

# **The Antecedents of Management Competence**

**The Role of Educational Background  
and Type of Work Experience**

Ragnhild Kvålshaugen

Dissertation for the Degree of Dr. Oecon.

Series of Dissertations 1/2001

**Norwegian School of Management BI**  
Department of Strategy

Ragnhild Kvålshaugen:  
*The Antecedents of Management Competence. The Role of Educational Background  
and Type of Work Experience*

© Ragnhild Kvålshaugen  
2001

Series of Dissertations 1/2001

ISBN: 82-7042-431-5  
ISSN: 1502-2099

Norwegian School of Management BI  
P.O.B. 580  
N-1302 Sandvika  
Phone: +47 67 55 70 00

Printing: Nordberg Hurtigtrykk

A printed version of the dissertation may be ordered from our website  
[www.bi.no/forskning](http://www.bi.no/forskning)

## Abstract

This study investigates the relationship between managers' demographic characteristics (educational background and work experience) and their management competence (preference for problem solving strategies and managerial behavior). Based on this overall research question, two underlying research questions were also investigated: What is the joint effect of educational background and work experience on management competence, and to what extent are demographic characteristics such as educational background and work experience good proxies for management competence? These research questions were first investigated through an exploratory study. The hypotheses developed from the exploratory study and the literature review were tested in a survey study. The survey (postal) was sent to 1200 managers who reported on their educational background, their careers and their management competence. Out of the 1200 managers, 551 responded (46% response rate) - 251 business-educated managers (*sivilokonoms*) and 300 engineering-educated managers (*sivilingeniors*).

The major theoretical perspective used in the study was the upper echelon perspective, which suggests that demographic characteristics can be used as proxies for cognitive bases and values (management competence). In addition, the study also draws heavily on theories of individual competence, and theories of insight and style (cognitive psychology).

The results from the study indicate that there are relationships between educational background, work experience and management competence. Regarding the relationship between preferences for problem solving strategies, educational background and work experience, the following results emerged:

- Engineering-educated managers have overall a greater preference for explorer problem solving strategies compared to business-educated managers.
- Managers with administrative types of work experience, no work experience from innovative industries, and those who have their prime work experience from large organizations, have overall a greater preference for assimilator problem solving strategies.

The investigations of the relationship between managerial behavior, educational background and work experience revealed the following relationships:

- Managers with diverse functional experience and background from manufacturing are more entrepreneurially oriented compared to managers with their prime experience from administrative functions.

Work experience from innovative industries also has a significant positive relationship to entrepreneurial orientation.

- Functional background prior to the first management position from throughput functions, i.e. production and operations and prime work experience from large organizations have significant relationships to managers' activity orientation.
- Managers with their prime work experience from large organizations do, on the average view themselves as more effective in leadership positions compared to the managers who have their prime work experience from small and medium-sized organizations.

The results from the survey study also revealed significant relationships between type of educational background and type of work experience. This finding suggests that the two educational groups have two routes to management positions. *Siviløkonomers* often have their functional background from areas such as finance, accounting and consulting, while *sivilingenjører* primarily have their functional background from production and operations.

Overall, educational background and type of work experience explained less than 10% of the variation in management competence. This suggests that the sole use of educational background and work experience as proxies for management competence are not highly recommendable. The results from the study indicate, however, that characteristics of the managers' present employer/organization have significant relationships to self-perceptions of management competence. Based on the findings in the study, management competence is suggested to be influenced by managerial characteristics such as personality and experience. In addition, context factors such as national culture, task environment, and characteristics of present employer/organization will influence the types of management competence mobilized.

**The research project was funded by the Norwegian Research Council.**

## Table of Contents

ABSTRACT .....	III
LIST OF TABLES .....	VIII
LIST OF FIGURES .....	X
ACKNOWLEDGEMENTS.....	XI
<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. RESEARCH MODEL AND RESEARCH DESIGN .....</b>	<b>5</b>
2.1 RESEARCH MODEL .....	5
2.2 OVERALL RESEARCH DESIGN .....	8
<i>Unit of analysis</i> .....	9
<b>3. THE EXPLORATORY STUDY.....</b>	<b>11</b>
3.1 RESEARCH QUESTIONS .....	11
<i>Managers' demographic characteristics</i> .....	11
<i>Management competence</i> .....	12
3.2 SAMPLE.....	13
3.3 DATA COLLECTION PROCESS .....	16
<i>Managers' demographic characteristics</i> .....	16
<i>Management competence</i> .....	18
3.4 RESULTS .....	19
<i>Managers' demographic characteristics</i> .....	19
<i>Management competence</i> .....	26
<b>4. LITERATURE REVIEW.....</b>	<b>31</b>
4.1 OVERALL PERSPECTIVE.....	31
<i>Contextual approach</i> .....	32
<i>Individualistic approach</i> .....	33
<i>Choice of perspective</i> .....	36
4.2 PREVIOUS RESEARCH UNDER THE UPPER ECHELON PERSPECTIVE.....	37
<i>Educational background</i> .....	38
<i>Functional background</i> .....	40
<i>Age and tenure</i> .....	41
<b>5. THEORETICAL CONSTRUCTS.....</b>	<b>45</b>
5.1 EDUCATIONAL BACKGROUND .....	45
5.2 WORK EXPERIENCE .....	46
5.3 MANAGEMENT COMPETENCE .....	48
<i>Problem solving strategies</i> .....	57
<i>Managerial behavior</i> .....	60

<b>6.</b>	<b>HYPOTHESES .....</b>	<b>67</b>
6.1	EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	67
6.2	ANTECEDENTS OF MANAGEMENT COMPETENCE.....	68
	<i>Problem solving strategies</i> .....	68
	<i>Managerial behavior</i> .....	70
<b>7.</b>	<b>SURVEY STUDY.....</b>	<b>79</b>
7.1	RESEARCH METHODOLOGY.....	79
	<i>Sample</i> .....	79
	<i>Data collection</i> .....	81
7.2	MEASUREMENTS.....	82
	<i>Dependent variables</i> .....	83
	<i>Independent variables</i> .....	91
	<i>Control variables</i> .....	94
7.3	DESCRIPTIVE STATISTICS.....	96
	<i>Dependent variables</i> .....	96
	<i>Independent variables</i> .....	97
	<i>Control variables</i> .....	100
7.4	DATA ANALYSES AND RESULTS.....	102
	<i>Methods of analysis</i> .....	102
	<i>Hypothesis testing</i> .....	105
7.5	VALIDITY.....	139
	<i>Statistical conclusion validity</i> .....	139
	<i>Internal validity</i> .....	141
	<i>Construct validity of putative causes and effects</i> .....	143
	<i>External validity</i> .....	149
7.6	SUMMARY OF THE RESULTS.....	150
<b>8.</b>	<b>DISCUSSION AND IMPLICATIONS.....</b>	<b>153</b>
8.1	THE RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND.....	153
	MANAGEMENT COMPETENCE.....	153
	<i>Educational background, work experience and preference for problem solving strategies</i> .....	154
	<i>Educational background, work experience and managerial behavior</i> .....	155
	<i>Organizational moderators on management competence</i> .....	157
8.2	THE JOINT EFFECT OF EDUCATIONAL BACKGROUND AND.....	159
	WORK EXPERIENCE.....	159
	<i>Educational background - a determinant of type of work experience</i> .....	160
	<i>Educational background - a social selection mechanism in the labor market</i> .....	162
8.3	DEMOGRAPHIC CHARACTERISTICS AS PROXIES FOR MANAGEMENT.....	163
	COMPETENCE.....	163
	<i>Problem solving strategies</i> .....	163
	<i>Managerial behavior</i> .....	164

8.4 IMPLICATIONS FOR FURTHER RESEARCH .....	166
<i>The relationship between personality, experience and management competence</i> .....	166
<i>The role of situational moderators on management competence</i> .....	167
<i>General issues</i> .....	169
8.5 METHODOLOGICAL IMPLICATIONS.....	169
8.6 IMPLICATIONS FOR PRACTICE.....	171
REFERENCES .....	175
APPENDIX 1: SECONDARY DATA SOURCES .....	189
APPENDIX 2: INTERVIEW GUIDE.....	191
APPENDIX 3: QUESTIONNAIRE .....	195
APPENDIX 4: COMPUTER PRINT OUTS.....	213

## List of Tables

TABLE 1: MANAGERS IN THE EXPLORATORY STUDY .....	15
TABLE 2: EDUCATIONAL BACKGROUND OF MANAGERS IN THE LARGEST INDUSTRIAL CORPORATIONS IN NORWAY 1936-1991 (AMDAM 1999) .....	20
TABLE 3: PERCENTAGE OF MEN AND WOMEN FROM SOCIAL GROUP I AND III WITH A UNIVERSITY DEGREE, WHO FINISHED A COLLEGE DEGREE IN 1958 AND WERE MANAGERS IN 1976 (EDVARDSEN, 1991) .....	23
TABLE 4: OVERVIEW OF PREVIOUS RESEARCH .....	42
TABLE 5: INSTRUMENTS MEASURING MANAGEMENT COMPETENCE.....	53
TABLE 6: MAJOR DIMENSIONS OF THE VARIABLES IN THE MANAGERIAL BEHAVIOR CONSTRUCT .....	63
TABLE 7: CORRELATION ASSIMILATOR - EXPLORER .....	85
TABLE 8: CORRELATION ORIGINAL VARIABLES AND THEIR FACTORS, PROBLEM SOLVING STRATEGIES.....	87
TABLE 9: EXAMPLES OF ITEMS FOR EACH VARIABLE IN THE MANAGERIAL BEHAVIOR INSTRUMENT .....	88
TABLE 10: CORRELATION VARIABLES MANAGERIAL BEHAVIOR.....	89
TABLE 11: CORRELATION BETWEEN ORIGINAL VARIABLES AND THEIR FACTORS, MANAGERIAL BEHAVIOR .....	90
TABLE 12: CONTROL VARIABLES.....	94
TABLE 13: CONTROL VARIABLES, NATURE OF PRESENT ORGANIZATION .....	96
TABLE 14: DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLES .....	97
TABLE 15: DESCRIPTIVE STATISTICS FOR INDEPENDENT VARIABLES.....	98
TABLE 16: COMPARISON DEMOGRAPHIC CHARACTERISTICS OF SIVILOKONOMS AND SIVILINGENIORS .....	99
TABLE 17: DESCRIPTIVE STATISTICS FOR CONTROL VARIABLES.....	100
TABLE 18: EDUCATIONAL BACKGROUND AND TYPE OF WORK EXPERIENCE, BIVARIATE CORRELATION ANALYSIS .....	105
TABLE 19: GROUPING OF RESPONDENTS BASED ON EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	107
TABLE 20: DEGREE OF MOBILITY BETWEEN INDUSTRIES .....	108
TABLE 21: DESCRIPTIVE STATISTICS ASSIMILATOR - EXPLORER STYLES - SEPARATE SCALES.....	110
TABLE 22: EDUCATIONAL BACKGROUND AND PREFERENCE FOR PROBLEM SOLVING STRATEGIES .....	111
TABLE 23: TEST OF BETWEEN-SUBJECTS EFFECTS, EDUCATIONAL BACKGROUND ...	112
TABLE 24: PARAMETER ESTIMATES EDUCATIONAL BACKGROUND AND PROBLEM SOLVING STRATEGIES.....	113
TABLE 25: TENURE AND PREFERENCE FOR PROBLEM SOLVING STRATEGIES.....	114
TABLE 26: TEST OF BETWEEN-SUBJECTS EFFECTS, AVERAGE TENURE AND FREQUENCY OF INDUSTRY CHANGE .....	115
TABLE 27: FUNCTIONAL BACKGROUND AND PREFERENCE FOR PROBLEM SOLVING STRATEGIES .....	117

TABLE 28: TEST OF BETWEEN-SUBJECTS EFFECTS, TYPE OF EXPERIENCE, FUNCTIONAL BACKGROUND PRIOR TO THE FIRST MANAGEMENT POSITION AND ORGANIZATIONAL EXPERIENCE.....	118
TABLE 29: REGRESSION MODELS, PREFERENCE FOR PROBLEM SOLVING STRATEGIES .....	121
TABLE 30: EDUCATIONAL BACKGROUND, WORK EXPERIENCE AND PREFERENCE FOR PROBLEM SOLVING STRATEGIES WITH CONTROL VARIABLES .....	122
TABLE 31: BETWEEN-GROUPS ANALYSIS, ENTREPRENEURIAL ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE .....	125
TABLE 32: ENTREPRENEURIAL ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE, REGRESSION ANALYSIS.....	127
TABLE 33: BETWEEN-GROUPS ANALYSIS, TASK ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	129
TABLE 34: TASK ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE, REGRESSION ANALYSIS .....	129
TABLE 35: BETWEEN-GROUPS ANALYSIS, POWER ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	131
TABLE 36: BETWEEN-GROUPS ANALYSIS, RELATIONSHIP ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	133
TABLE 37: BETWEEN-GROUPS ANALYSIS, ACTIVITY ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	134
TABLE 38: ACTIVITY ORIENTATION, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE, REGRESSION ANALYSIS .....	135
TABLE 39: BETWEEN-GROUPS ANALYSIS, LEADERSHIP EFFECTIVENESS, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.....	137
TABLE 40: LEADERSHIP EFFECTIVENESS, EDUCATIONAL BACKGROUND AND WORK EXPERIENCE, REGRESSION ANALYSIS .....	138
TABLE 41: POWER ANALYSES OF SIGNIFICANT MULTIPLE REGRESSION MODELS .....	140
TABLE 42: COMPARISON RESPONSE AND NON-RESPONSE SAMPLE.....	148

## List of Figures

FIGURE 1: INITIAL RESEARCH MODEL, VERSION 1 .....	5
FIGURE 2: FACTORS INFLUENCING MANAGERS' DEMOGRAPHIC CHARACTERISTICS...	7
FIGURE 3: A COMPETENCE TYPOLOGY (NORDHAUG 1993).....	28
FIGURE 4: INITIAL RESEARCH MODEL, VERSION 2 .....	30
FIGURE 5: CONTEXTUAL AND INDIVIDUALISTIC APPROACHES .....	35
FIGURE 6: EDUCATIONAL BACKGROUND CONSTRUCT .....	46
FIGURE 7: WORK EXPERIENCE CONSTRUCT .....	48
FIGURE 8: COMPETENCE ELEMENTS .....	51
FIGURE 9: MANAGEMENT COMPETENCE CONSTRUCT .....	64
FIGURE 10: RESEARCH MODEL .....	65
FIGURE 11: RESEARCH MODEL WITH HYPOTHESES .....	78
FIGURE 12: SUMMARY OF FINDINGS: EDUCATIONAL BACKGROUND AND WORK EXPERIENCE - MANAGEMENT COMPETENCE .....	151
FIGURE 13: FACTORS INFLUENCING MANAGEMENT COMPETENCE.....	165

## Acknowledgements

The support from several colleagues, friends and family has made the finalization of this dissertation possible.

First and foremost I would like to thank Associate Professor Bente Løwendahl for talking me into starting on my doctoral dissertation, which was not obvious since I then was 34 years old, had two children and a career. For me, Bente has been an academic role model and an excellent advisor. Nobody provides better comments to your research than Bente does.

I would also in particular like to thank Professor Rolv Petter Amdam who "took care" of me and made me part of the Creation of European Management Practice (CEMP) network which has made the process of finalizing my dissertation less lonely. I also thank him for all the fun we had conducting research together. I truly hope that the collaboration will continue in the future.

I would also like to thank the participants of the CEMP project for listening to my ideas and providing feedback. In addition, the social aspect of the CEMP group should not be forgotten. We have met on several occasions and really had a good time, which also motivated me to keep up the work even though I felt I was not getting anywhere.

I also owe great thanks to Associate Professor Bård Kuvaas and Professor Kjell Grønhaug. Thank you, Bård, for taking time to read through the first draft of my dissertation and for all the good and insightful comments and discussions along the way. Thank you, Kjell, for reminding me to develop a focused research question and research model and giving me important insight into research methodology.

This project would never have been completed if it were not for fellow doctoral students. In particular Randi Lunnan, Siw Fosstenløyken, Eirinn Larsen, Anne Flagstad and Marie Viken have been excellent friends and colleagues both in good and bad times.

Also my colleagues at the Department of Strategy have given both support and encouragement. This department consists of some of the best scholars at BI and being part of this milieu is therefore an excellent opportunity for learning. In particular I wish to thank Associate Professor Øystein Fjeldstad for being a really good leader and for the motivation he has contributed with during the process.

I owe great thanks to *Norske Sivilingeniørers Forening* and *Norske Siviløkonomers Forening* for helping me in the sampling process and letting me use their members as respondents. Also the support from the Norwegian Research Council (NRC) was of major importance for finalizing this project. At BI, Tore Abrahamsen helped me in the application process for the scholarship at NRC. I owe him great thanks for this help.

I would also like to thank the six managers who participated in the exploratory study. Their insight and reflections were of major importance for the following research in this project. Also thanks are sent to all the 551 managers who took time to complete the questionnaire and providing data for the research.

Furthermore, I want to thank Associate Professor Øyvind Martinsen and Professor Geir Kaufmann for letting me use their excellent instruments (A-E index and Managerial Behavior) in my questionnaire. Thank you, Øyvind for controlling the application of your instruments. This has been of great value for me. Since I was a novice in SPSS, I had to ask somebody for advice. Håvard Hansen taught me the basic functions in SPSS and was my help desk whenever I was stuck. Thank you, Håvard.

Since I had some background before starting my doctoral project, some of this experience was an inspiration to choose the particular research topic. Thank you to all my previous colleagues at Bankakademiet, NHI, NKI and DPH. In particular, thank you to Henri Werring, who made me realize that I can do what ever I decide to do. Also, Bjørn J. Hanssen who gave me the opportunity of experiencing being a leader and being truly interested in my research and providing support along the way.

Last, but not least, I would like to thank my family and friends for keeping up with me during this doctoral project and for the inspiration you have provided before I started the project. The support from you has meant a lot. In particular, thank you to Tor who has been patient and supportive when his wife wanted to challenge her intellectual capacity, and also to my two children, Lisa and Endre, who have helped mummy keep her feet on the ground and reminded her not to work too much.

Ragnhild Kvålshaugen  
Sandvika, November, 2000

## 1. Introduction

*“The 1990s have given us new insight into management. It is necessary that the management understands what the organization is producing”.*<sup>1</sup>

*“A sivilokonom degree is a more complete management education than a sivilingenior degree.”*<sup>2</sup> *This means that people with sivilokonom degrees are more qualified for different functions in the organization than those with sivilingenior degrees”.*<sup>3</sup>

There has long been a discussion about whether managers really have an impact on organizations and organizational performance. Lieberson and O’Conner’s (1972) frequently cited study found that managers account for little variance in organizational performance. However, later this study has been contested, among others by Weiner and Mahoney (1981) and Thomas (1988). If we believe that managers have an impact on organizations, it is also interesting to investigate whether or not there are any differences between groups of managers regarding their management competence. Learning theorists define learning as a process whereby knowledge is created through transformation of experience (e.g. Dewey 1958; Kolb 1984; Piaget 1969) suggesting that there is a link between individuals’ experience and competence. Inherent in the definition above lies a belief that individuals exposed to different types of knowledge will develop different sets of competence.

Another observation that led to my interest in this topic is the fact that people with degrees in engineering and degrees in business administration very often are found in management positions. This is an overall trend throughout Europe as well as in the U.S. (e.g. Amdam 1996; Byrkjeflot 1999b; Engwall 1992; Engwall and Zamagni 1998; Locke 1989). During

---

<sup>1</sup> Argument put forward by the President of *Norske Sivilingeniorers forening* (NIF) in order to explain why engineering-educated managers are attractive for Norwegian companies (Aftenposten April 22<sup>nd</sup> 1996).

<sup>2</sup> I have chosen to use the Norwegian titles of the graduates. These educational programs are translated as master programs in English. However, the English titles are not directly transferable to the Norwegian context since the *sivilokonom* program is 4 years of length and the *sivilingenior* program is 4 1/2 years of length.

<sup>3</sup> Argument put forward by the information executive in *Norske Sivilokonomers forening* (NSF) on why people with *sivilokonom* degrees are better qualified for management positions compared to people with *sivilingenior* degrees (Aftenposten April 22<sup>nd</sup> 1996).

education these two groups of students have been exposed to different types of knowledge. According to Biglan (1973), engineering is characterized as being abstract (mathematics important) and applied (active), while business education with its mix of topics is categorized as being concrete (soft) and applied in some topics like finance and accounting, and being concrete and basic (reflection) in topics like economics, organization and psychology. However, since these graduates are overall seen as excellent managerial material (elite), they are recruited into various positions in different companies and industries,<sup>4</sup> which means that their personal experience from business life may be quite diversified. In this sense, the formal knowledge they have in business related topics may have increased or decreased by their occupational experience.

This study investigates the relationship between the managers' demographic characteristics and their management competence. In addition, the study also investigates whether there are any differences between different groups of managers regarding their management competence. The managers' demographic characteristics is understood in terms of their educational background, functional background and tenure characteristics (Finkelstein and Hambrick 1996; Hambrick and Mason 1984). The understanding of management competence derives from the definition of individual competence. Individual competence is in general terms defined as composites of knowledge, skills and aptitudes that are applicable in work (Nordhaug 1993). Management competence is hence related to knowledge, skills, and aptitudes relevant for management positions. The management competence construct is represented by the following variables: preference for problem solving strategies and managerial behavior. *Educational background*, *work experience* (demographic characteristics) and *management competence* as constructs are discussed in more detail in chapter 5. The groups of managers that are compared are business-educated (*siviløkonoms*) and engineering-educated (*sivilingeniors*) managers in Norway. The introductory quote more or less assumes that nothing happens with the managers' competence after they have graduated. Some argue that managers' experience from work life is as important as the educational background for the development of the managers' competence (among others Hambrick and Mason 1984). These observations led to the overall research question addressed in the study:

**Is there any systematic relationship between managers' demographic characteristics and their managerial competence?**

---

<sup>4</sup> Labor market surveys *Norges Handelshoyskole* (NHH), *Handelshoyskolen BI* (BI), and NIF.

