - Pattern recognition
 - Big Data Analytics
 - etc
- Applications
 - Market analysis
 - Fraud detection
 - Data analysis
 - Pattern discovery
 - Predicting trends and behaviors

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Data Mining in Industry & Business





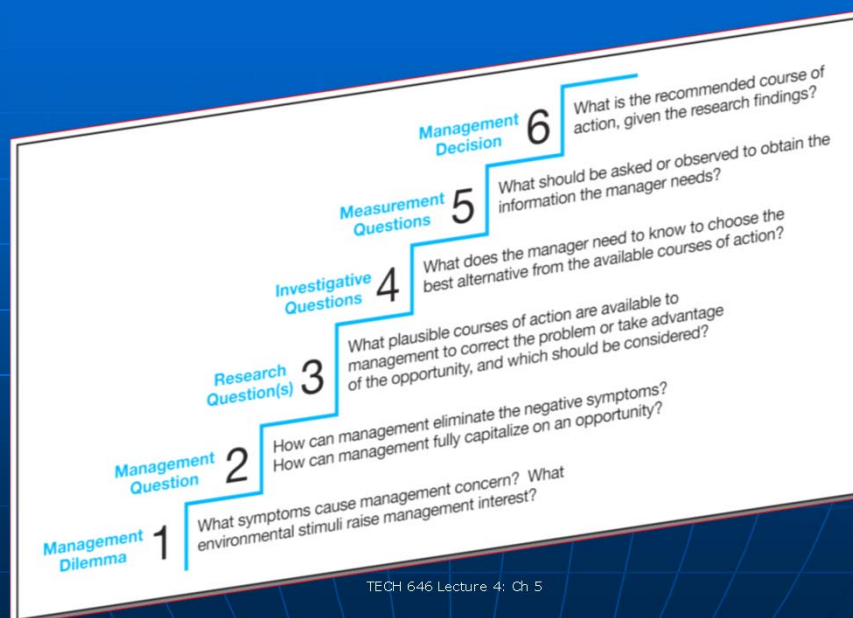
Stage 1: Clarifying the Research Question (Exhibit 4-1)



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Exhibit 5-6 Management-Research Question Hierarchy



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SalesPro's Dilemma (declining sales)

- **SalesPro**
 - A large manufacturer of industrial goods
 - Facing a situation – Declining sales
- **Exploration 1 - reveals**
 - It should not be declining in the South and Northeast
 - Environment factors - favorable
- **Exploration 2/3 - leads management to believe the problem is in one of the following three areas**
 - Salesperson **compensation**
 - Product **formulation**
 - Trade **advertising**

SalesPro's Dilemma (declining sales)

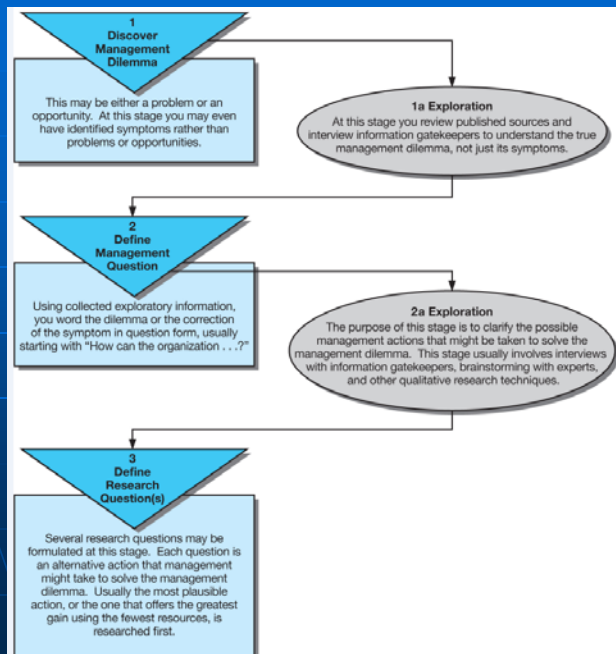
- **Exploration 4 – narrows the focus to sales compensation system**
- **Exploration 5 – leads to survey of all sales personnel in the affected regions**

Exhibit 5-7 SalesPro's Management-Research: Question Hierarchy (declining sales)

- 1** Why are our sales declining in the South and Northeast, while sales are booming in the Southwest?
- 2** How can we improve sales in the South and Northeast?
- 3** Should we introduce a 2 percent incentive commission-based compensation system on all sales over quota for salespeople in the South and Northeast or a 5-percent-of-profit regional bonus to the region that increases sales by 10 percent over quota (to be shared proportionately among the salespeople in the region)? Should we modify the product formula for distribution in the South and Northeast? Should we increase the level of advertising via trade publications in South and Northeast editions?
- 4** What is the likelihood that we will lose excellent salespeople in the South and Northeast if we implement the compensation change? What is the likelihood that current customer satisfaction in these regions will decrease? What is the likelihood that future sales to existing customers will be lost?
- 5** Please rate your level of concern for each of the following outcomes if management were to change your compensation to a commission-based system compared to the current salary system. For each outcome, indicate a number between 1 and 7 where 7 = extreme concern, 4 = neither concerned nor unconcerned, and 1 = no concern at all.