Why is this an interesting topic both for academics and for management? Finkelstein and Hambrick (1996:68) emphasize that “substantial work needs to be done on the antecedents or determinants of managers’ cognitive models. The distinct influences of different types of experience in shaping cognitions needs to be understood.” One aim with this study is to increase theoretically and empirically the knowledge about the antecedents of managers’ cognitive models and management competence. However, this topic is not only of interest for academics. Penrose (1959/1995) argued that an organization faces managerial diseconomies because of insufficient managerial services. In these situations the managers’ competence is not sufficient to support the growth of the firm, meaning that there is a disparity between the competence held by central managers and the type of managerial services the organization needs. This may be related to the fact that managers have the wrong type of competence to provide good managerial services for the organization. In addition, managers may not be able to use their competence optimally because they lack understanding of what kind of managerial competence the organization needs. Insufficient managerial services are often debated and discussed in the popular press. When a company shows poor performance, one explaining factor often mentioned is the managers’ lack of competence. Different stakeholders expect that managers have the sufficient competence to perceive, to comprehend, and take action related to the challenges faced by organizations. There are also ongoing debates about the composition of top management teams. A homogenous combination of competence in the top management team is by many researchers proven to be rather bad for overall organizational performance (e.g. Cohen and Levinthal 1990; Pfeffer 1983), because of few challenging viewpoints within top management teams. Hence, it is important to understand the antecedents of management competence since the competence held by managers is also likely to influence organizations (Child 1997; Finkelstein and Hambrick 1996; Weiner and Mahoney 1981).

Related to management practice, this research contributes first and foremost to knowledge about the relationship between the managers’ demographic characteristics and their management competence. The purpose of the study is to outline the relationship between demographic characteristics and management competence (possible antecedents of competence), and investigations of how certain types of demographic characteristics vary with the manager’s competence. The knowledge generated from the study is useful for organizations recruiting managers. For instance, if one organization looks for an innovative manager, there may be some types of experience that is correlated with the manager’s ability to be innovative.

Additionally, this knowledge may be useful for organizations aiming at composing particular types of management teams.

The thesis starts by presenting the preliminary research question, research model and overall research design. Chapter 3 presents the exploratory study, which consisted of an in-depth interview-based investigation of six managers' competence, focusing on their experience. I also examined the history and curricula of the schools from which these managers had graduated. The exploratory study was followed by a review of relevant previous research, presented in chapter 4. The exploratory study and the results from previous research served as underlying bases for the choices of theoretical concepts, presented in Chapter 5. The theoretical concepts *educational background*, *work experience* and *management competence* are defined here. Chapter 6 presents the hypotheses, which were tested in the survey part of the study. Chapter 7 presents the survey study and contains a presentation of the research methods used to test the hypotheses, the measurement of the theoretical concepts, the data analyses and the results of the study, and an evaluation of the validity of the findings. Discussions of the results and the implications for theory, methodology and managerial practice are presented in chapter 8. This chapter also includes some suggestions for future research.

## 2. Research Model and Research Design

This chapter presents the initial research model and the overall research design of the study.

### 2.1 Research model

The relationship between demographic characteristics (independent variable) and management competence (dependent variable) is in focus in this study. The aim is to examine whether or not there is any systematic relationship between managers' demographic characteristics and their management competence and thus identifying important antecedents of management competence. This led to the initial research model:



*Figure 1: Initial Research Model, version 1*

There are many possible sources influencing managerial competence. It was therefore imperative to explore these sources in more detail. According to Penrose (1995: 52), “Knowledge comes to people in two different ways. One can be formally taught, can be learned from other people or from the written word, and can, if necessary, be formally expressed and transmitted to others. The other kind is also the result of learning, but learning in the form of personal experience”. She goes on stating that “increasing experience shows itself in two ways – changes in the knowledge acquired and changes in the ability to use knowledge”. She also states that there is a link between what the managers know and how they act. Her insightful observations suggest that there are many ingredients of experience that might influence managerial competence. The formally taught knowledge is often acquired from education, the reading of different material, and from interaction with other people, e.g. in different types of networks. Regarding individuals' educational background, it is not random who completes which type of education, although this choice clearly has great influence on the individuals' possibilities in future work life. As expressed by Meyer (1978:55): “Education is a central element in the public biography of individuals, greatly affecting their life chances”. The two most influential

factors determining educational choices are personality and social background (Holland 1985; Segal 1992).

The personal characteristics will influence the type of profession the individual wishes to qualify for. Holland (1985) found a strong relationship between personality and choice of education. He suggests that people search environments that will let them exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles. For instance, people who are attracted to technical educations normally have a personality type that is characterized as realistic and investigative, while people who are attracted to business education normally have a personality type that is characterized as conventional and enterprising. This implies that the individuals' selection of both type and level of education is strongly related to their personal preferences. Personality cannot be viewed as a demographic characteristic. However, individuals' personality will influence the type of vocational choices and preferences they have (Holland 1985) and therefore this variable was included in figure 2.

Social background also influences educational choices. For instance in Norway, there is an over-representation of students attending business education and engineering education who have parents with higher education and who come from a traditional middle class background (NIFU 1997). Social background and personality will limit the type of education that is seen as interesting for the individual. We also know that certain educational backgrounds are more frequently found among managers, and thus we can assume that some personalities and people with particular social backgrounds are over-represented in management positions. From education, the individual achieves some formal knowledge of different topics (Schunk 1991) together with the symbolic effect connected to different types of educational background (Bourdieu and Passeron 1977). The formal knowledge becomes a concrete experience that may influence management competence. The symbolic effect of education plays an important role as a selector, sorter and allocator of the individuals' further occupational career. Education functions in society as a legitimating theory of knowledge defining certain types of knowledge as extant and authoritative. It also functions as a theory of personnel, defining categories of persons who are to be treated as possessing these bodies of knowledge and forms of authority (Meyer 1978). In this sense formal educational background functions as a selection mechanism for future occupational career and thus influences the types of experience that an individual is able to achieve. As expressed by Meyer (1978:75): "The education he receives has a very special status and authority: its levels and content categories have the power to redefine him legitimately in the eyes of everyone around him and thus take an

overwhelming ceremonial significance”. Educational background may therefore influence management competence in two distinctive ways – concrete formal knowledge and prerequisite for career opportunities and thus personal experience.

Learning from personal experience results from work experience, but also from general interaction with other people in different social settings. The nature of work experience can be formally expressed by looking at the different positions managers have had through their occupational career, their tenure in different positions, the types of organizations in which they have been employed, and the types of industries they have their experience from (Finkelstein and Hambrick 1996). Through occupational careers individuals are likely to gain knowledge and skills that become ingredients characterizing their competence.

In addition, personal experience is not only gained through interaction with people in their work place. From their social background, through their education and from their work experience individuals develop personal networks (Kotter 1982). Also the fact that different personality types have different interests, competence, and dispositions, they tend to surround themselves with special people to seek out problems that are congruent with their interests, competence and outlook of the world (Holland 1985). Thus, there might be a relationship between individuals’ personality and the type of people in their personal networks. These networks are likely to be arenas for transmitting formal knowledge, but also for learning by sharing personal experience. In this sense personal networks are also places where individuals gain managerial experience.

The above discussion led to the following conceptual model, which explains the independent variable in the study:

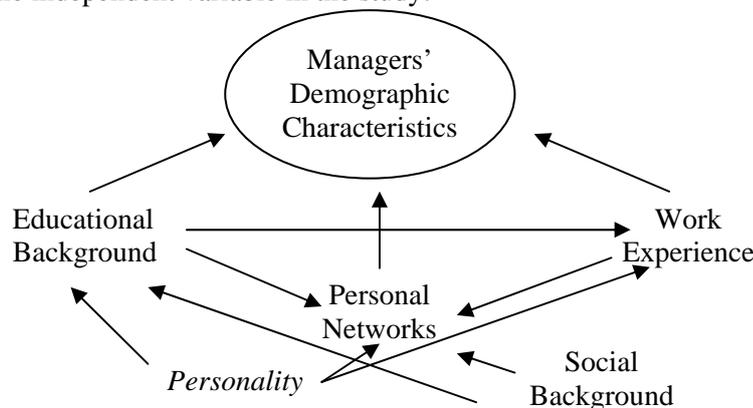


Figure 2: Factors Influencing Managers’ Demographic Characteristics

All the elements in the definition of managers' demographic characteristics can theoretically be assumed to influence management competence.

## **2.2 Overall research design**

This study consisted of two empirical parts. The first part was an exploratory study investigating the independent and dependent variables. This part consisted of an in-depth study of six managers' experience and competence, curricula analyses, and archival data on the role of the selected educational institutions in the Norwegian society. The second empirical part was a survey study, which tested the hypotheses developed from the exploratory study and the literature review. The overall research design for the whole project is presented in this chapter, while the direct choices related to the exploratory study and the survey study respectively are presented in chapter 3 and 7.

Research design is understood as the choice of strategy to collect the information needed for answering the research question (Ghauri, Grønhaug, and Kristianslund 1995). Research designs may be classified as exploratory, descriptive (explanatory) and causal (Ghauri et al. 1995). What overall research design is best is to a large extent related to the research question. When the research problem is unstructured and relatively little knowledge exists in the relevant research area, an exploratory research design is appropriate. The main focus using an exploratory research design is to build new theory (context of discovery). In situations where previous research on the phenomenon is more extensive, and the researcher is consequently better able to present structured problems, the focus lies more on testing theory (context of justification). Descriptive and causal designs are appropriate when the focus is on testing theory. Descriptive designs test pre-specified associations without giving information on which variable is the cause of another, while causal designs aim at finding and explaining the relationships between cause and effect.

The main aim of the study was to identify if there was any relationship between the managers' demographic characteristics and managerial competence. This study used a combination of exploratory and causal designs. The reason for this approach was connected to the available information on the independent and dependent variables examined. Investigations of the relationship between managers' demographic characteristics and cognition were not an immature research area (e.g. Finkelstein and Hambrick 1996), thus context of justification seemed like the appropriate choice of research design. However, the relationship between

managerial cognition and competence has not to my knowledge, explored that much. Also the proposed types of demographic characteristics that might influence management cognition is quite extensive (e.g. Hambrick and Mason 1984) and certainly there are some interaction effects between different types of demographic characteristics, but the nature of interaction effects have not been that detailed in previous research (e.g. Waller, Huber, and Glick 1995). In terms of being able to propose hypotheses based on previous theory, neither of the concepts were well enough defined and operationalized in order to generate hypotheses without more exploratory investigations. Particularly, the understanding of interaction effects between demographic characteristics and how to measure management competence (the relationship between cognition and competence) was unclear; thus the major aim with the exploratory study was to explore these topics.

### **Unit of analysis**

The study focused on individual managers and thus the unit of analysis was managers. However, it is important to be aware that practicing management or leadership cannot be taken out of a context. The life of the organization and the functions and the activities of the manager are closely linked. This is often labeled "management as an art". However, the nature of management does not need to vary with each social situation (Selznick 1957). This is in many instances labeled "management as a science". This study did not focus on the practice of management in a social setting. The focus was rather on the nature of managers' competence and whether there were any systematic relationships between the content of their competence and their demographic characteristics. However, institutional forces and activities (Scott 1995) also influence experience, both related to the opportunities individuals have for achieving particular types of competence, e.g. selection mechanisms in the labor market, and also through direct influence on individuals' cognitive bases and values from institutional forces, e.g. norms and cognitive constructions. In this study, the institutional forces were treated as dimensions of the independent variable (demographic characteristics), represented by norms and constructions developed from the individual's social background, educational background, work experience and from social interaction in personal networks.

Next, I will present the exploratory study. This chapter consists of a presentation of the research questions, the sample, the data collection process, and the results from the exploratory study.



### **3. The Exploratory Study**

The exploratory study consisted of two major parts. First, the nature of the independent variable (demographic characteristics) was examined. The focus here was on the more contextual elements (institutional forces) influencing the selection processes and the norms related to who become managers. In addition, the relationships between the different elements of the observable experience of managers (demographic characteristics) were examined. This investigation guided the choice of demographic characteristics that seemed to be most influential on management competence. The second part of the exploratory study consisted of an in-depth examination of the management competence construct. The aims were to generate insight on how to measure management competence, to look more closely at the relationship between demographic characteristics and management competence of a few managers, and to investigate types of theoretical perspectives that could be suitable when making operationalizations of the management competence construct.

#### **3.1 Research questions**

During the development of the research model I identified a need for more grounded investigations around the concepts *managers' demographic characteristics* and *management competence*. The existing literature regarding these topics did not provide complete answers to how the relationships between demographic characteristics and management competence could be investigated.

#### **Managers' demographic characteristics**

As for demographic characteristics, there was indistinctness around the interaction effects between the different characteristics (figure 2). I needed to understand the relationships between the different variables (personality, social background, educational background, work experience, and personal networks) better. This led to the following speculations: What roles do social background and personality play for educational choices? How are personal networks developed, and what influences do they have on managerial competence? Are some experience variables more influential when it comes to determine which individuals become managers in a society? Why do so many managers in Norway have the same educational background? These questions were in focus for the investigations around the independent variable (the managers' demographic characteristics).

## **Management competence**

The other topic under investigation concerned the dependent variable - management competence. One example of shortcomings in previous studies on management competence is how to measure management competence. Previous research on individual competence gives some ideas in this direction (e.g. Boyatzis 1982; Collin 1989; Nordhaug 1993). However, most of these studies have focused on individual competence as opposed to management competence. In addition, most of the studies have been occupied with examining task- and firm-specific competence in an organizational setting rather than focusing on more general management competence. In this sense, previous studies have primarily studied the link between the individual and the organization and how well the individual's competence fits the needs of the organization. Another research area that has investigated general management competence or cognitive bases and values, as they express it, is the upper echelon perspective (Finkelstein and Hambrick 1996; Hambrick and Finkelstein 1987; Hambrick and Mason 1984). These researchers suggest that observable demographic characteristics of top executives can be used to infer psychological cognitive bases and values. The issues raised in the research of individual competence and in the upper echelon perspective led to the following speculations around the dependent variable: How can management competence be measured? Is there really any connection between managers' competence and their demographic characteristics? In addition, since the upper echelon perspective focuses on top management, could concepts and ideas generated from this research area be useful for understanding the relationship between managers' demographic characteristics and management competence for professional and middle managers?

The information used to answer these research questions was collected in two major ways. First, different secondary data sources were reviewed (see appendix 1). Information impossible to acquire from the secondary data sources was collected from in-depth investigations of six managers. The information provided by the secondary and the primary data sources gave me knowledge of the relationship between demographic characteristics. It also generated ideas on how to measure management competence, and shed more light on the relationship between managers' demographic characteristics and management competence.

The next section of this chapter presents the six managers that participated in the exploratory study.

### 3.2 Sample

The sample for the exploratory study consisted of six managers who were selected based on the following criteria:

- The participants should be graduates from the *sivilokonom* program at Norwegian School of Economics and Business Administration (NHH) and the *sivilingenior* program at Norwegian University of Technology and Science (NTNU).
- Three representatives from each of the educational groups were selected and at least one representative in each group should be a woman.
- The participants should have various managerial experience.

The reason for the choice of the educational institutions was the fact that these schools were the two institutions that first started graduating *sivilokonom*s and *sivilingenior*s in Norway. In this sense, they were the fundamental elite institutions (Bourdieu 1996). Even though other educational institutions later on have been allowed to issue these titles, these two institutions have a particular symbolic influence based on their age and position in the Norwegian society (Amdam 1999). The reason for the deliberate choice of at least one female manager in each group lies in the overall belief that female managers are different from male managers (e.g. Grant 1988; Loden 1986). The choice of having variation in types of work experience was guided by the observation that some educational backgrounds seem to be more preferable in management positions compared to others. This indicates that graduates with business education and engineering education can have quite diverse types of work experience regarding types of industries, organizations and functions they have been employed in. Based on the belief that the nature of work experience can be as influential as educational background on management competence I searched for variation in the type of work experience and kept the educational background constant to two types of educational backgrounds. However, two of the participants in the *sivilingenior* group were also *doctor ingenior* as well as *sivilingenior*. This may indicate that these two participants to a larger extent have had a professional interest compared to managers with only a *sivilingenior* degree and therefore they may have other opinions about the managers' roles compared to the other participants of the exploratory study. Another bias caused by the characteristics of the participants of the two educational groups is their age. The table below shows that the participants in the *sivilokonom* group are much younger compared to the participants in the *sivilingenior* group. Age may also have an influence on their views of the relationship under investigation (Finkelstein and Hambrick 1996). Unlike many previous studies of managers (e.g. Finkelstein and Hambrick 1996; Hambrick and Finkelstein 1987;

Hambrick and Mason 1984) which particularly have focused on top executives, I was interested in managers at all levels. The major argument for investigating the relationship between management competence and managerial experience of managers of different managerial levels was to identify if managerial level influenced the relationship in any significant way. The detailed description of each manager who participated in the exploratory study is presented in the following table:

Table 1: Managers in the Exploratory Study

	M1	M2	M3	M4	M5	M6
<i>Gender</i>	Male	Male	Female	Male	Male	Female
<i>Birth year</i>	1962	1946	1962	1947	1948	1944
<i>Main education</i>	Sivil- okonom NHH 1986	Sivil- okonom NHH 1971	Sivil- okonom NHH 1986	Sivil- ingenior (electronics) NTH 1973	Sivil- ingenior (civil engineer) NTH 1974	Sivil- ingenior (chemical engineer) NTH 1970
<i>Add. education</i>	None	Inter- mediate program in sociology + different manage- ment programs	Different manage- ment programs	Dr. ing. NTNU (electronics) 1976 Manage- ment program at his first employer	Dr. ing. NTNU (civil engineer) 1978	Foundation in business adm. + different manage- ment programs
<i>Current position</i>	Chief Financial Officer Executive Vice President	Consultant head- hunting + board member	Marketing manager	Senior Vice President	Principal of the Info. Manage- ment Discipline	Senior Vice- President
<i>Length of current position</i>	4 years	7 years	6 years	1 year	6 years	4 years
<i>Industry</i>	Insurance	Mgmt. consultancy	Food industry	Energy – hydro power	Mgmt. consultancy	Industrial chemicals
<i>Career track</i>	P1: 1-year secretary for the chairman of the city govern- ment in Oslo. P2: 4 years as consultant. P3: 3 years in different positions at his current employer in economic and financial positions.	P1: 5 years in various financial, economic positions at a kitchen producer. P2: 6 years consultant + assistant secretary at the ministry of industry P3: 11 years in different positions in one of Norway's largest industrial corporations Last pos.: President of the company.	P1: 1 year marketing consultant in a bank. P2: 5 years marketing consultant, product manager and marketing manager at a publishing firm. P3: 1-year product manager. After that, marketing manager.	P1: 12 years as electronic engineer in one of Norway's largest electronic companies P2: 7 years as president of an IT- cooperation P3: 1 year consultant P4: 7 years in different mgmt. positions at his current employer – hydropower producer and seller.	P1: 4 years researcher P2: 1-year dr. scholar for the NRC <sup>5</sup> . P3: 15 years senior systems engineer, manager, vice president, resident representa- tive and special adviser in a large engineering consultancy firm in Norway.	P1: 6 years researcher P2: Since then different positions at her current employer (12 years) in following positions: marketing, technical manager, section head, chief engineer, assistant manager.

<sup>5</sup> Norwegian Research Council.

### **3.3 Data collection process**

In this section, the details concerning the data collection process are presented.

The data collection process started by going through various secondary data sources viewed as relevant for the research question (appendix 1). Based on these sources an interview guide was developed and interviews with the six managers were conducted. Each manager was interviewed for approximately two hours. The interviews were semi-structured in the sense that I used the same interview guide for all the interviewees (appendix 2), but we discussed freely around the research topic on the basis of the questions in the interview guide. The topics discussed were related to the manager's previous work experience and relevant leisure activities (s)he has been/is involved in as well as his/her previous and contemporary management roles, his/her views on management ideas developed during education, what (s)he believed were the most influential antecedents of his/her management competence, and the role his/her personal networks have played in the development of management competence. The written documentation from the interviews was sent back to the interviewees and they corrected and added things I had misunderstood, or things we did not discuss during the interview, but which they felt were important.

#### **Managers' demographic characteristics**

An important topic in the exploratory study was the relationship between the different experience variables (personality<sup>6</sup>, social background, educational background, work experience, and personal networks). The studies of Aamodt (1982), Edvardsen (1991), Opheim (1999) and Birkelund, Gooderham, Nordhaug, and Ringdal (2000) provided useful input regarding the social background of business and engineering graduates in Norway. However, these studies do not focus on the graduates who have become managers. These studies explore business and engineering graduates in general. In order to see if this picture was significantly different regarding managers with these two particular educational backgrounds, I asked the participants in the exploratory study about their general background (social background).

---

<sup>6</sup> This variable is not a demographic characteristic. However, individuals' personality is found to have strong influence on vocational choices (Holland 1985) thus influencing educational choices and career preferences. Personality can hence be considered an important prerequisite for individuals' type of educational background and type of work experience.

Regarding the relationship between personality and educational background there is to my knowledge no research in the Norwegian context focusing on the relationship between personality and vocational choices. Internationally, the most well known contributor in this area is Holland (1985). While conducting the exploratory study, his concepts of the relationship between personality and vocational choices served as important background information. In order to examine whether Holland's findings were relevant for individuals in Norway, I used the six managers' viewpoints given on the reasons for their educational choices. In addition, I also used the survey conducted by Edvardsen (1991) which examines the reasons for different educational choices among Norwegian students.

Regarding the relationship between educational background and work experience, I also used information from the six managers participating in the exploratory study. I investigated their curriculum vitae in order to see if there were any patterns that could explain why they had become managers. In addition, several previous studies also contributed with useful information on this topic e.g. Amdam (1999); Byrkjeflot (1997); Byrkjeflot (1999a); Gammelsæter (1991); Lidtun (1995); and Skaalebraaten (1996).

The insight concerning the development of personal networks was also based on the information given by the participants in the exploratory study. I asked them to specify to what extent they still had any contact with their co-students. The secondary data regarding personal networks is quite spare, at least related to Norway, which caused problems achieving an overview in order to propose hypotheses on the relationship between personal networks and management competence.

Another important topic was related to why people with a certain educational background are more frequently found in management positions compared to other educational groups. Could it be that graduates with the "right" certificates more easily get access to management positions compared to graduates without such certificates? There are two major ways of understanding why some educational backgrounds are more frequently found in management positions compared to others. The first obvious reason is that these graduates have particular competence based on their educational background that is seen as more appropriate for management positions. In the exploratory study this reason was further examined under the competence construct. Another reason may be based on the symbolic function which the certificates from the "right" schools have for selection processes of managers in the labor market. Here the proposed link between educational background and work experience is of particular interest. In the exploratory study, the symbolic function of the certificates for recruitment of

managers was examined by looking at different written material about this topic, like the history of the schools (Amdam 1993; Hanisch and Lange 1985; Jensen and Strømme Svendsen 1986), different labor market surveys (appendix 2), and different theses written about the topic (e.g. Lidtun 1995; Mardal 1998; Rystad 1995).

### **Management competence**

The major task here was to identify how management competence could be studied. Is it possible to detach management competence from the organization as Selznick (1957) suggests (management as a science) and study it on an individual level? In addition, is research examining the relationship between top managers' demographic characteristics and cognitive bases and values a promising route to follow for this study? The exploratory study also examined further the relationship between managers' demographic characteristics and their management competence.

Insight on how to measure management competence was achieved by asking the managers to identify important knowledge, skills, aptitudes and values they were able to retrace to their past experience (interview guide - appendix 2). In addition, major work was done on examining the concept theoretically. This included further investigations of how other researchers had measured individual and management competence (Boyatzis 1982; Collin 1989; Nordhaug 1993).

Another topic of importance related to the investigations around management competence was the relationship between the managers' demographic characteristics and their management competence. The aim here was to propose some preliminary relationships. The educational background as an antecedent of management competence was examined by investigating the curricula of some selected educational institutions, as well as by asking if any of the knowledge and skills taught at the schools have had any enduring effects on the graduates' competence. The type of formal knowledge received during education was identified by investigating the content of the curricula at the major business<sup>7</sup> and engineering schools<sup>8</sup> in Norway. The content analyses of the curricula were conducted before the interviews, and thus served as important background information for the interviews of the six managers. The role of work experience for management competence was examined by looking at the interviewees' curriculum vitae, the interviewees' reflections around their own work experience, and how

---

<sup>7</sup> NHH

<sup>8</sup> NTNU

they believed their particular type of work experience had influenced their management competence.

The investigations of the competence of the six managers participating in the exploratory study covered the similarities and differences between managers on different management levels in organizations since the six managers were found at different managerial levels. One of them had previously been a top manager and two were presently members of the top management team in their organization. The rest had different middle management or professional management positions.

### **3.4 Results**

This section presents the major results from the exploratory study, which together with the literature review (to be presented in chapter 5), served as the foundation for the generation of the hypotheses presented in chapter 6.

#### **Managers' demographic characteristics**

The presentation of the results from the exploratory study concerning managers' demographic characteristics is organized around the factors presented as issues influencing managers' demographic characteristics in figure 2, page 7, i.e. educational background, work experience, social background, personality<sup>9</sup> and personal networks.

##### *Educational background*

Educational background has a distinctive and important function for the selection processes of individuals to management positions. Both Amdam<sup>10</sup> (1999) and Skaalebraaten<sup>11</sup> (1996) showed that among Norwegian managers, lasting as far back as to 1936, engineers (read *sivilingeniors*) have frequently been found in management positions. From the 1970s and onwards the business graduates have increased their proportion of managerial positions. The domination of these two educational groups in management positions is still present in Norwegian business life.

---

<sup>9</sup> Personality is handled as an important prerequisite for educational choices, vocational choices and personal networks.

<sup>10</sup> The top manager's educational background in the largest industrial corporations in Norway from 1936-1991.

<sup>11</sup> The top manager's educational background in 50 of the 100 largest corporations in Norway from 1970-1995.

Table 2: Educational Background of Managers in the Largest Industrial Corporations in Norway 1936-1991 (Amdam 1999)

Education	1936	1967	1977	1984	1991
<i>Sivilingenior</i>	43%	52%	50%	35%	30%
<i>Sivilokonom</i>	3%	7%	24%	28%	41%
Law	3%	12%	8%	9%	9%
Other	51%	29%	18%	28%	20%
<i>Sivilokonom+</i> <i>Sivilingenior</i>	<b>46%</b>	<b>59%</b>	<b>74%</b>	<b>63%</b>	<b>71%</b>
<i>N =</i>	<b>30</b>	<b>68</b>	<b>78</b>	<b>79</b>	<b>70</b>

Skaalebraaten (1996) investigated the educational background of the top managers in 50 of the 100 largest corporations in Norway. His data also included 1995, and showed that *sivilingeniors* (36%) and *sivilokonom*s (34%) are still the most prominent educational backgrounds among top managers in Norway. However, there are some variations of the relative weight of each educational group in different time periods during the 20<sup>th</sup> Century. Amdam (1999) identified a covariation among the educational background of the managers and the general competence demands from business life in the different time periods. The classification of time periods is developed by Fligstein (1987) who identifies four time periods: direct control of competitors, manufacturing control, sales and marketing control, and finance control in the development of large corporations in the U.S. Fligstein (1987) used these time periods to explain the rise of finance presidents in large U.S. corporations from 1919 to 1979. According to Amdam (1999), the production control phase was present in Norway until 1960. This phase made the competence of the engineers particularly relevant and thus explains why engineers had such a prominent position in Norwegian business life during this period. From the 1960s and onwards the market control phase became more important, thus putting the competence of the business graduates more in focus. The finance control phase (from 1980 and onwards) further strengthened the demand for the type of competence represented by business graduates. As Amdam (1999:424) showed the relative success of business graduates in management positions<sup>12</sup> really increased from the 1970s and onwards, from 3.3 in 1967 to 9.4 in 1977. The relative importance of engineers was in the same period reduced from 8.6 (1967) to 3.3 (1977).

<sup>12</sup> The graduates' relative success in management positions is computed by dividing the number of top managers by the total number of graduates in the same educational group 10-35 years earlier. The total number of graduates includes both domestic and foreign graduated Norwegians, with the relevant educational background.

From the interviews with the six managers, it also seemed like the formal competence received during education has had an influence on whether or not an individual is viewed as appropriate for management positions. This is illustrated in the following quote<sup>13</sup> from one of the interviewees: *“The business graduate program is a general education, which emphasizes important elements related to the organization’s well-being. Even though you are not working in functions connected to accounting, finance and personnel administration, you know the relevant terms and concepts”*. The above findings suggested that there is a relationship between the educational background and selection mechanisms in the labor market regarding managers. Whether the influence of education is merely symbolic or if it has a direct effect on the managers’ competence was further analyzed in the survey study.

#### *Work experience*

The headhunting of graduates for recruitment to management positions was another observation that strengthens the argument of the graduates’ formal educational background as an important selection mechanism for managerial positions. Graduates are traditionally recruited to organizations by applying for positions publicly advertised in newspapers or other information channels. However, headhunting of excellent graduates has become more and more common. Attractive positions (often favorable for persons wanting to be managers) are not publicly advertised. Different prestigious companies’ selections of educational institutions from where they recruit graduates limit the type of graduates that have opportunities to enter such attractive positions. Traditionally, schools in Norway where companies frequently recruit graduates are NHH, NTNU and <sup>14</sup>BI. At the universities, headhunting of graduates has until recently been more or less unknown. Managers in organizations make the decision where the appropriate candidates for future employment are to be found. Many of these managers have themselves the same type of education that they seek from candidates they wish to recruit. Once a critical mass of managers has the same type of educational background, this elite will reproduce (Bourdieu 1996; Bourdieu and Passeron 1977). In this sense, the school where the graduates have received their certificates will serve as an important legitimization factor for selection in the labor market. By this selection mechanism graduates from prestigious schools have more easy access to positions that to a greater extent qualify them for management positions later on in their career.

---

<sup>13</sup> The different interviewees were promised anonymity. As a consequence no references to the sources are highlighted in the text.

<sup>14</sup> Norwegian School of Management – BI.

However, this is not the only factor that explains why some managers with particular types of educational backgrounds become managers. Structural factors such as managerial competence demands, industrial structure, and organizational structure researchers have been suggested to influence who becomes managers (e.g. Amdam 1999; Gammelsæter 1991; Fligstein 1987).

There is also another aspect with the headhunting of graduates. Previous studies show that there are clear relationships between who are recruited in lower positions and who become managers (Kotter 1982). This is related to the advancement system and life-long careers in many organizations. If an organization primarily recruits new employees from particular schools and educational programs, it is very likely that a large proportion of the managers in this organization also over time have quite homogeneous educational backgrounds.

Even though individual competence is not only developed through formal and higher education, the formal knowledge and skills gained during education and the symbolic effect of education as a selection mechanism for future work life seem to have an enduring effect on individuals (Meyer 1978).

Overall, the conclusions from the exploratory study suggested that the individual's educational background serves as a prerequisite for the type of work experience the individual achieves. To my knowledge, there are no studies on managers' career paths in Norway. For many years the different schools and associated organizations have made surveys investigating the labor market for their graduates immediately following the completion of their education.<sup>15</sup> These surveys have indicated that the graduates from the business and engineering schools to a great extent get jobs relevant to their educational specialization following graduation, even more so than other educational groups.<sup>16</sup> Very few (not surprisingly) received a management position right after graduation. What further happened with the graduates' career after the first position and before a fairly large proportion of them got into management, we do not know much about. However, the results from the interviews with the six managers suggested that it did not take long before these graduates were in management positions.

---

<sup>15</sup> Labor market surveys from NHH, BI, NIF and Universium.

<sup>16</sup> The Graduate Survey 1997, Norwegian Institute for Studies in Research and Higher Education (NIFU).

### *Social background and educational choices*

The preliminary assumptions that social background influenced educational choices seemed to be valid. In general, educational choice is assumed to be a function of gender, place of residence, parents' educational background, family income, parents' occupation, occupants per room, family size, and school achievements (Aamodt 1982). On a general level for all university-educated persons in Norway, there is an over-representation of candidates from social group I (father's occupation: academic, manager, executive officer) both for men and women, candidates with parents who have higher education, and candidates who come from urban areas (Aamodt 1982). The table below shows that men from social group I have tentimes greater chance of getting a university degree and becoming a manager compared to men from social group III and women from social group I.

*Table 3: Percentage of Men and Women from Social Group I and III with a University Degree, who finished a College Degree in 1958 and were Managers in 1976 (Edvardsen, 1991)*

<i>Gender</i>	<i>Male</i>		<i>Female</i>	
	<i>I</i>	<i>III</i>	<i>I</i>	<i>III</i>
<i>Social group</i> <sup>17</sup>				
Share of nineteen-year-olds who became students	47	6	41	4
Share of high school graduates who became students	71	60	36	20
Share of students who finished their education	65	67	48	39
Share of candidates who became managers	45	36	15	13

Recently more women than men have graduated from the universities, 19177<sup>18</sup> (67%) women and 9643 (33%) men in 1996/97.<sup>19</sup> However, regarding the *siviløkonom* program and the *sivilingenior* program the share of men and women is different from this overall picture. The gender dimension is of importance in order to understand the characteristics of the graduates at the selected educational institutions compared to other graduates in other educational programs at the university level. The *siviløkonom* and the *sivilingenior* programs have a tradition of being male dominated. In the *siviløkonom*<sup>20</sup> program in 1996/97, there were 285 (31%) women and 633 (69%) men who graduated. For the *sivilingenior* program in 1996/97 the

<sup>17</sup> Social group I: Father's occupation: academic, manager, executive officer. Social group III: Father's occupation: foreman, worker, farmer, fisherman.

<sup>18</sup> Educational level II - 4 years post-college education or less (equivalent with the *siviløkonom* program).

<sup>19</sup> Students' and the population's educational level Oct 1 1997, Statistics of Norway.

<sup>20</sup> Graduates from the Norwegian School of Management were not included in the statistics.

number of graduates were 314 (21%) women and 1215 (79%) men in 1996/97. For both studies, the number of females has increased during the last years.

Regarding social background of the graduates in the *sivilingenior* program (NTNU), there is an over-representation of students with parents who have higher education, parents with incomes above average, and with geographical proximity to the educational institution (Sor-Trondelag) (Opheim 1999). There are also proportionally more students from urban areas compared to sparsely populated areas in the *sivilingenior* program. The social background of students in the *sivilokonom* program has many similarities with the one identified in the *sivilingenior* program. The results from the Graduate Survey 1997 (NIFU) showed that there is a higher proportion of business graduates with fathers who have a higher education. This characterized 45.5% of the business graduates at NHH. In another study, Aamodt (1982) found that among the graduates at NHH there was an over-representation of males where the fathers had management positions and/or had occupations in commerce. The geographical proximity to the educational institution is also high for business graduates. There is an over-representation of graduates from Rogaland, Hordaland, Sogn og Fjordane and More og Romsdal at NHH. Proportionally there are not more students from urban areas compared to sparsely populated areas in the *sivilokonom* program (53% for cities and 47% from rural areas). This led to the conclusion that there is a strong link between educational choices and social background, especially regarding gender, social background and geographical location of the educational institution.

#### *Personality and vocational choices*

The personality variable as presented by Holland (1985) was only explored in the participants (the six managers) in the exploratory study. The graduates from the engineering education fit Holland's description, namely that individuals applying for engineering education have realistic and investigative personality types. However, the fact that this education was looked upon as a "good" education also influenced the educational choice. The same variable was also of importance for the business graduates. Holland (1985) suggests that people applying for business studies are enterprising and conventional. This picture was not so clear regarding the participants in the exploratory study. It seemed rather more important for them to select an education that gave them many opportunities for various occupational choices. Overall the participants did not have any clear career goal, so selecting a "good" education that gave them many opportunities in the labor market drove their educational choice. As one of the participants expressed it: *"This education is useful if you are not quite sure of what you*

want to be". Eriksen (1982) who made a study of some selected educational groups found that students overall chose their education primarily for the opportunity to get an interesting occupation and/or due to professional interest. He observed large differences between educational programs. He emphasized in particular that *sivilingenior* students more frequently chose their education based on the opportunity of having an interesting occupation and earning a good income compared to art students for instance. The main conclusion drawn from this exploration was that personal preference and values seemed to influence educational choices and these elements were to some extent linked to personality.

#### *Personal networks*

The last demographic characteristic examined was personal networks. One result from the exploratory study indicated that the personal networks developed during work experience were more important as an experience variable than those developed during education. However, the insight from the exploratory study made me understand that the development of personal networks is a complex matter to investigate. Based on the limited information I got out of the exploratory study combined with the limited information on this topic, at least for Norwegian managers, I decided to leave this variable and focus on the other variables when comparing managerial experience and management competence.

Initially, I proposed a link between social background, educational background, work experience and personal networks with personality as an important prerequisite for educational and vocational choices, and types of personal networks (figure 2). Based on the information collected from the six managers this initial model seemed to hold. The analyses conducted above led to the following conclusions regarding managers' demographic characteristics:

- There is a clear link between educational background and occupational career. The symbolic function of education seems to be more important than the concrete competence gained during education for the selection of graduates in the labor market, at least regarding educational groups recruited to management positions.
- The findings in the exploratory study suggest that educational background and work experience are the most influential antecedents of management competence. Social background and personality as antecedents of management competence are to some extent covered by educational choices since previous research has shown that some personality types (Eriksen 1982; Holland 1985) to a greater extent than

others are drawn to particular educational programs. We also know from previous research that there is an over-representation of students with a particular social background in engineering and business education (Birkelund et al. 2000; Edvardsen 1991; NIFU 1997; Opheim 1999; Aamodt 1982). However, the major aim of the study has not been to examine the nature of managers' demographic characteristics. Rather the aim was to investigate if there was any relationship between managers' demographic characteristics and their management competence. As a result, educational background and work experience were the demographic characteristics that were used in the further investigations.

- Personal networks seem to be important antecedents of management competence. However, in order to propose hypotheses on the relationship between personal networks and management competence more in-depth exploratory studies are called for due the relatively unknown status of this variable. Subsequently, this variable was not further analyzed in this study.

### **Management competence**

The next task of the exploratory study was to elaborate more on the management competence construct. This elaboration was more practical than theoretical. The theoretical definition of management competence is found in chapter 5.

The other topic under investigation focused on the relationship between managers' demographic characteristics and their management competence. This exploration started by focusing on the relationship between educational background and management competence. First, based on the content analysis of the curricula and the study of the six managers there seems to be some relationship between educational specialization and how individuals approach problem solving processes. Business-educated managers are primarily trained in analyzing problems,<sup>21</sup> while engineering-educated managers are trained in solving problems.<sup>22</sup> The participants in the exploratory study suggested that the overall problem solving strategies achieved during education might be an enduring ingredient of management competence. The following quotes are good examples of this contention: *"An engineer approaches a problem with the attitude of solving it, while a*

---

<sup>21</sup> "The core in the business graduate program is to train students in analytical thinking and analyzing major problems in business organizations" (The *siviløkonom* program, NHH 1990/91:3).

<sup>22</sup> "An engineer is a person who studies, invents and creates things"  
[http://www.ntnu.no/studtilbud/tekst.phtml?d=\\_siving](http://www.ntnu.no/studtilbud/tekst.phtml?d=_siving))

*person with a business education approaches the problem to figure out what is difficult". "Engineers are more solution-oriented, while people with business education are more process-oriented".* Second, it seems like technical education fosters more innovative skills than business education does. As one of the participants in the study said: *"Engineers are creators, they want to find solutions to problems and make things work".* Another participant emphasized that *"business graduates are trained to be administrators - define objectives, manage processes and make decisions".* In the curricula at NHH, many of the courses train students to analyze problems and thereby also make them more aware of risks connected to different decision alternatives. These courses train the students in approaching different challenges the company faces from a risk avoidance perspective. Engineers on the other hand are trained more in finding solutions than analyzing problems; they may put less focus on risk and more on searching for new opportunities. Third, people with a business education have a tendency to value profit maximization as opposed to engineers who rather value development of good solutions and creating new products. As two of the participants in the study expressed it: *"At NHH, everybody talked about profit maximization"* and *"at NTNU, the focus was on finding good solutions and creating things"*. Fourth, people with a broader experience base are more likely to practice general management than managers with more specific experience. As indicated by a quote from the exploratory study: *"A manager needs to focus on the decision (my insertion) process rather than making detailed decisions. Engineers in management positions often have difficulties in not having a finger in every pie".* The ability to practice general management seems also to be strongly correlated to type of work experience. Business-educated managers seem to have broader experience compared to engineering-educated managers, at least when it comes to mobility between industries and companies. The majority of the business graduates tends to start their career in finance, accounting and consulting.<sup>23</sup> Finance and accounting are functions connected to the control of the organization's activities. It may therefore be easier for persons with this kind of experience to take a more general view on the organization compared to managers who have their previous experience from production and in an engineering-specific area. Based on their experience, engineers seem to feel greater "ownership" to the organization's products compared to business-educated managers. Engineers have often been directly involved in the creation of the products. This also has consequences for managers with engineering background when they enter management positions. They seem to have more difficulties letting the profession fade away in a management position: *"they tend to develop into advanced professionals at a higher level*

---

<sup>23</sup> European Graduate Surveys 1998, Universium Institute.

*in the organization". On the other hand, a manager with an engineering background may know more about what is going on in the organization compared to a person with experience from control activities. "Persons with engineering background and experience have a greater ability to understand the realities and not only the "numbers" behind what is happening in the factories and markets".*

Another question concerned whether or not research on top managers was relevant for understanding management competence at all managerial levels. There is no reason to believe that experience achieved by top managers will influence them in a different way compared to middle managers or professional managers. The same fundamental issues are present. The use and need for different sets of competence may vary with different types of management positions. Nordhaug's competence typology (1993) was used to demonstrate these differences. He identifies six types of competence possessed by an individual.

		FIRM SPECIFICITY INDUSTRY SPECIFICITY		
		Low		High
TASK SPECIFICITY	Low	I Meta-Competence	II Industry Competence	III Intra-organizational Competence
	High	IV Standard Technical Competence	V Technical Trade Competence	VI Unique Competence

Figure 3: A Competence Typology (Nordhaug 1993)

Task specificity is believed to be of minor importance in most management positions (e.g. Kotter 1982; Mintzberg 1973). However, task-specific competence may be of importance for professional managers and some middle managers. Professional and middle managers need, in many instances, to be experts in or have good knowledge of the specific area they manage. Examples of positions where unique competence (in particular skills related to the administration and maintenance of organizationally idiosyncratic routines and procedures) is of importance, are for financial directors, project managers, and works managers. The higher up the hierarchy, the less need the manager has for task-specific competence. Regarding firm-specific and industry-specific competence, there is great disagreement between both practicing managers and researchers whether this

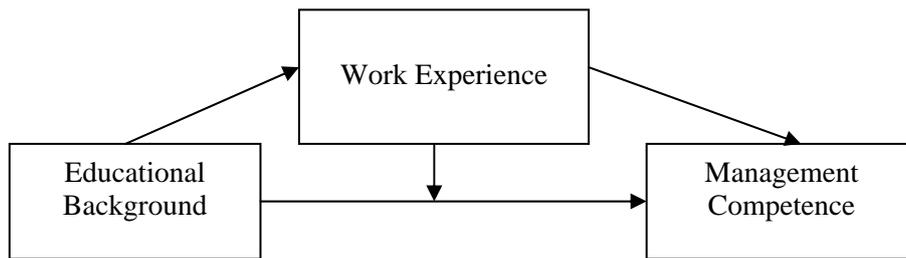
type of competence should be high or low for managers. This debate is particularly related to industry competence and intra-organizational competence. Managers who have most of their occupational experience from the same industry are likely to have high industry-specific competence. Similarly, managers who have long organizational tenure are likely to have high intra-organizational competence. The importance of meta-competence like creativity, ability to communicate, negotiation skills, and ability to communicate with others is likely to increase the higher up in the hierarchy the manager is. Top managers need to a greater extent well-developed meta-competence (Nordhaug 1993). This has in particular been shown in the studies of Collin (1989) and Morgan (1988). The main reason for the importance of meta-competence in top management positions is the top executives' comprehensive use of and need for interpersonal and conceptual skills (managing people and symbols as well as analytical problems). The discussion above suggests that, depending on managerial level, different managerial competence will be nourished and applied, thus having implications for the application of management competence.