 - Lack of predictability of monthly pay.
 - Increased internal competition for sales prospects.
 - Reduced time for postsale servicing of customer needs.
 - Reduced incentive for postsale servicing of customer needs.

Exhibit 5-8 Formulate the Research Question



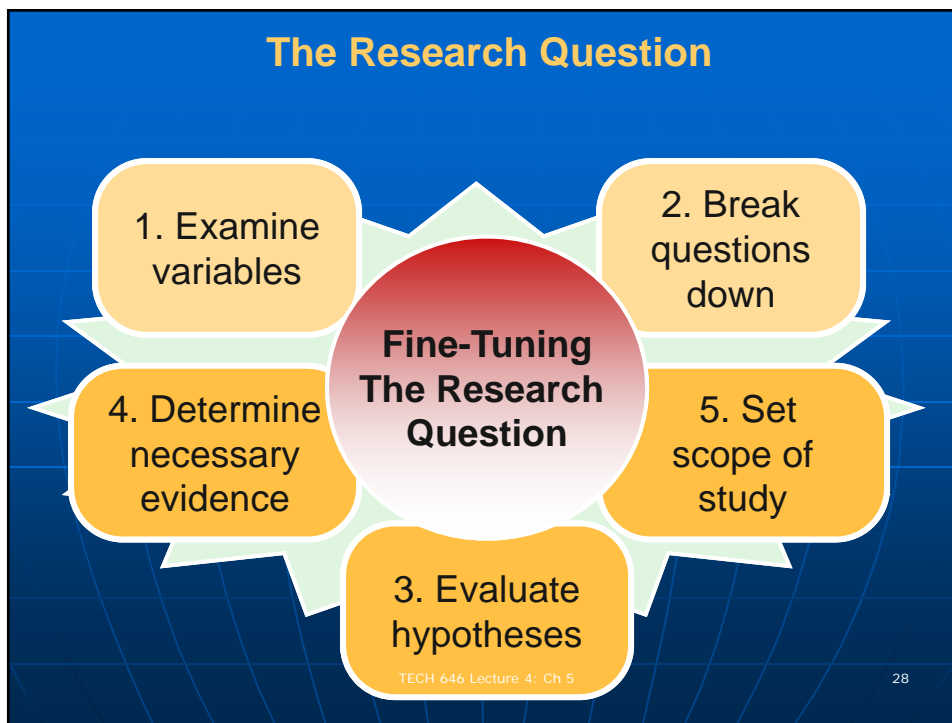
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Exhibit 5-9 Types of Management Questions

Categories	General Question	Sample Management Questions
Choice of Purpose or Choice of Objectives	<ul style="list-style-type: none"> What do we want to achieve? 	<ul style="list-style-type: none"> Should we reposition brand X as a therapeutic product from its current cosmetic positioning? What goals should XYZ try to achieve in its next round of distributor negotiations?
Generalization and Evaluation of Solutions <small>(choices between concrete actions to solve problems or take advantage of opportunities)</small>	<ul style="list-style-type: none"> How can we achieve the ends that we seek? 	<ul style="list-style-type: none"> How can we achieve our 5-year goal of doubling sales and profits? What should be done to improve the CompleteCare program for product repairs and servicing?
Troubleshooting or Control <small>(monitoring or diagnosing ways an organization is failing to meet its goals)</small>	<ul style="list-style-type: none"> How well is our marketing program meeting its goals? Why is our marketing program not meeting its goals? 	<ul style="list-style-type: none"> What is our product line's sales-to-promotion cost ratio? Why does our department have the lowest sales-to-Web page visit ratio? Why does our product line have the lowest off-shelf display occasions in the industry?

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The Research Question



Fine Tuning Research Question

1. **Examine variables** to be studied and assess whether they are operationally defined.
2. Review the **research questions** to **break them down** into second and third-level questions.
3. If **hypotheses** are used, be sure they meet the quality tests.
4. **Determine** what **evidence** must be collected to answer the various questions and hypotheses.
5. **Set the scope of the study** by stating what is not a part of the research question.