Based on the discussion above the following conclusions were drawn regarding management competence:

- Both educational background and work experience seem to have distinctive effects on individuals' competence. Whether or not these demographic characteristics are clear antecedents of management competence is not obvious. The main reason why it was only possible to draw vague conclusions on this matter from the exploratory study, was the fact that the sample was too small. The rest of the thesis focuses on the antecedents of management competence, and investigates the relationship between *educational background* and *work experience* (independent variables) and *management competence* (dependent variable).
- The upper echelon perspective, at least from a practical point of view, appears to be a suitable theoretical framework also for studying the relationship between the managers' demographic characteristics and their management competence for managers at different hierarchical levels. The effect of experience may be the same regardless of where the managers are in the hierarchy. However, the use of the competence may differ between managers in different management positions. For instance, some middle managers and professional managers may be more task-oriented compared to top managers. Managers recruited to middle manager and professional manager positions may also need more industry-specific and intra-organizational competence to handle their

jobs compared to top managers. These observations need to be taken into account during the further analysis.

The above conclusions led to the following research model:



*Figure 4: Initial Research Model, version 2*

The next part of this thesis follows up another problem that became visible in the initial parts of the study. Previous studies on the subject matter are based on many different theoretical perspectives i.e. institutional theory, cognitive psychology, learning theory, research on individual competence, and historical comparative research (the list is not meant to be exhaustive). The next chapter deals with the selection of the overall theoretical framing of the research question. It also summarizes previous research within the chosen theoretical framing.

## **4. Literature Review**

This chapter starts by discussing relevant theoretical perspectives for the research topic and positions this research in relation to these. The chapter also consists of a review of previous empirical research investigating the antecedents of management competence.

### **4.1 Overall perspective**

Several perspectives can be used to approach the research question. How experience influence individuals has been addressed in many research areas, e.g. cognitive psychology (e.g. Martinsen 1994; Raaheim 1974; Sternberg 1988; Weisberg 1980), upper echelon perspective (e.g. Finkelstein and Hambrick 1996; Hambrick and Mason 1984; Hitt and Tyler 1991), institutional theory (e.g. Alvarez 1998; Geertz 1973; March 1994; Meyer and Rowan 1977; Parsons 1951; Powell and DiMaggio 1991; Røvik 1998; Selznick 1957), historical-comparative studies (e.g. Amdam 1996; Amdam 1999; Engwall 1992; Engwall and Zamagni 1998; Locke 1989), and research on individual competence (e.g. Boyatzis 1982; Collin 1989; Nordhaug 1993). These different perspectives can further be categorized as the individualistic approach and the contextual approach. The upper echelon perspective, the relationship between experience, insight and cognition, and the individual competence perspective can be defined as perspectives belonging to the individualistic approach. Institutional theory and historical-comparative studies can be defined as perspectives belonging to the contextual approach. The main difference between the individualistic and the contextual approach lies in their unit of analysis. The unit of analysis among the contextualists is institutional regulations, norms and constructions and the focus is on how these institutional forces influence managerial cognition and action in organizations (institutions to individual). Under this perspective most of the research has focused on how institutional norms, regulations and constructions are produced and diffused to management. Under the individualistic approach the unit of analysis is individual managers. The focus is mainly on how overall experience influence their cognition and subsequently has impact on organizations (individual to organization). In this sense the individualistic approach focuses more on how managers receive, absorb, translate, and transform institutional norms, regulations, and constructions than how these institutional forces are produced and diffused. Both perspectives are relevant for this research project. Next, the two approaches are presented, with particular emphasis on their relevance for this research project.

### **Contextual approach**

The contextual approach focuses on institutions and how they affect organizations and actors in organizations. For this research project institutional theory and the historical-comparative perspective are the two most central perspectives. Most research under these two perspectives has focused on the production and diffusion of institutional forces (e.g. Alvarez 1998; Amdam 1996; Byrkjeflot 1997; Engwall and Zamagni 1998; Fligstein 1990; Gourvish and Tiratsoo 1998; Kipping and Bjarnar 1998; Locke 1989; Powell and DiMaggio 1991) and subsequently how they are believed to influence managerial practice. According to Scott (1995:33) institutions are defined as consisting “of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers (cultures, structure, and routines) and they operate at multiple levels of jurisdiction”. Thus institutions are multifaceted systems incorporating symbolic systems and regulative processes that influence social behavior, e.g. managerial behavior. Institutional forces influencing managerial practice come from various sources and are transferred through different channels. Examples of such channels are educational institutions, consulting firms, different types of management publications, and multinational companies (Engwall and Zamagni 1998). Institutions have three pillars (Scott 1995) – regulative, normative and cognitive. The regulative aspect (e.g. DiMaggio and Powell 1983; North 1990) lies in the belief that institutions constrain and regularize behavior, while the normative pillar (e.g. Durkheim 1949; Parsons 1951; Selznick, 1957; Amdam 1996; Engwall and Zamagni 1998; Locke 1989) focuses on how values and norms developed by different institutions influence organizations and behavior in organizations. Last, those who emphasize the cognitive aspect (e.g. Berger and Luckmann 1966; Geertz 1973; Zucker 1977) focus on the cognitive dimensions of human existence and on the rules that constitute the nature of reality and the frames through which meaning is made. Contextualists infer that all action in and between organizations is constrained by different types of institutions. Under the contextual approach organizational behavior has more or less been ignored. Their focus has rather been on "how social choices are shaped, mediated, and channeled by institutional arrangements" (DiMaggio and Powell 1991:2). Also the choices that actors make are to a large extent viewed as determined by institutional forces, as this quote from DiMaggio and Powell (1991:3) shows: "this line of thinking suggests that individual preferences and such basic categories of thought as the self, social action, the state, and citizenship are shaped by institutional forces".

Regarding differences between institutional theory and the historical-comparative perspective, the institutionalists have primarily been concerned

with cross sectional studies. A vast amount of the studies have been purely theoretical, and by the neo-institutional perspective the focus has been on international homogenization of institutional forces (isomorphism) influencing individuals and organizations. Research under the historical-comparative approach, on the other hand, has focused on longitudinal studies, in particular emphasizing that institutions are cultural phenomena focusing on comparisons between nations in the production and diffusion of institutional forces (Engwall 2000; Engwall and Zamagni 1998; Locke 1989) and also conducting some selected case studies of how institutional forces influence organizations (Amdam 1993; Amdam 1999). In addition, the historical-comparative research has to a large extent been empirically driven (identifying an interesting institutional force and examining it). Under the historical-comparative approach the overall view is that institutions are heavily affected by historical factors that influence the range of options available. I have made a rather broad classification of institutional theory and historical-comparative research and many will argue that a much more fine-grained categorization is necessary. However, my point here has been to emphasize the differences in the unit of analysis and the relationship between production and absorption of management ideas.

### **Individualistic approach**

The individualistic approach focuses on managers and how their experience have influenced and formed their cognitive bases and values. Individuals' experience are to a large extent formed by institutional forces e.g. based on the influence from their previous education, experience from work life, participation in various networks, and reading books and other types of publications. I have classified three theoretical perspectives under the individualistic approach - research on the relationship between experience, insight and cognition (cognitive psychology), the upper echelon perspective, and research on individual competence. Cognitive psychology is the forerunner to the other perspectives and goes back to Greek philosophy. The concept of cognitive models is of particular relevance here. A cognitive model has three ingredients - cognitive content, cognitive structure, and cognitive style. Cognitive content is the things we know, assume, and believe and is developed through experience. Cognitive structure is how this content is arranged, connected, or situated in an individual's mind. This is often called a schema. Schemas facilitate what is called top-down, conceptually driven, or theory-driven processes, which means processes heavily influenced by one's organized prior knowledge, as opposed to processes that are more bottom-up or data-driven (Abelson 1981). The prior knowledge is organized in categories and these categories are the schemas. Cognitive style refers to how individuals' mind works - how they gather and process information i.e. whether persons are logical or non-logical in their

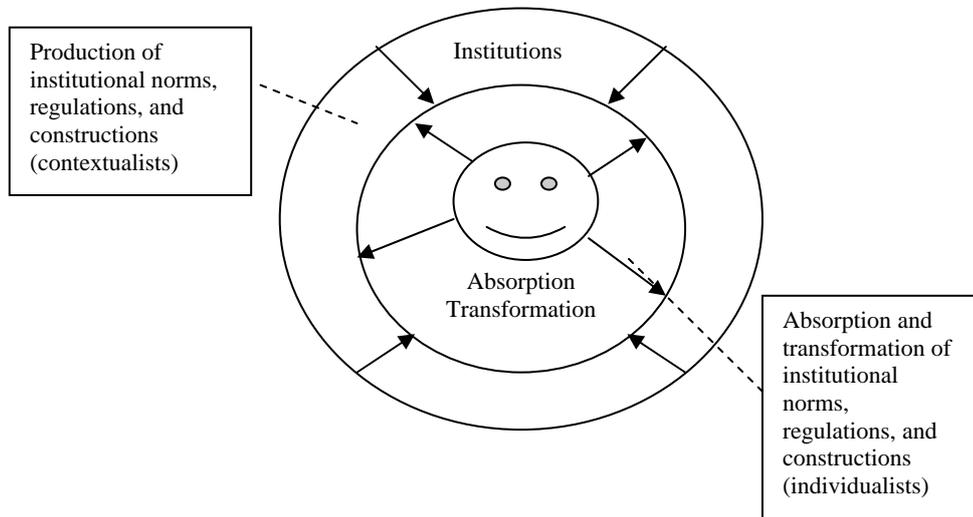
reasoning (Barnard 1938/1968) or sensation, intuition, thinking or feeling oriented (Jung 1921) in their perception and judgment. Experience are believed to influence cognitive models, which make these concepts relevant for this research project.

Another interesting theoretical concept is individual competence. Individual competence can be understood as being suitable in work life for particular tasks and roles (Latin *competere*). Individual competence is a composite of knowledge, skills, and aptitudes (Nordhaug 1993) and the values held by the individual will influence how and when this competence is used. Cognitive models are part of individuals' competence and thus influence the individuals' suitability in different work situations. The interesting aspect of the concept of individual competence in relation to cognitive models is that it is a broader concept and focuses in particular on work life. The concept emerged from human capital theory (Becker 1983), which distinguishes between general and firm specific knowledge. The underlying assumption is that an individual's competence is developed based on a combination of personality (aptitudes) and experience (knowledge and skills). Research on individual competence has to some extent been concerned with management competence (Boyatzis 1982; Collin 1989). Previous empirical research has primarily focused on the link between the nature of work tasks and the use of particular elements from an individual's competence, e.g. firm-specific, task-specific, and industry-specific competence (Løwendahl 2000a; Nordhaug 1993). Identification of the antecedents of the management competence has so far, to my knowledge, not been addressed in research on individual competence.

Researchers within the upper echelon perspective have particularly been interested in the relationship between demographic characteristics (experience) and cognitive bases and values. The upper echelon perspective (Finkelstein and Hambrick 1996; Hambrick and Finkelstein 1987; Hambrick and Mason 1984) reconciles the views of strategic choice and environmental determinism (Hrebiniak and Joyce 1985) and argues that managers do matter in determining organizational outcome, but only to the extent that they have enough discretion to make a variety of strategic choices. Strategic choice is defined as the process whereby power-holders within organizations decide upon courses of strategic action. Hambrick and Mason (1984) propose that while decision-makers are exposed to an ongoing stream of potential stimuli, their cognitive bases and values filter and distort their perceptions, and thereby affect strategic choices. The filtering of perceptions is conditioned by factors such as their knowledge, understanding, and prior preferences, which would then enter as informational input into their subsequent thinking and decision making. In this sense the predetermined mind-sets for the

interpretive process is of great importance, because these mindsets could limit the range of choices recognized and considered. An operationalization of these mindsets can be cognitive models and/or individual competence. Under the upper echelon perspective the argument is that observable demographic characteristics of top executives can be used to infer psychological cognitive bases and values. Individual characteristics that indicate something about the managers' cognitive bases and values are the managers' age, organizational and industrial tenure, functional background, educational background and gender (Finkelstein and Hambrick 1996; Hambrick and Mason 1984). However, the proposed relationship between demographic characteristics and cognitive bases and values has, to my knowledge, only been tested empirically on a sample of 91 managers working in four companies in Hungary (Markóczy 1997). Markóczy's study measured the relationship between beliefs regarding to organizational success and individual characteristics. The study presented in this thesis aims to identify if there really is any significant relationship between demographic characteristics and cognitive bases and values (in this setting defined as management competence).

The relationship between the contextual and the individualistic approach can be illustrated as in the following figure:



*Figure 5: Contextual and Individualistic Approaches*

### **Choice of perspective**

Both the contextual and the individualistic approach are relevant for this research project. If the starting point is all the research under the contextual approach focusing on production and diffusion of institutional forces, the individualistic approach is most relevant since it focuses on how these institutional forces produced by educational institutions, publications, and consulting firms are absorbed, translated and transformed by individuals. I have chosen an individualistic approach based on the upper echelon perspective (Finkelstein and Hambrick 1996; Hambrick and Finkelstein 1987; Hambrick and Mason 1984) combined with research on individual competence (Boyatzis 1982; Collin 1989; Nordhaug 1993). The upper echelon perspective addresses how the managers' experience influences their cognitive bases and values (Finkelstein and Hambrick 1996; Hambrick and Mason 1984). I have chosen to use the concept of individual competence (Boyatzis 1982; Nordhaug 1993) to represent managers' cognitive bases and values. There are two major reasons for this choice. First, there is a need to examine the relationship between cognitive content, structure and style (the elements in the manager's cognitive bases) (Finkelstein and Hambrick 1996). In cognitive psychology researchers have been most occupied with the cognitive style construct (Finkelstein and Hambrick 1996) and as a result there are few pieces of empirical research on cognitive content and structure. Since the individual competence construct is based on the interaction effect between the different elements [content (knowledge), structure (skills) and style (aptitudes)] this is a good argument for using this construct when studying the relationship between experience and management competence. Secondly, the individual competence construct is action oriented in the sense that it addresses competence applicable in work (Nordhaug 1993). A cognitive model is to a greater extent disaggregated from the reality than is the individual competence construct since research on managers' cognitive models in many instances does not explicitly take into account the context which managers are part of. An additional benefit from using individual competence to represent the manager's cognitive bases and values is that it allows me to see this study as an extension of my previous research (Kvålshaugen 1994). The major reason for not choosing the contextual approach is the fact that most of the research in this area has focused on production and diffusion of institutional forces, making the already existing theories in the area difficult to apply while studying absorption, translation and transformation of management ideas. However, this research project can be seen as an extension of the contextual perspective in the sense that it examines how ideas produced and diffused by different institutional forces are absorbed and received by practicing managers.

Based on the choices discussed above, the following section gives priority to a review of empirical research under the upper echelon perspective.

#### **4.2 Previous research under the upper echelon perspective**

Under the upper echelon perspective researchers have investigated the relationship between strategic management and the managers' demographic characteristics both on an individual level and related to top management teams. This review focuses on empirical studies under the upper echelon perspective primarily concerned with the relationship between the individual managers' demographic characteristics and the influence these factors are assumed to have on managerial actions in organizations (table 4, page 42 summarizes previous research from the upper echelon perspective relevant for this thesis). This focus is chosen because the individual manager will be the unit of analysis in my thesis and not top management teams. This review is organized according to Finkelstein and Hambrick's (1996) categorization of demographic characteristics which seem to have the greatest influence on the managers' cognitive bases and values: the managers' educational background, functional background, and age and tenure.

Perhaps the most extensive test of the upper echelon perspective is found in Hitt and Tyler (1991). They studied how different perspectives of strategic decision making (rational-normative, external control, strategic choice) have an impact on choices made in organizations. Their test of the strategic choice perspective is of particular relevance here. They found that the use of different strategic decision models varies with executive characteristics. The factors that were most influential were the executives' age; years of work experience; functional experience; and type of education. Their findings suggest that executives matter above and beyond rational analytical processes and industry characteristics. One of the conclusions drawn from the study is that in order to get an accurate understanding of strategic decisions one has to take into consideration the effects of the executives' personal characteristics. In order to improve the upper echelon perspective as means for understanding strategic decision making better, they suggested that one should account for the managerial level the executive is on in the organization. In addition, they suggest that one should look more into combinations of experience. They state that the types and effects of experience may be more complex than previously suggested. Rajagopalan and Datta (1996) have investigated the relationship between industry conditions and CEO characteristics. They examined whether or not industry conditions could play a role in explaining variations in CEO firm tenure, educational level, functional background, and functional heterogeneity. They found some support for that high performers appeared to align the studied CEO characteristics more closely to industry conditions than low performers

did. In order to improve the upper echelon perspective, they suggested that one should examine variations in CEO characteristics and their associations with environmental characteristics among diversified firms as well as smaller firms.

However, using demographic characteristics as proxies for managerial cognition has also been questioned in previous research. Markóczy (1997) has conducted one of the most extensive studies in this field. She found that using demographic characteristics as proxies for cognition is highly questionable. She investigated the relationship between four individual characteristics (functional background, age, national culture and hierarchical position) and individual beliefs concerning organizational success. 17.2 % of the variation in the individual beliefs was explained by individual characteristics, and she questions whether it is a sufficient amount of variation to use demographic characteristics as substitutes for cognition.

### **Educational background**

A number of previous studies have focused on educational level and specialization and how these traits influence strategic choices made by managers in organizations. Finkelstein and Hambrick (1996) suggest that since top executives are many years beyond their formal education, it may seem unlikely that their educational experience would affect managerial choices and behavior. Yet a significant body of research (e.g. Bantel and Jackson, 1989; Hitt and Tyler, 1991; Kimberly and Evanisko 1981; Tyler and Steensma, 1998; Wally and Baum, 1994; Wiersema and Bantel 1992) suggests that the schooling of managers is reflected in the characteristics of the organizations. The influence from educational background is identified in five different areas – strategic choices (Hitt and Tyler 1991), level of cognitive complexity (Wally and Baum 1994), organizational performance (Hambrick, Black, and Fredrickson 1992), innovativeness (e.g. Bantel and Jackson 1989; Kimberly and Evanisko 1981; Tyler and Steensma 1998; Wiersema and Bantel 1992), and moral reasoning and values (e.g. Marnburg 1997; McCabe, Dukerich, and Dutton 1991 & 1994; Rest and Thoma 1985).

Hitt and Tyler (1991) found that the type of educational background had an effect on strategic choices, but the level of formal education (except in selected subgroup analyses) did not. A contradicting finding was reported by Wally and Baum (1994), who found a very strong correlation between the amount of formal education and a measure of cognitive complexity, or the ability to discern patterns and distinguish among objects. Hambrick et al. (1992) found that companies led by CEOs with MBA degrees were more profitable than those without such CEOs. The explanation for this finding was based on the observation that executives with MBAs tend to confer

formalization and control on organizations; in high-technology companies, which can tend toward chaos, these are valuable capabilities. This finding supports Hambrick and Mason's (1984:201) argument that "the analytic techniques learned in an MBA program are geared primarily to avoiding high losses or mistakes ... business schools are not particularly well inclined to develop innovative or risk-taking tendencies...people who are drawn to business schools ...tend to be organizers and rationalizers".

Other studies again have examined the relationship between educational level and specialization and the managers' innovativeness and ability to change. Kimberly and Evanisko (1981) found that the amount of formal education of hospital chief administrators was positively associated with the adoption of both technological and administrative innovations in hospitals. Similar positive associations were found for banks (Bantel and Jackson 1989) and computer companies (Thomas, Litschert, and Ramaswamy 1991). Several other researchers have also identified a relationship between educational level and innovativeness (Becker 1970; Rogers and Shoemaker 1971). In addition to educational level as an indicator of innovativeness, Wiersema and Bantel (1992) found that an educational specialization in science and engineering was positively related to change in corporate strategy. In the same line, Tyler and Steensma (1998) found that top executives with a technical education focused more on a piece of information that represented an opportunity for the firm to stretch their current stock of resources, than did executives without technical education. As an explanation for this result, Heilmeyer (1993) proposes that technical training fosters in individuals a long-term commitment to a deeper understanding of relevant technologies and prepares an executive to predict, comprehend, and anticipate long-term change, while business education to a larger extent pursues short-term performance goals at the expense of innovation and long-term asset building (Hambrick and Mason 1984).

Executive values are also influenced by educational background (Beltramini, Peterson, and Kozmetsky 1984; Lane and Schaupp 1989; Marnburg 1997; McCabe et al. 1991; McCabe et al. 1994; Rest and Thoma 1985). McCabe et al. (1991; 1994) found significant differences between business school students and law school students regarding their moral reasoning and values. Marnburg (1997) found that engineers have higher ethical standards compared to business-educated people. He explains this condition with business-educated people being more oriented towards competition, while engineers are more oriented towards developing smart products and services.

### **Functional background**

Regarding managers' functional background and the effect this experience has on the managers' cognitive bases and values, there have been several empirical research projects examining this relationship (Gupta and Govindarajan 1984; Hitt and Tyler 1991; Song 1983; Steensma and Liberti 1999; Tyler and Steensma 1998; Waller et al. 1995). Song (1983) found that there was a significant relationship between the incumbent CEO's experience and the diversification strategy of a firm. His work showed that companies which had a CEO with experience of an operational nature (production, marketing) would diversify by internal development while companies whose CEO had experience of a non-operational nature (finance, accounting, law) would opt for diversification by acquisition. Reed and Reed (1989) replicated Song's findings and found no support for the relationship between CEOs' experience and diversification strategies. However, they found that the interaction between CEO experience and the selected means of diversification affects performance. This suggests that the complexity of other factors, e.g. external environment and conditions in the internal organization, modify the importance of CEO experience in the strategy selection process. Gupta and Govindarajan (1984) measured the overall number of years general managers had spent in the specific functional area of marketing and sales and found it to be positively related to the managers' tolerance for ambiguity. This is in line with the perception that managers with marketing and sales experience are more used to dealing with exogenous, uncontrolled factors than managers who have more experience from functional areas such as production or accounting. Waller et al. (1995) who examined executive perception further supported this relationship. One of the variables they studied related to executive perception was the effect of functional area work experience. They found that functional background was associated with selective perception most strongly in areas where the manager has a high level of competence. For example, a manager with functional experience from R&D is more likely to perceive changes in competitors' product designs than does a manager with a functional background from sales and marketing. On the other hand, Gupta and Govindarajan (1984) did not find any relationship between functional background and risk-taking propensity. The same non-finding was replicated in the study of Hitt and Tyler (1991). Steensma and Liberti (1999) studied the influence occupational experience has on comprehensiveness in strategic decision making. They found no significant relationship between the level of diversity in occupational experience and decision making comprehensiveness. However, they found a positive relationship between the pursuit of a predominately technical career and comprehensiveness. Tyler and Steensma (1998) found that executives with experience from firms that are perceived to emphasize technology and to have success with technological alliances in the past tend to focus more on the opportunities

provided by the alliance and less on the riskiness of the venture. This is previously also supported by among others Ginsberg and Venkatraman (1992), who suggested that organizations facing similar situations respond differently, particularly in the way they seize or fail to seize strategic opportunities resulting from technology innovations. Managerial interpretations and competitive postures will influence the investment in new technology.

### **Age and tenure**

Several researchers (Boeker 1997; Brockmann and Simmonds 1997; Geletkanycz and Hambrick 1997; Hambrick, Geletkanycz, and Fredrickson 1993; Schwenk 1993) have found a relationship between the executives' age and tenure and strategic management. Hambrick et al. (1993) made an investigation as to why some executives were more committed to the status quo than others. They found that the longer the executive's tenure in an industry and in the organization, the higher the manager's commitment to the status quo. In addition, Schwenk (1993) found that the CEO's tenure and company experience were positively associated with self-serving attributions (taking credit for positive results and laying blame on the environment for negative results). His results suggest that executives with more extensive experience in a company tended to identify more strongly with the company and with current strategy and therefore attribute negative results to external causes. Boeker (1997) examined among other things how chief executive characteristics interacted with organizational performance and strategic change. He found that chief executive tenure had a significant effect on strategic change, whereas chief executive succession did not. He further identified that managerial characteristics alone might cause the organization to change. However, poor organizational performance increased their motivation to do so. Brockmann and Simmonds (1997) investigated the relationship between the level of experience and the use of tacit knowledge and intuition in strategic decision making situations. They found a positive relationship between the CEOs' use of tacit knowledge and industry experience (industry tenure). However, no significant findings for age (broad experience) and firm specific experience (the respondent's tenure in the current organization) on the use of tacit knowledge were identified. Related to intuition, they found that the level of intuition (thinker or feeler) had a moderating effect on the relationship between a CEO's industry experience and use of tacit knowledge, meaning that the personality type will influence the use of tacit knowledge.

The following table summarizes some empirical contributions within the upper echelon perspective which have investigated the relationship between individual managerial characteristics (demographic variables) and strategic management.

Table 4: Overview of Previous Research

<b>Managerial Characteristics</b>	<b>Effects on</b>	<b>Studies</b>
<b>General</b>	Strategic decision making models	Hitt & Tyler (1991)
	Relationship between industry conditions and CEO characteristics	Rajagopalan & Datta (1996)
	Demographic characteristics as proxies for cognition	Markóczy (1997)
<b>Educational background</b>	Strategic choices	Hitt & Taylor (1991)
	Level of cognitive complexity	Wally & Baum (1994)
	MBA degree and organizational performance	Hambrick et al. (1992)
	Innovativeness	Becker (1970) Rogers & Shoemaker (1971) Kimberly & Evanisko (1981) Bantel & Jackson (1989) Thomas et al. (1991) Wiersema & Bantel (1992) Tyler & Steensma (1998)
	Moral reasoning and values	Beltramini et al. (1984) Rest & Thoma (1985) Lane & Schaupp (1989) McCabe et al. (1991; 1994) Marnburg (1997)
<b>Functional background</b>	Types of diversification strategies	Song (1983)
	Fit between CEO experience and type of diversification affects performance	Reed & Reed (1989)
	Managers' tolerance of ambiguity	Gupta & Govindarajan (1984)
	Executive perception	Waller et al. (1995)
	Technical career and comprehensiveness in strategic decision making	Tyler & Steensma (1998) Steensma & Liberti (1999)
<b>Age and tenure (in position, in organization, in industry)</b>	Commitment to status quo	Hambrick et al. (1993)
	Self-serving attribution	Schwenk (1993)
	Strategic change	Boeker (1997)
	Use of tacit knowledge and intuition	Brockmann & Simmonds (1997)

As shown above, most of the previous empirical research gives some, but no conclusive support that managerial characteristics influence management in organizations. One of the studies reviewed even showed that the proposed relationship between demographic characteristics and cognition was highly questionable (Markóczy 1997).

The following major limitations have been proposed and identified in the already existing literature:

- Some suggest that a look at the combination of experience (age, tenure, educational background, and functional background) will provide more insight into the relationship between managers' demographic characteristics and their cognitive bases and values (Hitt and Tyler 1991). Many studies up till now have only looked at one or a few aspects of the managers' experience and how this/these elements affect(s) organizational and managerial tasks and activities. The combined effect is believed to be stronger.
- Most of the studies conducted have focused on the managers' effect on one particular organizational process (i.e. innovations, entering into technological alliances, commitment to status quo). However, a lot of other factors may modify the importance of the managers' experience in these matters (Bass 1990; Reed and Reed 1989), which may lead to weak effects and even spurious effects between the independent and the dependent variable. This is related to the essential question of applying demographic characteristics as proxies for cognitive bases and values (management competence). This subject matter calls for more empirical investigations.
- Many studies have tested their theoretical conceptualization on quite small samples. They have also used quite broad categories in measuring the managers' experience (e.g. college graduate, number of years employed in position, primarily experience from production) (Waller et al. 1995). The nuance in the findings is therefore questionable.



## **5. Theoretical Constructs**

The results from the exploratory study and the review of previous research showed the need to examine the antecedents of management competence further. The managers' educational background and work experience seemed to be important antecedents of management competence. This chapter contains the definitions of the theoretical constructs presented as the independent and dependent variables in the initial research model (figure 4). These constructs were used as the basis for the development of the survey that empirically tested the antecedents of management competence.

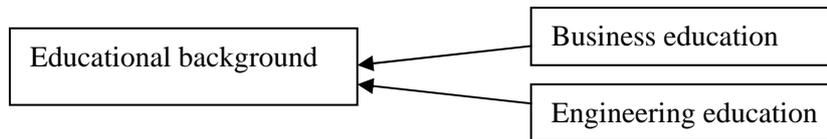
Some limitations of how previous research has measured the executives' experience were identified in the literature review. One major problem with previous studies is that they more or less ignore the combined effect of different types of experience, e.g. that technical education to a large extent seems to lead to technical work experience (Hitt and Tyler 1991; Tyler and Steensma 1998) and that business graduates often start their career in accounting, finance and consulting (see exploratory study). Another problem is the broad categorization of the executives' experience (in terms of demographic characteristics) previously used. A more fine-grained categorization is needed; e.g. we should not only look at whether or not the managers primarily have their functional experience from manufacturing (Waller et al. 1995). The managers may also have had some functional experience from sales for a short period, and this may have influenced the managers' cognitive bases and values. Another limitation emphasized in particular by Hitt and Tyler (1991) suggests that managerial level needs to be taken into account in the upper echelon perspective.

In the following section, the theoretical constructs (educational background, work experience and management competence) are presented.

### **5.1 Educational background**

Educational background can be understood as the formal education a manager has completed. This study focuses on managers who have business education or engineering education. All other additional formal education was also identified. In addition, the types and the amounts of management courses these managers have attended were also identified.

The model below presents the educational background construct:



*Figure 6: Educational Background Construct*

## **5.2 Work experience**

Work experience is defined as the manager's functional background and tenure (Finkelstein and Hambrick 1996). In this chapter the theoretical definitions of the work experience construct is presented, while the operationalizations of the variables of the work experience construct is presented in chapter 7.

Functional background is related to the type of experience managers have from the organization they have been employed in, i.e. marketing, finance, accounting, or engineering. Dearborn and Simon (1958) proposed that executives' functional experience provided a lens through which they could see business problems and solutions in general. Previous research has both confirmed (e.g. Song 1983; Tyler and Steensma 1998; Waller et al. 1995) and disconfirmed (e.g. Gupta and Govindarajan 1984; Reed and Reed 1989; Vroom and Pahl 1971) Dearborn and Simon's view. Finkelstein and Hambrick (1996) proposed that this relationship was best studied within the frames of an organization i.e. the degree of general management within the organization, the level of formal management education among the managers, and the degree of ambiguous and multitudinous strategic stimuli within the organization.

Several researchers have investigated the relationship between strategic management and executives' tenure (see literature review chapter 4). Executive tenure can be understood in many different ways e.g. tenure in position, tenure in organization, and tenure in industry (Finkelstein and Hambrick 1996). The different types of tenure are strongly interrelated, since all time spent in the position is also spent in the organization. Further, all time spent in the organization is also spent in the industry. However, Finkelstein and Hambrick (1996) suggest that all these types of tenure can be considered separately.

Tenure and functional background cannot be totally detached from the organization or the industry where the managers have their particular experience. Thus the nature of industry(ies) and the size of the firms where the managers have their tenure and functional background will contribute with deeper information about the managers' previous tenure characteristics and functional background. The natures of the industries where the managers have received their experience is categorized according to two factors, namely the degree of knowledge intensity in the industry and the innovation rate of the industry. The reason for looking particularly at experience from knowledge intensive firms is because we know that management of knowledge intensive firms is quite different from management of labor intensive organizations (e.g. Alvesson 1995; Løwendahl 1992; Maister 1993; Løwendahl 2000b). Knowledge intensive firms are organizations staffed by a high proportion of highly qualified staff who trades in knowledge itself (Alvesson 1995; Starbuck 1992). Knowledge intensive industries are industries that consist of many such firms. Examples of knowledge intensive firms are professional services (e.g. consulting), non-professional services (e.g. gourmet, restaurants, schools), and products (e.g. computer software) (Løwendahl 1992; Løwendahl 2000b).

The reason for dividing industries into more or less innovative industries is related to the belief that working in an innovative environment will affect individuals' competence relative to those who have not. Innovative organizations like Mintzberg's (1979) adhocracy are structured and function quite differently compared to the machine bureaucracy. Employees in innovative organizations are trained in breaking away from established patterns. Management is also different in adhocracies compared to other types of organizations. Instead of having many layers of middle managers, the adhocracy is more known for having many project managers. Top managers in an adhocracy spend most of their time with battles that ensure strategic choices, in handling the many other disturbances that arise all over these fluid structures, and also devote a good deal of time to monitoring the projects (Løwendahl 1992; Løwendahl 2000b; Mintzberg 1979). "The most important single role of the top management of Adhocracy (especially Operating Adhocracy) is that of liaison with the external environment" (Mintzberg 1979:448). Experience from innovative organizations as opposed to other types of organizations may have an enduring effect on individuals' competence. In some industries, the share of innovative companies are larger compared to others. Innovative industries are defined as industries which have new product innovations and process innovations above the average in a country (Maus 2000).

The size of the firm is another variable that may have an effect on the managers' type of work experience particularly functional background. An organization's size influences the breadth of experience an individual receives. Small organizations tend to have less division of labor compared to larger organizations (e.g. Chandler 1962; Thompson 1967). A particular functional background from a small organization may have given the individual broader experience compared to a more specialized function in a large organization. The size variable is also connected to industries. The machine bureaucracy, the professional bureaucracy, and the divisionalized firm tend to have more specialized functions compared to organizations with simple structures or adhocracies (Mintzberg 1979).

Below is the specification of the work experience construct:

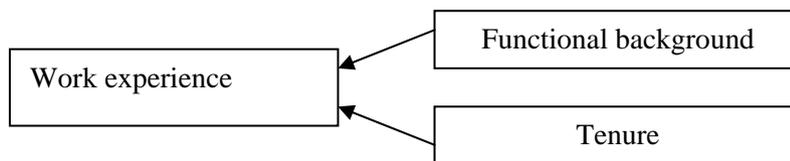


Figure 7: Work Experience Construct

### 5.3 Management competence

The starting point for understanding management competence is individual competence. Individual competence is in general terms defined as composites of knowledge, skills and aptitudes that are applicable in work (Nordhaug 1993). Competence as defined by Nordhaug (1993) broadens the term "knowledge", as it includes articulated knowledge, tacit knowledge, skills, and innate aptitudes. The competence already possessed will also influence the acquisition of new competence. The managers' search, comprehension, and interpretation of new knowledge will be influenced by the overall competence they already possess.

Knowledge can be understood in terms of knowing that something is the case (knowing that or knowing what) (Schunk 1991) and includes facts, generalizations, theories, and hypotheses. Knowledge consists of two elements - articulated and tacit knowledge. Articulated knowledge is specified verbally or in writing, computer programs and the like (Hedlund and Nonaka 1993), whereas tacit knowledge may be understood as knowledge that is intuitive and non-verbalized (Polanyi 1969). The manager's existing knowledge provides a platform from which additional

knowledge is sought, comprehended, and interpreted (March and Simon 1958).

According to Nelson and Winter (1982:73): "...skills are programmatic, in that they involve a sequence of steps with each successive step triggered by and following closely on the completion of the preceding one... the knowledge that underlies skillful performance is in large measure tacit knowledge in the sense that the performer is not fully aware of the details of the performance and finds it difficult or impossible to articulate a full account of those details". Skills may be seen as knowing how to perform activities. Skills are largely tacit knowledge applied to tasks, where aptitudes may contribute both to the quality of the skills and the ability to learn new skills quickly. Similarly, knowledge contributes both to the skills applied and to the ease with which new skills may be learned.

An aptitude is a relevant talent, and as such very hard to transfer or even develop (Nordhaug 1993). Aptitudes are about knowing when to employ knowledge and skills and why it is important to do so. Aptitudes help individuals select and employ knowledge and skills to fit task goals. Metacognitive knowledge (Schunk, 1991) is strongly connected to aptitudes. Metacognition comprises two related sets of knowledge. First, one must understand what knowledge, strategies, and resources are needed to accomplish a task. Second, one must know how and when to use this knowledge and strategies to ensure that the task is completed successfully. These monitoring activities include checking one's level of understanding, predicting outcomes, evaluating the effectiveness of one's efforts, planning one's activities, deciding how to budget time, and revising or switching to other activities to overcome difficulties (Schunk 1991).

It is important to distinguish between the content of management competence and the use of this competence. We know from previous research that the nature of the organization and its environment is likely to influence how the competence is used (Bass 1990; Finkelstein and Hambrick 1996; Selznick 1957). In addition, the values held by the manager will also influence the use of the competence (Nordhaug 1993). The concept of managerial discretion (Hambrick and Finkelstein 1987) gives deeper insight into how the context and the manager's personality influences the use of management competence. The manager's latitude of action (use of competence) is seen as a function of characteristics connected to the task environment (i.e. industry structure, capital intensity, market growth), to the internal organization (i.e. resource availability, inertial forces), and to the manager's personality (i.e. tolerance of ambiguity, cognitive complexity, aspiration level) (Finkelstein and Hambrick 1996). The manager's

competence is likely to influence how (s)he understands the task environment and the internal organization, thus influencing the actions made by the manager.

Values also influence how the competence is used (Nordhaug 1993). For instance, a manager who highly values materialism will use his/her knowledge and skills differently from a manager who puts high value on collectivism, even though the two have the same knowledge and skill base. Values can be defined as broad and relatively enduring preferences for some state of affairs and consist of both personal and social values (Hambrick and Brandon 1988). The personal values are conceptions of what the person desires (e.g. wealth, security), while social values have to do with what the person finds desirable in others or in the broader social system (e.g. rationality, equality). However, there is no clear demarcation between the two sets of values. Values can also either be instrumental or terminal (Hambrick and Brandon 1988), that is, dealing either with means or ends. Like the relationship between personal and social values, there is no clear demarcation between these two sets either. This research project does not focus on how the competence is used, but rather aims to identify important antecedents of management competence. Hence, the factors that influence the content of managers' competence are of major interest.

Individual competence is a composite of knowledge, skills and aptitudes and thus is empirically difficult to measure. A particular type of competence, e.g. the ability to analyze the organization's environment and take strategic action, may often consist of different knowledge and skill components. The individual's aptitudes will affect his/her ability to take advantage of the knowledge and skills that characterize the competence. In a wider sense, the individual's values will affect the use of his/her competence in a specific area, but also what the individual is able to develop in terms of new competence. The following figure illustrates this relationship:

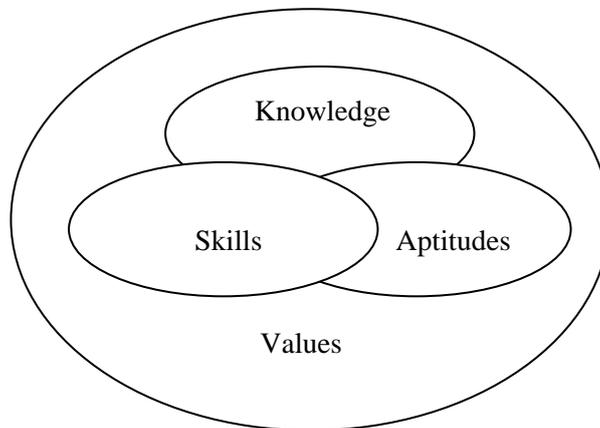


Figure 8: Competence Elements

In order to measure management competence, I developed a concept called competence elements. The different competence elements consist of a set of knowledge, skills and aptitudes. The use of these competence elements is affected by the values held by managers. The characteristics of the organization and the task environment influence the different competence elements. These contextual variables will also affect which competence elements that are used in specific situations and how they are used. In order to select competence elements that are of importance for managers, I have looked at the functions or the roles of a manager in the organization (Bass 1990; Rost 1993; Yukl 1994) and previous research identifying important meta-competence of managers (Boyatzis 1982; Collin 1989). Mintzberg's (1973) research of what managers do is used as a foundation for explaining the managers' job and consequently the competence elements that are seen as particularly useful in management. Mintzberg classifies what managers do in terms of 10 major roles. The 10 roles are again separated into three categories - *interpersonal roles* (figurehead, leader, liaison) which are directly linked to the manager's status and authority, *informational roles* (monitor, disseminator, spokesman), which are linked to the manager's importance as an information facilitator in the organization, and *decisional roles* (entrepreneur, disturbance handler, resource allocator, negotiator), which combine the roles the managers are involved in when they make decisions - both on the operative level (handling requests for authorization, scheduling his/her own time etc.), and on the more strategic level (long-term goals, visions, strategic plans, etc.). In addition, the importance of certain meta-competence for managerial work has been heavily stressed in the management literature (Boyatzis 1982; Collin 1989; Nordhaug 1993). There are clear overlaps between Mintzberg's understanding of the managers' job

and the types of meta-competence researchers propose are particularly useful in management positions. Competence related to interpersonal (managing people and symbols, i.e. interpersonal and informational roles) and conceptual skills (managing analytical problems, i.e. decisional roles) have been emphasized as important for managers.

I have chosen two overall competence elements related to the roles identified by Mintzberg (1973), which may inform us about how managers think (cognitions) and act (behavior) in their management positions, namely preference of problem solving strategies and managerial behavior. Meta-competence like creativity, ability to communicate, ability to cooperate with others, and analytical capabilities are inherent in these two constructs. As Yukl (1994:47) summarizes it, “the descriptive research suggests that managerial work includes four types of activities: (1) building and maintaining relationships, (2) getting and giving information, (3) influencing people, and (4) decision making”. By looking at problem solving strategies and managerial behavior, all of these aspects of management are more or less covered, at least partially.

How to measure problem solving strategies and managerial behavior, on the other hand, posed another problem. Several instruments have been developed for measuring these types of competence already. Quite early in the study I decided to look at the already existing instruments to see if any of them could be useful for my purpose. The following section provides a short review and a presentation of potential instruments for measuring problem solving strategies and managerial behavior.

The instruments that I found most relevant vis-à-vis Mintzberg’s understanding of management and important managerial meta-competence identified by Boyatzis (1982) and Collin (1989) were Myers-Briggs’ Type Indicator (MBTI), Kolb’s learning styles (the competency circle), Kirton’s Adaptor and Innovator framework (KAI), the Multifactor Leadership Questionnaire (MLQ), Assimilator-Explorer Styles (A-E styles), and the Managerial Behavior instrument. Below the table there is a short presentation of each of the instruments, followed by my arguments for choosing the instruments applied in the survey study.