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Investigative Questions

- The information that the decision maker needs to know
- The questions that researcher must answer to satisfactory arrive at a conclusion about the research question
- MindWriter situation – Different packaging specifications
 - **Performance consideration**
 - **Attitudinal issues**
 - **Behavioral issues**

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MindWriter Laptop Service Issues

- MindWriter situation – Different packaging specifications
 - Performance consideration
 - Relative costs of options
 - The speed of packing serviced laptops
 - The arrival condition of test laptops packaged with different materials)
 - Attitudinal issues
 - Perceived service quality based on packaging materials used
 - Behavioral issues
 - Employee's ease of use in packaging with the considered materials

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BankChoice Market Project Example (p. 113)

- The Management Question
 - The president is concerned about erosion of **bank's profitability** (the management dilemma) and wants to turn this situation around
 - How can we improve our profit picture?
- The Research Question
 - The question is broad
 - Increase profit via ?
 - Increased deposits
 - Downsizing of personnel
 - Outsourcing of the payroll function
 - Others
-

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BankChoice Market Project Example (cont.)

- **Further discussion** between the bank president and the business researcher shows 2-Questions:
 - The problem of low deposit growth is linked to concerns of a competitive nature
 - Increasing customer complaints
- **Refine Management Question** into the following 2-subquestions
 - How can we improve deposits?
 - How can we improve internal operations that currently result in customer complaints?

BankChoice Market Project Example (cont.)

- Need to collect some **exploratory information** on
 - What factors are contributing to the bank's failure to achieve a stronger growth rate in deposits?
 - How well is the bank doing regarding customer satisfaction and financial condition compared to industry norms and competitors?
- **Revised Management Question**
 - What should be done to make the bank more competitive?
- **Research project approved!**

BankChoice Market Project Example (cont.)

- Developed two major **investigative questions** to study market
 - **(1) What is the public's position regarding financial services and their use?**
 - a. What specific financial services are used?
 - b. How attractive are various services
 - c. What bank-specific and environmental factors influence a person's use of service
 - (2) What is the bank's competitive position?

BankChoice Market Project Example (cont.)

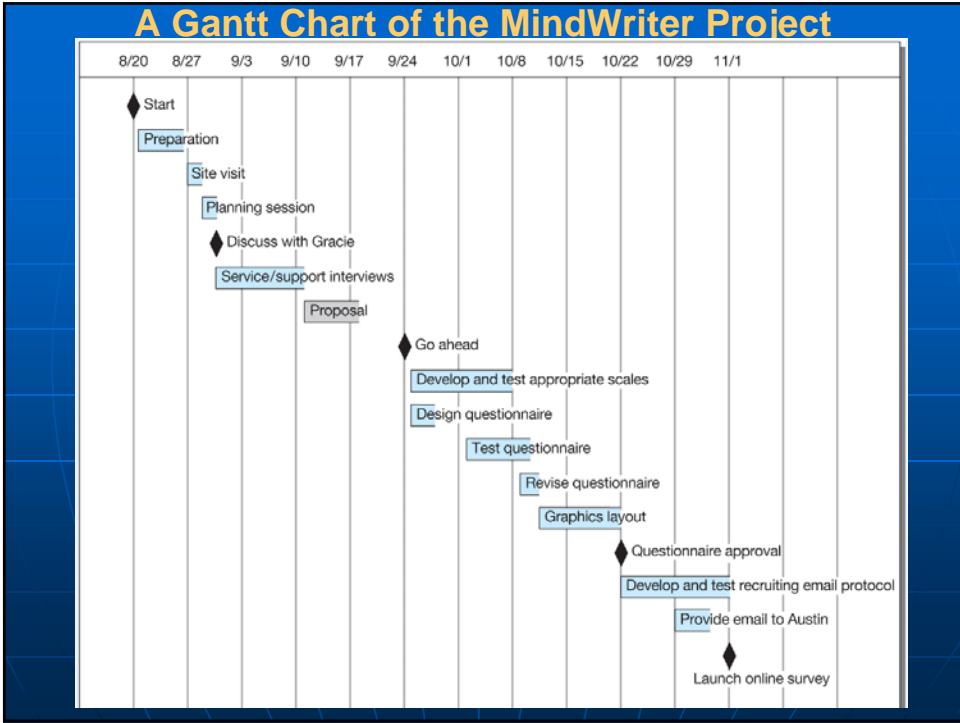
- **(2) What is the bank's competitive position?**
 - a. What are the geographic patterns of our customers and our competitor's customers?
 - b. What demographic differences are revealed among our customers and those of our competitors?
 - c. What descriptive words or phrases does the public (both customers and noncustomers) associated with BankChoice? With BankChoice's competitors?
 - d. How aware is the public of BankChoice's promotional efforts?
 - e. What opinion does the public hold of BankChoice and its competitors?
 - f. How does growth in services compare among competing institutions?

Measurement Questions

- Actual questions developed and used to collect data in a study
- Could become questions on a “**survey**” or “**elements** on an observation checklist”
- Two types
 - Predesigned, pretested questions
 - Custom-designed questions

Exhibit 5-10 Proposal for MindWriter CompleteCare Satisfaction Research, pp. 114-115

- **Project Title**
Repair Process Satisfaction Proposal
MindWriter Corporation CompleteCare Program
- **Problem Statement**
- **Research Objectives**
- **Importance/Benefits**
- **Research Design**
- **Data Analysis**
- **Results: Deliverables**
- **Budget**



Bibliographic Database Searches

Bibliographic Search Process	Web Search Process
1. Select a database appropriate for your topic.	1. Select a search engine or directory.
2. Construct a search query.	2. Determine your search options.
<ul style="list-style-type: none"> ▪ Review and evaluate search results. ▪ Modify the search query, if necessary. 	3. Construct a search query.
3. Save those valuable results of your search.	<ul style="list-style-type: none"> ▪ Review and evaluate search results. ▪ Modify the search query, if necessary.
4. Retrieve articles not available in the database.	4. Save those valuable results of your search.
5. Supplement your results with information from Web sources.	5. Supplement your results with information from non-Web sources.

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Advanced Searching Process

Step 1: Build a list of synonyms for each concept in the management question.

Concept A	Operator	Concept B	Operator	Concept C
training	AND	sex* harassment	AND	lawsuit
awareness		wom*n		law
behavior		female		courts
professional		gender		legal
development		men		

Step 2: Create and search with a concept group by combining each term in a column with **OR**. Put each concept group in parentheses. Then combine each concept group with **AND**.

(training OR awareness OR behavior OR professional development) AND (sex* harassment OR wom*n OR men OR female OR gender) AND (lawsuit OR legal OR law OR courts)

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Review of Advanced Search Options

Expanding Your Search

OR

Use **OR** to search for plurals, synonyms, or spelling variations. Either or both terms will be present in results.

- woman **OR** women
- business **OR** corporation
- international **OR** foreign

Truncation

Symbols (?, *, !) that replace one or more characters or letters in a word or at the end of a word.

- elect* (retrieves electricity, electric, electrical)
- child? (retrieves children, childish, child's)

Narrowing Your Search

AND

Use **AND** to require that all terms you specify be present in the results.

- child **AND** advertising

NOT

Use **NOT** to eliminate terms from your search. But use **NOT** with care. It is easy to eliminate the good with the unwanted.

- medicine **NOT** nursing
- Caribbean **NOT** Cuba

Phrases

Use a term consisting of two or more words. Some phrases require double quotes to enclose the phrase, while others do not.

- human resource management
- "human resource management"

ADJ

ADJ requires the first term specified to immediately precede the last term specified.

- six **ADJ** sigma

Limiters

Conditions (**date**, **publication type**, **language**) for limiting your search. Most databases also offer *field limiting*, limiting the occurrences of your search to a specific database field, such as the author field, title, etc. Some bibliographic databases offer the convenience of limiting the search results to peer-reviewed articles or to articles only available in full text. Use the latter with care as some significant articles may be overlooked even though they are available in the library.

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Snapshot: Crossing the Deception Line? P. 99

Business intelligence is fertile ground.

Comprehensive literature search

Expert interviews

Former employee interviews

Monitor competitive publications

Attend presentations by executives

Share proprietary information

Snapshot: Surfing the Deep Web (p. 100)

“ Although many popular search engines boast about their ability to index information on the Web, some of the Web’s information is invisible to their searching spiders. The most basic reason is that there are no links pointing to a page that a search engine spider can follow. Or, a page may be made up of data types that search engines don’t index—graphics, CGI scripts, or Macromedia Flash, for example.”



Snapshot: How will Cloud computing affect research (p. 100)

A computing environment where data and services reside in scalable data centers accessible over the Internet.

“[The organization] pays only for [server] capacity that [it] actually uses.”

“There’s no hardware to purchase, scale, and maintain, no operating systems, database servers, or application servers to install, no consultants and staff to manage it all, and no need for upgrades.”

Data no longer reside on organizations servers; data security and control of proprietary info

Snapshot: Mining the Web for Feeling? (p.105)

Sentiment analysis and opinion mining: apply computational treatment to opinion, sentiment, and subjectivity in textual form.

Difficult comment analysis problems

False Negatives

Relative Sentiment

Compound Sentiment

Scoring Sentiment

Sentiment Modifiers

Conditional Sentiment

Snapshot: OdinText: Text Analytics for the DIY Researcher (p. 107)

“Most firms have a wealth of rich unstructured data within their organization ... that they need to understand.”

Monitors customer comments

Draws attention to new, important trends

Calculates sentiment

Filters ‘noise’

User-determined analysis

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Snapshot: The Online Professional Community as a Source of Business Information (p. 112)

Sponsored content website

Shop-talk community

Professional collaboration community

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Snapshot: Surfing the Deep Web

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