Table 5: Instruments Measuring Management Competence

Instrument	Measure
Myers-Briggs Type Indicator (Myers and McCaulley 1985)	Psychological types (16 types)  Based on the following dimensions: Extroversion (E) / Introversion (I) Sensing perception (S) / Intuition perception (I) Thinking judgement (T) / Feeling judgement (F) Judgement (J) / Perception (P)
The Competency Circle (Kolb 1976)	Learning styles  Identifies four types of major learning styles: <ul style="list-style-type: none"> <li>• Accommodators</li> <li>• Divergers</li> <li>• Assimilators</li> <li>• Convergers</li> </ul>
Kirton's Adaptor and Innovator framework (Kirton 1987)	Problem solving strategies  Identifies two problem solving strategies: <ul style="list-style-type: none"> <li>• Adaptors</li> <li>• Innovators</li> </ul>
The Multifactor Leadership Questionnaire (MLQ) (Bass and Avolio 1989)	Transactional and transformational leadership  Transactional variables <ul style="list-style-type: none"> <li>• Contingent reward</li> <li>• Management-by-exception</li> </ul> Transformational leadership <ul style="list-style-type: none"> <li>• Charismatic leadership</li> <li>• Individual consideration</li> <li>• Intellectual stimulation</li> </ul>
Assimilator-Explorer Styles (A-E styles) (Kaufmann and Martinsen 1991)	Problem solving strategies  Identifies two problem solving strategies: <ul style="list-style-type: none"> <li>• Assimilators</li> <li>• Explorers</li> </ul>
Managerial Behavior <sup>24</sup> (Martinsen 1999)	Managerial behavior  Related to six dimensions of leadership: <ul style="list-style-type: none"> <li>• Entrepreneurial orientation</li> <li>• Task orientation</li> <li>• Power orientation</li> <li>• Relationships orientation</li> <li>• Activity orientation</li> <li>• Leadership effectiveness</li> </ul>

<sup>24</sup> The instrument is developed for and owned by *Administrativt Forskningsfond* (AFF).

### *Myers-Briggs Type Indicator (MBTI)*

MBTI is an instrument operationalizing Jung's (1921) four preferences - Extraversion/Introversion, Sensing perception/Intuitive perception, Thinking judgement/Feeling judgement, and Judgement/Perception. Jung suggested that these personality characteristics were present in the individual at an early age. The instrument measures whether you are extravert or introvert, sensing or intuitive, etc. Based on these measurements, the individual's psychological type is identified (16 in total). MBTI has to a large extent been used to study managers (Gardner and Matinko 1996). The previous research can be categorized into two streams (Walck 1996). The first stream is primarily descriptive in the sense that it focuses on populations of managers, determines their types, and makes inferences from the type distributions about managers as a category, or about the organizations, industries, professions, or countries from which the sample is drawn. The second stream of research is predictive, rather than descriptive. This research has identified skills, capacities, and behavior associated with management and leadership and tests predictions about how these traits relate to different psychological types. The latter one is the most relevant for this research project.

There are several problems connected to the use of MBTI as an instrument of measuring management competence. The first obstacle concerns the relationship between personality and behavior. The researchers using MBTI propose that psychological types (personality) can predict behavior, e.g. if you are a ST (sensing/thinking) type you are best fitted in bureaucratic organizations, doing operational problem solving, being an identifier in decision making, and are characterized as action averse (Walck 1996). However, more recent research has shown that individuals can be many psychological types and can also shift type depending on the circumstances (e.g. Kaufmann 1995; Sternberg, Wagner, Williams and Horvath 1995; Weisberg 1980). There are also several methodological problems connected to the MBTI instrument. When it comes to reliability, dichotomous type score, e.g. thinking or feeling personality type yields lower reliabilities (Gardner and Matinko 1996). However, the estimated reliabilities of type categories appear to be satisfactory in most cases (Carlyn 1977). Another problem is related to validity, where questions asked of participants completing the forms are fairly abstract. It is therefore difficult to ascertain their accuracy. There are also some important theoretical obstacles connected to the MBTI instrument. The key structural assumptions of type theory (Jung 1921) remain largely unvalidated. This is a problem since the MBTI is an operationalization of the Jung's psychological types. The theoretical and methodological problems with the MBTI led to the decision of not applying the instrument in the survey study to measure management competence.

#### *The Competency Circle (Kolb's learning styles)*

Kolb's instrument is primarily developed for identifying individual learning styles. However, it has also been used to measure problem solving strategies and showing adaptive competence as they relate to learning styles. This instrument is based on the theoretical framework called experiential learning and has its origin from the work of Dewey (1958), Piaget (1969) and Lewin (1951). The theory behind the instrument suggests that a learning process goes through four different stages - concrete experience (CE), reflective observations (RO), abstract conceptualization (AC), and active experimentation (AE). There are differences between individuals on how they grasp information, whether they use concrete experience or make abstract conceptualizations, and how they transform the information, either through active experimentation or reflective observation. Based on these processes, Kolb suggests that you can identify four overall types of learning styles - Accommodators (CE + AE), Divergers (CE + RO), Assimilators (RO + AC), and Convergents (AC + AE). The instrument identifies these four different learning styles.

The competency circle was considered a very appropriate instrument for measuring management competence since learning styles could be considered a managerial meta-competence (Boyatzis 1982; Collin 1989). However, there are several aspects with the instrument that guided my decision not to use it. I considered the circle scales generated from each respondent to be particularly difficult to handle in the statistical analyses. The main reason for this lies in the large sample. I needed to develop a competency circle for each respondent and the nature of the competency circles would complicate the data analyses since major transformation of the data would have been necessary in order to compare learning styles with experience data. In addition, my aim was not to look at a learning process, but rather to identify the managers' competence as are. Kolb's learning styles also take into consideration that people are in different development paths. This is important when examining their learning styles - a youth's learning style is likely to be different from an adult's. However, the respondents in my sample were more or less at the same development level in terms of age and profession and therefore this advantage of the instrument did not matter in this study.

#### *Kirton's Adaptor and Innovator framework*

Kirton's instrument is useful for measuring mental processes, which underlie concepts of creativity, problem solving and decision making. His framework is based on the theory of cognitive style. The key assumption underlying the Adaption-Innovation theory is that it relates to the individual's preferred

cognitive strategies involved in change and therefore also strategies of creativity, problem solving and decision making (Kirton 1989). A second key assumption is that cognitive style is related to numerous aspects (traits) of personality that appear early in life and are particularly stable (Kirton 1989). The instrument measures on a continuous scale whether you belong to one of the categories, e.g. being an adaptor, having some of the following characteristics: precision reliability, efficiency, methodicalness, prudence, discipline, and conformity; or being an innovator, who has some of the following characteristics: undisciplined, thinking, tangentially, and approaching tasks from unsuspected angles.

This instrument is very comparable with the A-E style instrument. Both are concerned with problem solving strategies and also group respondents in two groups. However, the major difference lies in the fact that A-E style instrument measures assimilators (equivalent to adaptors) and explorers (equivalent to innovators) on separate scales. Meaning that the A-E style instrument is open to individuals having elements of both problem solving strategies. This was the major reason for choosing the A-E style instrument instead of the Adaptor-Innovator instrument.

#### *Multifactor Leadership Questionnaire (MLQ)*

The MLQ has also been extensively used to measurement managerial characteristics (Bryman 1992; Lowe and Galen Kroeck 1996) and frequently used as a selection tool for managers. This instrument is developed based on Burns' (1978) distinction between transactional and transformational leadership. These leadership dimensions have further been developed particular by Bass (1985). A transactional leader is recognized as operating within the existing system or culture, has a preference for risk avoidance, pays attention to time constraints and efficiency, and generally prefers process above substance as means for maintaining control. A transformational leader, on the other hand, seeks new ways of working, seeks opportunities in the face of risk, prefers effective answers to efficient answers, and is less likely to support the status quo. Transformational leaders do not merely react to environmental circumstances - they attempt to shape and create them.

MLQ is a widely applied instrument and for this reason it was important to consider the appropriateness of this instrument for my purpose, particularly relating to measuring managerial behavior. One strength of the MLQ is that it is designed both for self-report and evaluation of the managers done by subordinates. Theoretically, Bass (1985) argues that there are conceptual differences between charisma, individual consideration and intellectual stimulation (variables of transformational leadership). Carless' (1998) test

suggests that there are some problems with the discriminant validity of the instrument MLQ-5X (subordinates' evaluation of their managers). Her findings indicate that the MLQ-5X's sub-scales are highly correlated. A high proportion of the variance of these sub-scales is explained by the higher-order construct (Carless 1998). As a result, she concludes that subordinates do not distinguish between these different behaviors among their managers. Similar problems are also identified with the MLQ-1 (the self-report questionnaire) (Bycio, Hackett, and Allen 1995). As Bycio et al. (1995:477) states "Clearly, strong assumptions about the factorial nature of the MLQ across forms, populations, or both are premature". There is also a problem with the MLQ related to the dichotomous distinction between transformational and transactional leaders. Den Hartog, Van Muijen, and Koopman (1997) suggest that another dimension should be included - laissez-faire leadership. However, this type of leadership has also been included in later versions of the MLQ. Based on the problems of discriminant validity of the instrument and the dichotomous view of management, I decided to use a multidimensional instrument based on many of the ideas from Bass, but also others to measure managerial behavior - the Managerial Behavior instrument (Martinsen 1999).

In the following section, the definitions of the important variables measured in the *A-E styles* (Kaufmann and Martinsen 1991) and *Managerial Behavior* (Martinsen 1999) are presented.

### **Problem solving strategies**

Yukl (1994:87) defines problem solving as "identifying work-related problems, analyzing them in a systematic, but timely manner, and acting decisively to implement solutions and deal with crises". Related to Minzberg's (1973) understanding of management, problem solving strategies are particularly important in the entrepreneurial role<sup>25</sup> and the disturbance handler role<sup>26</sup>. Fulfilling these roles, managers need to approach problems in a more explorer-oriented manner (novelty seeking). Other managerial roles may request a more assimilator problem solving strategy (rule following). Examples of such roles are the resource allocation role<sup>27</sup>

---

<sup>25</sup> The entrepreneurial role is characterized by the manager's ability to search the organization and its environment for opportunities and initiate "improvement projects" to bring about changes, and the ability to supervise the design of certain projects.

<sup>26</sup> The disturbance handler role is connected to the manager's responsibility for corrective action when the organization faces important, unexpected disturbances.

<sup>27</sup> The resource allocation role is connected to the manager's decisions of where the organization will expend its efforts.

and the negotiator role<sup>28</sup>. In these roles, the manager deals with the organization as is, and in order to get decisions accepted the way of handling the problems must not be distant from what the rest of the organization expects. Preference for problem solving strategies is also related to meta-competence such as creativity and analytical capabilities.

Kaufmann (1979) proposes that there are individual differences in problem solving strategies. Some people have a tendency to vary their problem solving strategies (explorers), while others use more established and standardized strategies (assimilators). Other researchers (e.g. Kagan, Rosman, Day, Albert, and Phillips 1964; Kirton 1989) have also identified these differences. I have chosen to use the A-E style instrument developed by Kaufmann and Martinsen (1991) when identifying problem solving styles. The A-E style instrument (Kaufmann 1995; Kaufmann and Martinsen 1991; Martinsen 1995b) identifies two types of problem solving styles: a rule-following strategy (assimilator) and a novelty seeking strategy (explorer). Previous experience is a hindrance for explorers, while for assimilators it is a positive factor. In this sense, explorers are more data-driven in their problem solving, while assimilators are more theory-driven (Abelson 1981). The underlying concept of problem solving used in the A-E styles is based on Piaget's (1969) distinction between assimilation and accommodation. Assimilators assimilate information through established rules or schemes. Explorers on the other hand change their way of thinking through intensive information seeking. One major implication that is drawn from the theoretical concepts is that each person can have aspects of both styles related to the types of tasks the individual has to solve. However, the assimilator and explorer dispositions are described as relatively stable individual differences regarding preferred problem solving strategies. This observation has implications for both problem solving and problem finding performance (Kaufmann 1995). Explorers are more creative and better at restructuring because they are supposed to be more open, flexible and novelty seeking. In addition, they are more willing to take risks in coping with novelty. Assimilators are held to be more conformist, rule bound and rigid, less open and more anxious. In addition, they are more prone to use logic, being analytically oriented and more efficient. They are more able to maintain the current state of affairs because of their risk avoiding tendencies and their need to maintain cognitive economy.

The A-E styles instrument has been shown to be more reliable (Kaufmann 1995; Martinsen 1994) to test problem solving strategies than for instance

---

<sup>28</sup> Where the manager deals with those situations in which (s)he feels compelled to enter negotiations on behalf of his/her organization.

KAI (Kirton 1989). In particular because the A-E styles instrument recognizes that the individual can possess both problem solving strategies, even though one of them usually is more prominent. In most of the other instruments used to measure problem solving strategies, the adaptive and the innovative nature of individuals are measured on a continuum (like the KAI-instrument), not as separate entities.

The role of experience is also explicitly treated in relation to the A-E styles. Martinsen (1995) found that individuals with an exploratory problem solving strategy are restrained by experience, while individuals with an assimilative problem solving strategy get help from previous experience. KAI, for instance, views preference for problem solving strategies primarily as a personality trait (cognitive style).<sup>29</sup> Martinsen (1994) argues that preference for problem solving strategy is a composite of personality traits and insight (experience). Several researchers (e.g. Gupta 1988; Salancik and Pfeffer 1978) have debated the relationship between experience, personality and behavior. Salancik and Pfeffer (1978:233) argue that "the social context binds people to behavior through a process of commitment, affect saliency of information about their past activities, and provides norms and expectations that constrain their rationalization or justification of those activities". This view suggests that in most instances there is no direct link between personality and behavior. It will mostly be mediated by experience. This is further clarified by Gupta (1988:170) who argues that "demographic variables such as age, education, and work experience account only partially for individual personality, and the combination of demographic and personality variables account only partially for individual behavior". This is important insight in this research project, particularly in relation to the choice of variables to represent managerial competence. Preference for problem solving strategies can primarily be viewed as a personality variable although the use of it will certainly be affected by social setting and experience (Salancik and Pfeffer 1978). One of the major tasks in this research project was to examine the relationship between demographic characteristics and personality traits such as preference for problem solving strategies. The next variable to be presented - managerial behavior - was chosen with the aim of exploring the relationship between demographic variables and individual behavior.

---

<sup>29</sup> Kirton (1989:3) in his presentation of the key assumptions underlying the Adaption-Innovation theory: "...is that cognitive style is related to numerous aspects (traits) of personality that appear early in life and are particularly stable, as is cognitive style".

## **Managerial behavior**

While problem solving strategies relate to how the manager thinks (e.g. analytical and creative capabilities), management behavior is more related to how the manager acts. Cognitive psychology has shown us that there is a clear link between thinking and acting. However, I chose to measure these two factors of management separately as two different types of management competence. Fiedler (1967) defines management behavior as the particular acts in which a manager engages in the course of directing and coordinating the work of his group members. This may involve activities such as structuring the work relations, praising or criticizing group members, and showing consideration for their welfare and feelings. In the management competence literature these abilities are often defined as managerial meta-competence. Managerial behavior is thus connected to the fulfillment of managerial roles.

Many operationalizations of the study of management behavior have been suggested (e.g. the Michigan studies, the Multifactor Leadership Questionnaire (MLQ), the Leadership Observation System (LOS)). Based on the general overviews of research on managerial behavior in Bass (1990) and Yukl (1994), Martinsen (1999) identifies six dimensions, which indicate managerial behavior - entrepreneurial orientation, task orientation, power orientation, relationship orientation, activity orientation, and leadership effectiveness. Martinsen's (1999) instrument is used in the survey in order to measure how the managers' themselves evaluate their managerial behavior. This instrument was chosen primarily because it is based on reputable international research, but developed for Norwegian managers. Most of the other instruments available are designed in the U.S. for U.S. managers. We know that there are some cultural differences between work life in the U.S. and in Norway (e.g. Hofstede 1991) and such differences maybe important to take into consideration when designing a survey. If the questions asked are unfamiliar for the managers this can affect both the response rate and the quality of responses. Since the development of the variables to identify managerial behavior is based on well-established international research and the empirical data is taken from a Western-European country, the results from the study should to some extent be generalizable outside Norwegian borders as well. However, among the European countries there are several differences in the qualification system of management (e.g. Amdam 1996; Byrkjeflot 1999b; Engwall and Zamagni 1998). Norway is often categorized as belonging to the Scandinavian tradition which has been heavily influenced by the qualification system of management in Germany and the U.S. (Engwall and Zamagni 1998; Gourvish and Tiratsoo 1998). The qualification system of management in several other European countries is quite different, e.g. Britain (Tiratsoo 1998) and France (Bourdieu 1996;

Locke 1989) and therefore one should be aware of the national peculiarities when applying the results in a wider context.

Below, the six dimensions of managerial behavior are presented.

#### *Entrepreneurial orientation*

Entrepreneurial orientation is related to how transformational (Bass 1990; Burns 1978) a manager is. In terms of the managerial roles identified by Mintzberg (1973), the entrepreneurial orientation will in particular be related to the roles of leader (interpersonal) and entrepreneur (decisional). A transformational manager typically inspires followers to do more than originally expected (Bass 1985; Burns 1978). The manager does this by raising the level of awareness; getting followers to transcend their own self-interest for the sake of the team, organization, or larger polity; and by altering their need level on the motivation hierarchy or expanding their portfolio of needs and values. Transformational leadership is often detailed in terms of charisma, inspirational leadership, individualized consideration, and intellectual stimulation (Bass 1985).

#### *Task orientation*

According to Hersey and Blanchard (1993), task oriented managers initiate structure for their followers, define the roles of others, explain what to do and why, establish well-defined patterns of organization and channels of communication, and determine ways to accomplish assignments. When it comes to the managerial roles identified by Mintzberg (1973), task orientation will in particular influence how the manager gives meaning to the resource allocator role (decisional). A purely task oriented manager is likely to keep distance psychologically from his/her followers and to be more cold and aloof (Blau and Scott 1962). Task orientation tends to depend on the manager's personality as well as situational contingencies (Bass 1990). The task oriented managers are often seen to be more aggressive, more able to tolerate hostility, and more anxious to be respected. Task oriented managers are often viewed as more effective and there is also a positive association between task orientation and success as a manager (Bass 1990).

#### *Power orientation*

Managers may be more oriented toward the use of power and political manipulation than to the social approaches of influencing others. Power orientation is an aspect of the personality, and is related to authoritarianism, power motivation and Machiavellianism (Bass 1990). Regarding the managerial roles identified by Mintzberg (1973), power orientation will in particular influence how managers give meaning to the figurehead role (interpersonal), disseminator role (informational) and disturbance handler

role (decisional). Managers that can be classified as power oriented are occupied with being directive, coercive and persuasive, concerned with production and want to be lone decision-makers, initiators of structure, goal emphasizees and work facilitators. They are also concerned with performance (Bass 1990). Power motivated managers can be effective if they are task oriented, rather than concerned about interpersonal relationships, and if they can inhibit their need for power. Another important research finding is that authoritarianism appears to decline with experience (Bass 1990).

#### *Relationship orientation*

Relationship oriented managers are concerned with group maintenance and the well-being of other people, they are interaction oriented and they emphasize employees (Bass 1990). In terms of the managerial roles identified by Mintzberg (1973), relationship orientation will particularly influence how managers give meaning to the roles of leader (interpersonal), liaison (interpersonal), monitor (informational) and negotiator (decisional). Relationship oriented managers focus on maintaining personal relationships, opening channels of communication, and delegating to give subordinates opportunities to use their potential (Hersey and Blanchard 1993). This type of management is democratic and employee oriented, rather than autocratic and production oriented. The relationship oriented managers are more accommodating, less able to tolerate hostility, and more anxious to be loved.

#### *Activity orientation*

Activity orientation is usually associated with the traits of dominance, assertiveness and extroversion, as well as with attempts to lead (Bass 1990). Regarding the managerial roles identified by Mintzberg (1973), activity orientation will in particular influence the roles of leader (interpersonal), spokesperson (informational) and negotiator (decisional). Research has shown that more activity by leaders, regardless of style, is usually associated with greater satisfaction and effectiveness of their followers (e.g. Fleishman and Simmons 1970; Karmel 1978). The active manager often has an extrovert personality type (Jung 1921). This type of manager has the ability to self-monitor behavior, has a sense of self-efficacy and sensitivity to understand what is appropriate to do. Also traits of dominance and assertiveness are associated with activity oriented managers.

#### *Leadership effectiveness*

Leadership effectiveness is the last variable in the managerial behavior construct. The combination of all the managerial roles identified by Mintzberg (1973) will determine the manager's effectiveness in the management positions. Leadership effectiveness is normally understood as

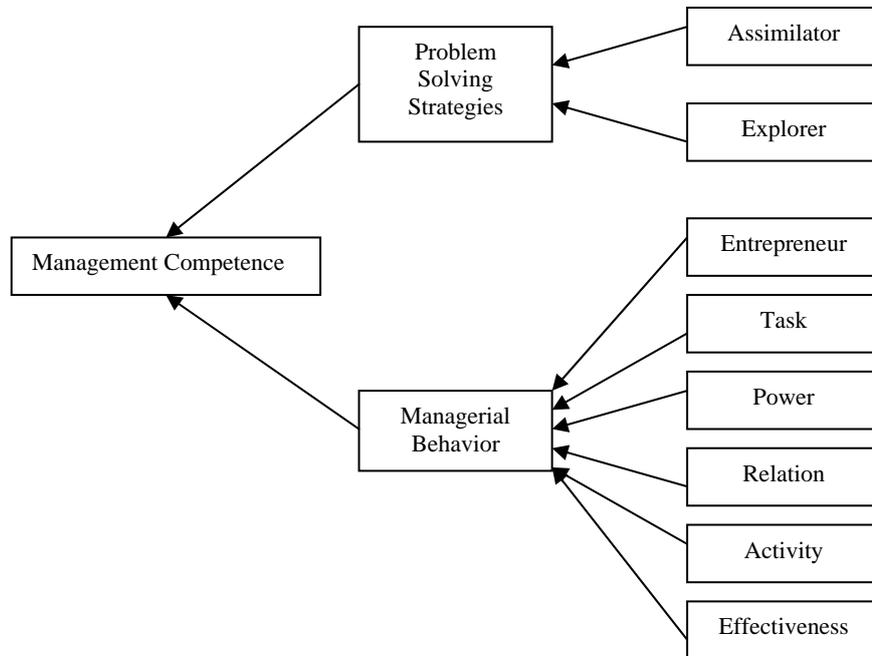
the consequences of the leader's actions for followers and other stakeholders (Yukl 1994). Examples of results of leadership effectiveness may be to what extent the leader's organizational unit performs its task successfully and attains its goals, the satisfaction among the followers with their leader, and the contribution of the leader to the quality of group processes. However, there is a need to distinguish between the successful influence of the managers and their long-term effectiveness, as determined by the contribution of the influence to attaining the long-term goals and well-being of the organization.

The following table presents the major dimensions of each of the variables in the managerial behavior construct.

*Table 6: Major Dimensions of the Variables in the Managerial Behavior Construct*

<b>Variables</b>	<b>Major Dimensions</b>
Entrepreneurial orientation	Raising the level of awareness. Getting followers to transcend their own self-interest for the sake of the team. Altering need levels.
Task orientation	Initiation of structure. Define roles. Structure work. Organizing and establishing communication channels. Define ways to accomplish assignments.
Power orientation	Being directive, coercive and persuasive. Concerned with production. Lone decision maker. Initiator of structure. Goal emphasize and work facilitator. Concerned with performance.
Relationship orientation	Democratic. Employee oriented. Accommodating. Less able to tolerate hostility. Anxious to be loved.
Activity orientation	Dominant. Assertive. Extrovert. Attempt at leading. Sense what is appropriate to do.
Leadership effectiveness	The organizational unit the manager leads attains goals, performs tasks successfully. Followers are satisfied with their manager. The manager contributes to the quality of the group processes.

The following figure presents the management competence construct:



*Figure 9: Management Competence Construct*

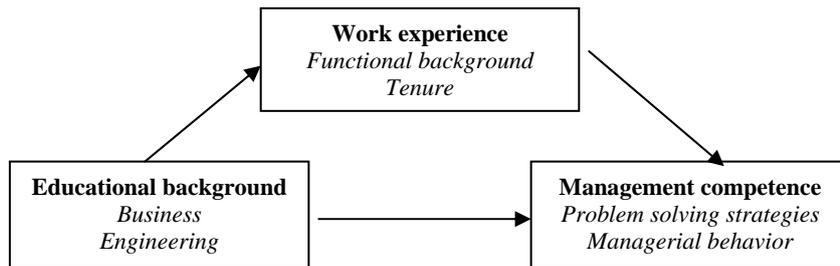
The specifications of the theoretical constructs in this chapter clarify the research question proposed in the introduction in the following way:

- What is the relationship between managers' educational background and work experience and their problem solving strategies and managerial behavior?

In addition, based on the findings in the exploratory study and in the literature review, the following underlying research questions were proposed:

- What is the joint effect of educational background and work experience on management competence?
- To what extent are demographic characteristics such as educational background and work experience good proxies for management competence?

Based on the definitions of the theoretical constructs, the following research model will serve as an underlying framework for the empirical investigations of the antecedents of management competence:



*Figure 10: Research Model*

The following chapter presents the hypotheses on the relationships between managers' demographic characteristics and their managerial competence. These hypotheses are generated from the results of the exploratory study and previous research under the upper echelon perspective.



## 6. Hypotheses

This chapter presents the hypotheses tested in this research project. The hypotheses are developed based on the findings in the exploratory study and the literature review. The hypotheses are organized into two categories – the joint effect between educational background and work experience, and the antecedents of management competence (the relationship between educational background, work experience and management competence).

### 6.1 Educational background and work experience

Both previous research (e.g. Hitt and Tyler 1991; Tyler and Steensma 1998) and the exploratory study suggest that there is a joint effect of educational background and work experience on management competence. Some researchers have found that engineers primarily work in the manufacturing and process industries (Hanisch and Lange 1985). Also statistical data of fresh graduates from NHH, BI and NTNU (see Appendix 1) suggests that graduates primarily start in positions that are highly relevant and connected to their educational background. A large share of the business graduates start working in consulting firms, or in finance departments. Similarly, engineering graduates traditionally start working in a position closely connected to their educational specialization, i.e. process technology, civil engineering, electronics engineering, and mechanical engineering. Based on this insight the following hypotheses are proposed:

**H<sub>1A</sub>:** Managers with a business education primarily have their previous work experience from accounting, consulting and finance.

**H<sub>1B</sub>:** Managers with an engineering education primarily have their previous work experience from manufacturing and engineering related areas.

Based on the findings in the exploratory study, there seem to be some differences among the two groups of managers related to their mobility between industries. This is also consistent with the view that business education is more general in nature than engineering education (e.g. Fligstein 1990; Locke 1989; Whitley 1984; Whitley, Thomas, and Marceau 1981). All organizations need to handle their economic matters and therefore business-educated managers are seen as qualified for functions in a greater variety of industries compared to engineers. Business-educated managers seem to start their career either in an organization's finance department or as consultants. The competence gained from this experience seems to be more easily transferred between organizations and industries than competence from manufacturing. This observation leads to the following hypothesis:

**H<sub>2</sub>:** Business-educated managers have a greater degree of mobility between industries compared to engineering-educated managers.

## **6.2 Antecedents of management competence**

The hypotheses concerning the extent to which educational background and work experience are important antecedents of management competence is presented in this section. These hypotheses are generated based on previous empirical research and the exploratory study. Ringer (1992) suggests that managers with different backgrounds should be different from each other in the sense that they belong to different fields of knowledge, which influence their present competence but also the competence they are able to develop in the future. The field of knowledge will also influence the managers' personal networks. However, the contention proposed by Ringer has not previously been investigated in relation to managers. This study aims at doing so.

### **Problem solving strategies**

The first set of hypotheses focused on the antecedents of problem solving strategies. The problem solving strategies are more related to the thinking aspects of management, and these overall strategies will among other things influence how managers approach problems and subsequently also the decision making based on the understanding of the relevant problem. If we look at the antecedents of problem solving strategies, the subjects presented in the curricula at the business school overall target their focus at profit maximization and analyzing why the organization may have problems. In the engineering school, on the other hand, the focus is more on developing excellent technological solutions, improving the overall processes inside the organization and hopefully, through these actions, earning some money. The managers that participated in the exploratory study also confirmed these observations. As one of them expressed it: *"Engineers are more solution oriented, while people with business education are more process oriented"*. The aspect of looking forward is of great importance in engineering education, while the focus is stronger on history in business education – looking backward to predict the future. The focus on risk aversion and the extensive emphasis on analysis in the business schools' curricula may have become a stable component in the managers' mind that influences how they approach problems. The same may be true for engineers. In engineering education, the main focus is on creating new technologies and good solutions to problems. Based on the characteristics of the assimilator problem solving strategy and the explorer problem solving strategy described above, one can assume that:

**H<sub>3A</sub>:** Engineering-educated managers more often use an explorer problem solving strategy compared to business-educated managers.

**H<sub>3B</sub>:** Business-educated managers more often use an assimilator problem solving strategy compared to engineering-educated managers.

However, individuals also gain a lot of experience from practice and this may lead to preferences for another overall problem solving strategy. Previous research has shown that experience influences preferences for problem solving strategies (Martinsen 1994). If the manager has extensive experience in a particular area this may lead to an assimilative problem solving strategy, while little experience may lead to an explorative problem solving strategy. It is likely that the overall problem strategy is as much influenced by type of work experience as by educational background. Most of the problem solving learned during education is more theoretical (knowledge) while problem solving done at the work place is practice oriented and thereby more likely to become a skill component in the managers' competence (Nordhaug 1993), and thus more ingrained as a competence element. In this research project, work experience is understood in terms of functional background and tenure. Tenure in position, organization and industry are used as indicators of the managers' depth of experience in a particular area. The deeper the experience of managers in specific areas, the greater the chance that they prefer an assimilator problem solving strategy. This leads to the following hypothesis:

**H<sub>3C</sub>:** The more extensive the experience of managers in specific areas, the more likely they are to prefer an assimilative problem solving strategy.

We also know that some functions in an organization are more creative and innovative in nature compared to others (Gupta and Govindarajan 1984; Song 1983; Tyler and Steensma 1998; Waller et al. 1995). Managers with their prime experience from R&D, marketing and production are likely to use more explorer oriented problem solving strategies compared to managers with their prime experience from finance, accounting and general administration. This leads to the next hypothesis:

**H<sub>3D</sub>:** Managers with experience from R&D, marketing and production are more inclined to apply an explorative problem solving strategy compared to managers with experience from finance, accounting and general administration.

## **Managerial behavior**

The last set of hypotheses was connected to the managers' orientation and behavior in organizations. Six dimensions connected to managerial behavior were identified - entrepreneurial orientation, task orientation, power orientation, relationship orientation, activity orientation and finally leadership effectiveness (Bass 1990; Yukl 1994). The hypotheses concerned the covariation between educational background, work experience and the behavior characteristics.

### *Entrepreneurial orientation*

Managers' entrepreneurial orientation is related to how good the managers are at inspiring subordinates to do more than expected. One important element influencing managers' entrepreneurial orientation is their degree of charismatic personality (Bass 1985). Charismatic personalities can only by their appearance inspire followers. Even though personal capacity in fact is very important, I will argue that also insight gained from experience will influence the managers' entrepreneurial orientation. Individuals who apply for engineering education are found to be more investigative and realistic (Holland 1985), meaning that these persons may be more entrepreneurial in nature compared to business graduates even before entering higher, formal education. The analysis of the content of business education and engineering education conducted in the exploratory study further suggests that this difference is even strengthened by educational background. Other researchers (e.g. Tyler and Steensma 1998; Wiersema and Bantel 1992) have also identified a relationship between technical education and innovativeness.

**H<sub>4A</sub>**: Engineering-educated managers are more entrepreneurially oriented compared to business-educated managers.

Work experience can also be assumed to influence entrepreneurial orientation. Barbosa (1985) found evidence that business innovation is enhanced by certain degrees of marketing experience. He concluded that a marketing orientation among top managers confers more of a customer-based, creative, expansionist capability in the firm, which serves to enhance the yield from innovative efforts. Managers tolerance of ambiguity, which is of importance in entrepreneurship (March 1991; Stacey 1993), was found to be positively related to the overall number of years general managers had spent in marketing and sales (Gupta and Govindarajan 1984). So it seems that experience from some functional areas is more closely linked to entrepreneurial orientation than others. In addition, managers often have experience from more than one functional area, and diverse experience may increase the managers' level of competence and thus their ability to be

intellectually stimulating (Bass 1985). Bass (1985:99) defines the transformational manager's intellectual stimulation as "the arousal and change in followers of problem awareness and problem solving, of thought and imagination and of beliefs and values". In addition, diverse experience may infuse the managers to be more open-minded and less paradigmatic in their managerial position since their knowledge area is assumed to be more extensive compared to managers with more homogeneous experience. This leads to the next hypothesis:

**H<sub>4B</sub>:** Managers with diverse functional experience is more entrepreneurially oriented compared to managers with more homogeneous functional experience.

We also know that there are differences between industries regarding their innovation rate. It is fair to assume that managers with their prime experience from innovative industries are more entrepreneurially oriented compared to managers with experience from less innovative industries. The number of product innovations (new or changed) and process innovations is one way of measuring the industry's innovation rate. This is an OECD standard for measuring innovation rates within different industries. A recent report developed by the Norwegian Research Council (Maus 2000) categorizes different Norwegian industries' innovation rate. The data from this report is used in order to categorize industries as being more or less innovative. In Norway, the following industries are found to be most innovative - production of chemicals and chemical production (71%), telecommunications (56%), the electronic and optic industry (50%), and the computer industry (50%).<sup>30</sup> <sup>31</sup> The size of the firm is also an indicator of firm's innovation rate. If we look at all the employment groups together, the most innovative firms are those that have more than 500 employees (71%).<sup>32</sup> If we split the firms into two groups, namely the manufacturing industry and the service industry, we find that large firms as a total are most innovative (100-199 employees: 61%, 200-499 employees: 72%, and above 500 employees: 84%). In the service industry, the largest firms are the most innovative (200-499 employees: 29%, and above 500: 67%). In Norway, 1 out of 3 firms are engaged in innovative activities.

---

<sup>30</sup> Table A.II.1 (p. 272) Det norske forsknings-og innovasjonssystemet - statistikk og indikatorer, 1999. The Norwegian Research Council.

<sup>31</sup> The percentages in the parentheses describe percentages of firms within the subsequent industries that are defined as innovative.

<sup>32</sup> Table A.II.2 (p. 273) Det norske forsknings-og innovasjonssystemet - statistikk og indikatorer, 1999. The Norwegian Research Council.

**H<sub>4c</sub>:** Managers with their prime experience from large companies in innovative industries are more entrepreneurially oriented compared to managers with experience from small companies in less innovative industries.

We know that the length of tenure may have an effect on managers' ability to be transformational. For instance, managers who have worked in the same organization for a long time are likely to be less entrepreneurially compared to more recently employed managers. This observation is among others discussed by Hambrick and Fukutomi (1991). They identified the five seasons of CEOs' tenure: response to mandate, experimentation, selection of an enduring theme, convergence, and dysfunction. At the start of the CEOs tenure in an organization they are under pressure to demonstrate their efficacy. CEOs usually start their jobs with relatively strong commitment to their paradigms (previous mental models). The first period lasts for 1-2 years. After gaining a foothold in the organization, the CEOs start experimenting and are quite open-minded to new viewpoints. This period also lasts for 1-2 years. After this initial phase, the CEOs soon commit psychologically to whatever approaches have been most comfortable and effective. This period also lasts for 1-2 years. Then the convergence phase emerges where the CEOs focus more intensively on the sense of correctness in established ways of operating and seeing the world. In the word of Miller (1991), the longer the CEOs' tenure, the more over-confident they become. Even though Hambrick and Fukutomi's study only concerned CEOs, there is no reason to believe that length of tenure has any different significant effect on middle managers and professional managers than it has on CEOs. This leads to next hypothesis concerning the manager's entrepreneurial orientation:

**H<sub>4d</sub>:** Managers' entrepreneurial orientation declines with tenure, both in position and in organization.

#### *Task orientation*

The next hypotheses are concerned with the relationship between the managers' demographic characteristics and their task orientation. Managers differ in their concern for the group's goals and the means to achieve the goals. The main concerns for task oriented managers are production and that the organization reaches its goals. The content analysis of business education conducted in the exploratory study shows that business education aims at training students in being task oriented, e.g. the curriculum contains subjects that focus on how to structure the organization in an effective manner, how to reach the overall goal of profit maximization, and how to sell the product

produced by the organization. In engineering education the task orientation is more related to the concrete solutions that are to be developed. This is in particular related to knowledge in project management and operations management, meaning that the task orientation in engineering education is found more on the micro level than in business education. Macro level task orientation is more important in management positions since this type of task orientation is more related to the definition of the role of others in the organization, the establishment of well-defined patterns of organization and channels for communication, etc. This leads to the following hypothesis:

**H<sub>5A</sub>:** Business-educated managers are more task oriented compared to engineering-educated managers.

Work experience may have a moderating and a distinctive effect on managers' task orientation. The type of organization and industry from which the managers have their prime experience is likely to influence their task orientation. For instance managers who are "under the gun" to produce immediate results are more likely to be task oriented (Bass 1990). Also, poor past performance of the organization seems to make the managers more task oriented. However, these elements are not directly investigated in the study since I do not take into consideration the aspects of the organization the managers are part of. On the other hand, it is assumed that managers' task orientation declines the longer they are in the same position (Bass 1990). The reasons for this changing focus are that tasks become routine, the managers learn to know their subordinates and can usually work better with them, and the managers learn the expectations of the top management.

**H<sub>5B</sub>:** The shorter tenure the managers have in the same position and organization, the more task oriented they are.

#### *Power orientation*

The following hypotheses are concerned with the proposed influence educational background and type of work experience has as antecedents of power orientation. Managers in general are believed to be more power-motivated compared to people with other types of careers such as teaching, science and journalism (Harrell and Stahl 1981). However, within the management group there may also be variations regarding power orientation. Power orientation is related to the type of authority underlying the management position. Previous studies (e.g. Kvålshaugen 1994; Løwendahl 1992; Løwendahl 2000b) show that engineers tend to use their professional know-how in an area as a basis for status and respect in management positions. In this sense, the managers are often respected because of their

know-how, not in management, but in a functional area important for the organization. Over the years business-educated managers have become managers of organizations that are based on knowledge from the engineering profession (Amdam 1999; Gammelsæter 1991). These managers have no authority based on their engineering achievements, and hence their authority must come from other sources such as being concerned with production and economic results, or emphasizing objectives. Since business-educated managers are more frequently employed as managers of organizations that are not directly creating value based on these managers' professional expertise, they are assumed on the average to be more power oriented in management position. This leads to the following hypothesis:

**H<sub>6A</sub>:** Managers with a business education are on the average more power oriented compared to their engineering-educated counterparts.

Authoritarianism appears to decline with experience (Bass 1990), meaning that the more recently the managers are employed in functions and in organizations (less experienced), the more authoritarian they tend to be. Managers can have long experience from other positions in the organization (long tenure in organization). This will serve as a counter force even though managers are quite recently employed in their present managerial positions, meaning that such managers are not as authoritarian as more recently employed managers recruited outside the organization.

**H<sub>6B</sub>:** The shorter the managers' average tenure in the position, the more authoritarian they are.

#### *Relationship orientation*

The next set of hypotheses concerns the managers' relationship orientation. Relationship oriented managers are concerned with the well-being of people in the organization. They rather supervise than control their subordinates. Managers in Norway are overall seen as more relationship oriented compared to managers in many other countries (Hofstede 1991). One explaining factor may be the special form of capitalism identified in Norway – democratic capitalism (Sejersted 1997). However, even though the overall relationship orientation may be high among Norwegian managers, there may still be differences between and among the two groups of managers in this study. Engineering education has for quite a long time used co-operation as a pedagogical tool for student assignments (Waage 1964). This pedagogical tool has also to a large extent been used at BI (Amdam 1993), but not so

much at NHH.<sup>33</sup> However, the first school to research and practice this approach on a large scale was NTNU (Waage 1964).

The work of engineering and of accounting is quite different. Often engineering tasks are solved in teams, while accountants often work more on individual tasks. We know that most of the graduates from the discussed schools start their career in positions related to their educational specialization.<sup>34</sup> The majority of business graduates tend to start their career in finance, accounting and consulting, while most of the graduates from the engineering school start their career in an area related to their educational specialization.<sup>35</sup> These observations give at least two arguments supporting the hypothesis that engineering-educated managers are more used to co-operation compared to business-educated managers. Since they are used to working with others and value co-operation, it is likely that engineering-educated managers value more and put more emphasis on relations to employees and other managers in management positions.

**H<sub>7A</sub>:** Engineering-educated managers are more relationship oriented compared to business-educated managers.

The managers' type of work experience may have a moderating effect on the influence from educational background as well as a direct effect on the managers' relationship orientation. For instance, if the business-educated managers have worked for long time in consulting firms where solving tasks together in groups is quite usual, they may be as relationship oriented as any engineering-educated manager. Nisbett (1986) suggests that relationship oriented management is desirable as the work force becomes more educated and seeks greater participation, as business becomes more complex and requires a team of experts to deal with its problems, and a high technology increases in usage. This suggests that some managers working in firms belonging to the "knowledge economy" should be more relationship oriented compared to managers working in other types of firms.

**H<sub>7B</sub>:** Managers working in knowledge intensive firms are more relationship oriented compared to managers working in less knowledge intensive firms.

Tenure in position and in organization is also likely to influence the managers' relationship orientation. The longer managers have stayed in the same position and in the same organization, the more relationship oriented

---

<sup>33</sup> Curricula 1980, 1985, 1990 and 1995.

<sup>34</sup> Labor market surveys NHH, BI and NTNU.

<sup>35</sup> European Graduate Surveys, Universium Institute.

they become. The reason for this hypothesis is that the more acquainted the managers have become with their subordinates, the more concerned they are with their well-being (Bass 1990). In addition, managers with relatively long tenure in position and organization know the expectations of their superiors fairly well and are also able to ease the requirements of their subordinates more readily (Bass 1990).

**H<sub>7C</sub>:** The longer the tenure in both position and in organization, the more relationship oriented the managers.

#### *Activity orientation*

The next hypotheses propose some antecedents of the managers' activity orientation. The managers' activity orientation is usually associated with the traits of dominance, assertiveness and extroversion. Findings in the exploratory study suggest that managers with an engineering background have more difficulties in letting the profession fade away when they enter management positions – the engineers tend to develop into advanced professionals at a higher level in the organization rather than taking the responsibilities as managers. Their focus on the professional role rather than management seems to affect their ability to lead. Results from a previous study (Kvålshaugen 1994) suggests that engineers recruited through promotion are even less activity oriented compared to those recruited from outside. They particularly have difficulties in dominating their subordinates, which often is necessary in a management position (Mintzberg 1973). The role of general management is an underlying perspective in business education (Locke 1996; Whitley 1981), meaning that business-educated managers to a greater extent are focused on leading rather than being excellent professionals, whereas the opposite may be the case with engineers. This leads to the first hypothesis on the antecedents of the managers' activity orientation:

**H<sub>8A</sub>:** Business-educated managers are more activity oriented compared to engineering-educated managers.

Work experience may both have a moderating effect on educational background, and be a direct antecedent of itself. The managers' functional background may give some indication of the managers' activity orientation. Finkelstein and Hambrick (1996) proposed that managers with their prime experience in throughput functions (i.e. manufacturing and operations) tend to pursue Defender strategies. The Defender strategy is characterized as being occupied with technological efficiency (Miles and Snow 1978). The characteristics of the Defender strategy is very much in line with the

operationalizations of activity orientation used in this research project. Finkelstein and Hambrick (1996) distinguished between experience from throughput functions and output functions. Output functions are defined as marketing, sales, and R&D. People working in such functions tend to be more externally oriented than internally oriented (Song 1983). This led to the following hypotheses:

**H<sub>8B</sub>**: Managers with their prime functional background from throughput functions are more activity oriented compared to managers who have their prime experience from output functions.

The length of managers' tenure in organization is likely to influence their activity level (Hambrick and Fukutomi 1991). The managers' activity level seems to be reduced by the time spent in the position, but also in the organization.

**H<sub>8C</sub>**: The longer the managers' tenure both in the position and in the organization, the lower the managers' activity orientation.

#### *Leadership effectiveness*

The last set of hypotheses is concerned with the antecedents of leadership effectiveness. Leadership effectiveness is related to the visibility of managers in organizations. Which groups of managers that are more effective is quite difficult to predict. This variable is perhaps more than any of the others related to context (type of organization, type of industry, types of subordinates, etc). However, based on the notion that business-educated managers seem to be more activity oriented, one can also assume that they perceive themselves as more effective.

**H<sub>9A</sub>**: Business-educated managers perceive themselves as more effective leaders compared to their engineering-educated counterparts.

However, the managers' knowledge and experience related to type of organization they manage are also likely to influence the leaders' perception of their effectiveness. Engineers are believed to be good managers particularly because they know how value is created in the organization. As one of the participants in the exploratory study expressed it: "*People with engineering background and experience have greater ability to understand the realities and not only the "numbers" behind what is happening in the factories and markets*". If the managers have long tenure in the same organization or industry, their experience can be characterized as extensive

related to one particular type of organization or industries. This leads to the following hypotheses:

**H<sub>9B</sub>**: The more in-depth knowledge the managers have of the value creation processes in the organization where they are managers, the higher score they achieve on their own perception of leadership effectiveness.

These hypotheses lead to the following relationships to be tested in the empirical part of the study:

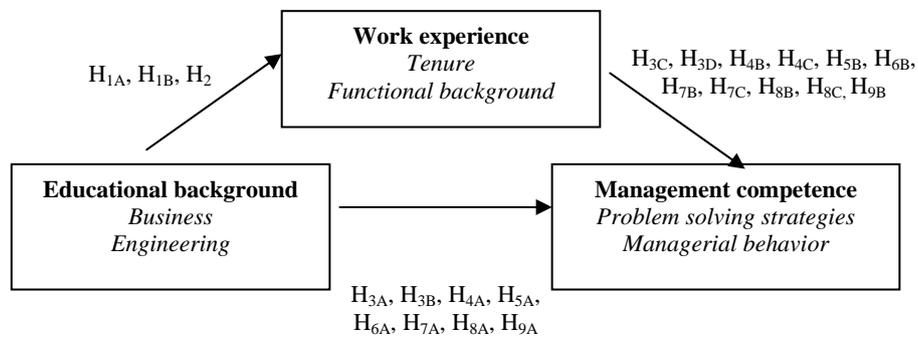


Figure 11: Research Model with Hypotheses

Since both the theoretical considerations (chapter 5) and the hypotheses are presented, I will now focus on the empirical parts of the survey study, starting with a presentation of the research methodology.

## **7. Survey Study**

The survey study was designed as a further extension of the exploratory study. The aim was in particular to capture the antecedents of management competence. The survey had its main focus on the context of justification - testing whether or not the proposed relationships developed from the exploratory study had enough power to be generalizable.

The overall research design was presented in chapter 2. The first sub-chapter presents the research methodology of the survey study. Next, the discriminant, convergent and nomological validity of the measurement models are discussed. After the presentation and discussion of the measurement models, descriptive statistics of the dependent, the independent and the control variables are presented. Then follows the results from the data analyses. This sub-chapter describes the choice of methods of analysis and presents the results of the hypotheses testing. The last sub-chapter discusses the validity of the findings. The discussion of the results and their implications will follow in the final chapter (chapter 8).

### **7.1 Research methodology**

This sub-chapter presents the research methodology of the survey study.

#### **Sample**

The sample of the survey study was extracted from the membership lists of *Norske Siviløkonomers Forening* (NSF) and *Norske Sivilingeniørers Forening* (NIF). These two organizations have an overall purpose of serving their members' professional and social interests, and in this sense they are not traditional labor unions only negotiating wages and working conditions. NSF has 11701 members and NIF has 36000 members. These organizations were chosen because it was relatively easy to get access to a large number of managers in each of the educational groups who worked in various industries and functions. A sample of 1200 managers was extracted consisting of 600 managers in each educational group. The sample was randomly selected from a total population of 1516 business-educated managers and 900 engineering-educated managers. These populations were based on the categorization from NSF and NIF on the number of their members being managers in private sector in Norway and graduated from respectively NTNU, and NHH and BI. The choice of such a large sample was in line with Waller et al. (1995), who argued that studies occupied with the relationship between the managers' demographic characteristics and management competence should be idiographic or survey studies with very large samples. The main reason for this request was that the sample used to make such

generalizations needed to have enough variation in the independent variables (effect size). This was important in order to explain all or most of the variance caused by the independent variables on the dependent variable – all aspects covered. To be concrete, variation in the sample in this particular study meant having managers with the same educational background, but with different types of work experience, gender, age, etc.

The theoretical population of this study was all business-educated and engineering-educated managers in the private sector in Norway. It was impossible to collect data from all the members of the population. My main concern was to establish a setting where the proposed relationships could be tested. Thus the major focus was not on the representativeness of the sample in relation to the total population, but rather to test the proposed theories (Calder, Phillips, and Tybout 1981).

The respondents in the sample were selected based on the following criteria:

- Each respondent must currently be in a management position. A management position was defined in terms of managers who have responsibility for employees.
- All the respondents must work in the private sector.
- The respondents must be graduates from the *siviløkonom* program at NHH or BI, or graduates from the *sivilingenior* program at NTNU.
- The managers in the sample must be found at all managerial levels in the organization (top managers, middle managers, and professional managers, etc).
- No gender or age requirements were posed.

The choice of managers in a broad sense, not only top managers, was done in order to compare whether or not managers in top management positions have systematically different experience from managers at lower levels. The reason for only selecting managers in the private sector was the advice from a scholarly researcher in this area who had observed great differences in the nature of management of private versus public sector. Also the fact that most of the business graduates who are members of NSF work in the private sector made this the obvious choice.<sup>36</sup> I chose only graduates from the major Norwegian business schools (NHH and BI) and the major engineering school (NTNU). The main reason for including BI graduates in the survey study was the nature of the population in the files at NSF. By adding the graduates from the Norwegian School of Management (BI) the overall

---

<sup>36</sup> The members of NSF are found in the following categories: 13% work in the public sector; 62% work in the private sector; 19% are student members, 5% are self-employed and 1% are retired persons (<http://www.nsf.no/Fakta/Medlemstall/>).

population sample increased from 886 to 1516. Managers graduated from BI were chosen because this school is the major business school in Norway besides NHH (Amdam 1993). The choice of managers from these schools was also connected to the exploratory study where I focused my investigations on the curricula and archival material from these selected educational institutions. Based on these investigations, I knew what type of knowledge these graduates had been exposed to during education and the social and political roles of these educational institutions in Norwegian society. Another group that would have been valid to include in the survey sample was foreign educated business and engineering graduates. In particular in the post-war period, due to undercapacity in the national educational system, many students went abroad to get their business or engineering diploma (Amdam 1999). This is a substantial group among Norwegian *sivilokonom*s and *sivilingenior*s. Statistics show that 30 - 40% of the total capacity of *sivilokonom* and *sivilingenior* education were taken abroad in the 1970s and 1980s (the time period where the major proportion of the respondents graduated).<sup>37</sup> The major proportion of these students graduated in the United States of America. If students have completed a certified foreign educational program they are allowed to use the titles *sivilokonom* and *sivilingenior*. However, since this is a fragmented and heterogeneous group, I decided not to include them in the survey even though several of them are members of NSF and NIF.<sup>38</sup> Particularly, the type of educational programs they had been exposed to was too complicated to track in this setting.

### Data collection

Two questionnaires were developed – one for business-educated managers and one for engineering-educated managers. These two questionnaires were identical except for the section concerning educational background (see appendix 3).

The data from the main sample was collected in June 1999. The original sample consisted of 1200 business-educated managers and engineering-educated managers, 600 respondents in each group. Out of the 1200, 551 managers answered the questionnaire meaning that the overall response rate was 46%. 251 of those were business-educated managers (42%), and 300 were engineering-educated managers (50%). This is a fairly good response rate taken into consideration that the questionnaire was sent to managers. In

---

<sup>37</sup> <http://www.lanekassen.no/stat/Statistikk/Utlandsstatistikk>, Utdanningsstatistikken SSB.

<sup>38</sup> Foreign educational programs are certified by the Ministry of Education, Research and Church Affairs, but governed by NHH (*sivilokonom*) and NTNU (*sivilingenior*).

order to increase the initial response rate, one reminder was sent to those who had not responded within a month after the first dispatch of the questionnaire.

Managers were asked to give a report describing their educational background, work experience and management competence. In the analyses, these elements were compared in order to see if there were any systematic relationships between these variables. There were several weaknesses with the data that I had to take into consideration when drawing conclusions from the study. These weaknesses are discussed in more detail in sub-chapter 7.5.

## **7.2 Measurements**

This section consists of a presentation of the measurement of the different variables (dependent, independent and control) in the research model. The reliability of the measures and the discriminant, convergent and nomological validity of the different variables are also evaluated.

Since all the dependent variables were treated at an interval level of measurement and considered reflective as opposed to formative, coefficient alpha was used to estimate the reliability of the measures (Cronbach 1951). In order to control for discriminant and convergent validity of multidimensional constructs of problem solving strategies and managerial behavior, explorative factor analysis was applied (e.g. Carmines and Zeller 1979; Nunnally and Bernstein 1994). According to Hair, Anderson, Tatham and Black (1992), factor analysis can be used for confirmatory purposes in order to control for the degree to which the data meets the expected structure. Principal component factor analysis (PCA) was used as the method for extraction of factors. The main reason for this choice was that I wanted to summarize most of the original information (variance) in a minimum number of factors for prediction purposes, and as suggested by Hair et al. (1992), PCA is an appropriate method to use for this purpose. An oblique factor rotation was used on the measurements of the preference for problem solving strategies since previous research had shown that the two variables (assimilator and explorer) were correlated (Martinsen 1994; Martinsen 1995a).<sup>39</sup> The PROMAX rotation was used since this method is considered an appropriate oblique rotation method for large datasets. An orthogonal factor rotation was chosen to develop the best possible measurement model for the managerial behavior construct since I was primarily interested in the

---

<sup>39</sup> Hair et al. (1992) advise that oblique rotation should be used when the underlying factors are assumed to be correlated.

best linear combination of variables.<sup>40</sup> I used the VARIMAX method since the aim was to simplify the columns of the factor matrix, which represented each variable that was tested. Since the aim was not to develop instruments, but rather to evaluate whether or not the instruments used in the questionnaire functioned according to their purpose, I user-specified the number of factors. This was done after running an initial factor analysis without such specification both for the preference of problem solving strategies construct and the managerial behavior construct.

### **Dependent variables**

The dependent variables measured the managers' self-understanding of their management competence. As discussed above there are several weaknesses connected to relying solely on the managers' self-perception of their competence. The fact that the study has a cross sectional design meant that the managers' competence report was answered from a current state of affairs thus likely to be closely connected to their present position. Therefore I included 5 control variables characterizing their present employer. These variables are presented later in this chapter.

#### *Problem solving strategies*

The A-E style instrument was applied to identify problem solving strategies (Kaufmann and Martinsen 1991). Preference for problem solving strategies consists of two variables - assimilator and explorer. There are 15 items identifying each of the problem solving strategies. In addition, the instrument has 4 filler indicators<sup>41</sup> in order to control for opportunistic completion of the questionnaire. All together the instrument consists of 34 items. The A-E style instrument measures an individual's degree of both assimilator problem solving strategy and explorer problem solving strategy.

The explorer problem solving strategy is measured with items such as:

- When trying to solve a problem, I most often try to find new means of doing so.
- I quite like situations in which it is necessary to break with conventional wisdom.
- I like situations in which you have to seek new knowledge actively.

---

<sup>40</sup> The best linear combination is understood as the particular combination of original variables that would account for most of the variance in the data as a whole compared to any other linear combination of the variables.

<sup>41</sup> I never get angry if I get stuck; I always answer honestly; I have never made a major error in solving a problem; I have never cheated.

The assimilator problem solving style is measured with items such as:

- I prefer to stick to what I know well.
- I prefer to plan and structure what I am to do.
- I am best suited for work which requires precision and a systematic approach.

All the items are measured by a Likert scale consisting of 5 scores (do not correspond at all, do not correspond, neutral, correspond, correspond very well). The total scores can be measured in four ways; by summing all the scores (both assimilator and explorer), by summing assimilator items separate from explorer items, by computing the means either for the total A-E score or means for each variable. In the first instance, the minimum score is 30 and the maximum score is 150. By separating the problem solving strategies the minimum score is 15 and the maximum score is 75. The means are from 1 to 5. The higher the score, the more explorer oriented problem solving strategy, and the lower the score, the more assimilator oriented problem solving strategy is preferred by the individual.

Research using the A-E styles instrument (Kaufmann 1979; Martinsen 1994) has identified that A-E styles are rooted in dynamic factors, and that they are uncorrelated with general intelligence. They have also identified that the situation where the problem solving occurs will influence the type of problem solving strategies used (Martinsen 1995a) This observation had important design consequences for the use of instrument in this study. Martinsen (1995) found that the posited interaction between the A-E styles and experience should be most salient when a relatively relaxed attitude is present. In motivating situations, we can expect the performance pattern to be reverse for assimilators and explorers for structured and unstructured tasks respectively. This observation was the most important argument for asking the managers to identify their overall problem solving style rather than asking them to solve a problem and then report how this problem was solved, by answering the contentions presented in the instrument. By asking the managers generally to describe their problem solving style, I created an unmotivated situation where I most probably got hold of the manager's preferred problem solving strategy as is at present.

In this study, the loading of the assimilator items and the explorer items were highly negatively correlated.

Table 7: Correlation assimilator - explorer

		<b>Assimilator</b>	<b>Explorer</b>
<b>Assimilator</b>	Pearson Correlation	1.000	-.662**
	Sig. (2-tailed)	.	.000
	N	523	505
<b>Explorer</b>	Pearson Correlation	-.662**	1.000
	Sig. (2-tailed)	.000	.
	N	505	527

\*\* . Correlation is significant at the 0.01 level (2-tailed).

This observation led to the conclusion that the instrument worked according to its purpose in this survey and that the two problem solving strategies could be viewed as two distinctive types of problem solving preferences. Thus, there was support for the instrument's discriminant validity. However, in order to control for the convergent validity, a deeper analysis of each of the items which composite the different variables was needed. PCA is an appropriate tool for this purpose (Hair et al. 1992).

Different factor analyses have previously been performed on the instrument (e.g. Martinsen 1989; Martinsen 1995a). Based on these factor analyses the instrument is found to describe 3 factors – novelty vs. structure seeking, high vs. low ideational productivity, and opposition vs. preference for structure (Martinsen 1989). When I ran PCA without factor constraints 6 factors emerged. They could be grouped as structure seeking (1); novelty seeking (2); preference for structure (3); opposition for structure (4); high ideational productivity (5) and low ideational productivity (6). This is in line with the previously identified factors (Martinsen 1994; Martinsen 1995b) (see appendix 4, table I). However, the scree plot (appendix 4, figure I) from the factor analysis showed that the curve flattens out after factor 3, indicating that most of the variance in the sample concerning preference for problem solving strategies is explained by the first 3 factors. However, the fourth factor loaded with an eigenvalue of 1.082, and according to the rules presented by Hair et al. (1992) factor 4 was included in the further analysis. The reliability measures were quite weak for factor 5 and 6, and since I was primarily interested in testing novelty seeking vs. structure seeking and preference for structure vs. opposition for structure, I chose to focus on the 4 mentioned factors in the further analysis. I then conducted a PCA with PROMAX rotation and specified that four factors should emerge from the analysis. The aim was to identify the items that best represented novelty seeking vs. structure seeking and opposition for structure vs. preference for structure. The results from the analysis are found in appendix 4, table II.

Connected to the original variables, novelty seeking and opposition for structure are conceptually related to the explorer problem solving strategy,

while structure seeking and preference for structure are conceptually related to the assimilator problem solving strategy (Kaufmann 1995).

A further inspection of the items was done in order to select the set of items that best represented each of the factors such that the measurement gained satisfactory convergent and discriminant validity. The decision rule proposed by Hair et al. (1992), which suggests that each factor loading should be above .50 and the distance between the loadings of each item of the different factors should be minimum .30, was used. The chosen items are shown in bold in table II, appendix 4. The selection of the items to represent each factor in further analysis is always a decision balancing between reliability requirements on one hand and convergent and discriminant validity requirements on the other hand. Some of the factors loaded above .50, but the distance to the loadings of other factors was not above .30. From factor 1 (structure seeking), item 17 and 27 were removed due to high loading respectively on factor 3 as well as factor 1. For factor 3 (preference for structure), item 4 was removed due to high loading on factor 4 (.47), and since the reliability was still acceptable with 4 items representing this factor, I decided not to use item 4 in further analyses. Regarding factor 4 (opposition for structure) item 22, 10 and 9 had high loadings on other factors as well as factor 4. The analysis of the reliability showed that item 22 and 10 were the optimal composite of items representing this factor. However, both these items had high loadings on novelty seeking and in a practical sense the respondents may not have been able to separate novelty seeking from opposition for structure. But since there is a theoretical distinction (Kaufmann 1995), this factor was kept for further analysis. Item 32, although only high loadings on factor 4, was removed because it was detrimental to the reliability of factor 4. After reaching a composite of items that contributed with satisfactory reliability and convergent and discriminant validity for each factor, I ran a new factor analysis to control the loadings of the kept items (see appendix 4, table III). Overall the items acted according to the initial model. The results from the PCA indicated that the respondents were able to separate assimilator style and explorer style and that they were consistent when responding to the questionnaire. The total variance explained by the 4 factors was 58.2%.

In order to test for nomological validity, a comparison between the initial variables (assimilator and explorer) and the factors developed from the PCA was conducted. Bivariate correlation analysis of the original variables and the components developed from the PCA is considered an appropriate method for such analysis (Hair et al. 1992). The following results were obtained:

Table 8: Correlation original variables and their factors, problem solving strategies

	ASS	EXP	1	2	3	4
ASS	1.000					
EXP	-.662	1.000				
1	.911**	-.599	1.000			
2	-.492	.784**	-.459	1.000		
3	.588**	-.641	.402**	-.312	1.000	
4	-.524	.752**	-.507	.517**	-.335	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

According to Hair et al. (1992) a rule of thumb is that the correlation between the original variables and their factors should be at least  $+ .15$  at 1 % - level when the sample size is 300 or larger. The correlation coefficients showed that the instrument with the chosen factors acted according to its theoretical purpose. There is a strong positive correlation between structure seeking (factor 1), preference for structure (factor 3) and assimilator problem solving style. The original explorer variable is highly correlated with novelty seeking (factor 2) and opposition for structure (factor 4). However, the correlations between the two sets of factors (factor 1 and 3, and factor 2 and 4) are also quite strong suggesting that these sets of factors are to some extent correlated in the sample. These factors are conceptually related, but since there is a theoretical distinction between these factors I chose to use them as separate measures in the further analyses.

The results from the PCA and the correlation analysis suggest that the A-E style instrument can be best represented by 4 factors (structure seeking, novelty seeking, preference for structure, and opposition for structure) in this sample. Reliability measures, convergent, discriminant and nomological validity were satisfactory for these 4 factors so in the further analyses the factors generated from the PCA were used.

#### *Managerial behavior*

An instrument developed by Martinsen (1999) measured the managers' self-understanding of managerial behavior. This instrument is fairly newly developed and even though both reliability and validity tests have been performed on the instrument, a further inspection of how it worked in this survey was needed. The variables that the instrument measures are based on previous research on management that has been summarized by e.g. Bass (1990) and Yukl (1994). Based on previous research, they have identified several dimensions that are important aspects of managerial behavior. The instrument measures six variables: entrepreneurial orientation, task

orientation, power orientation, relationship orientation, activity orientation, and leadership effectiveness. For each variable, 10 items are developed to indicate the variable. All in all, together the instrument consists of 60 items. Examples of items for the different variables<sup>42</sup> are found in the following table:

*Table 9: Examples of items for each variable in the managerial behavior instrument*

<b>Entrepreneurial orientation</b>	I see issues from a holistic perspective. I formulate entirely new objectives. I react quickly to changes in the market place.
<b>Task orientation</b>	I ensure that the goals are clarified for my followers. I control that my followers keep the schedule. I make it clear what tasks my followers are going to do.
<b>Power orientation</b>	I give my goals priority before those of others. I make sure that no one is in doubt that I am in charge. My aim is to convince others.
<b>Relationship orientation</b>	I listen to my followers without interrupting them. I help the members of a team to cooperate. I reward actions that bring us to the goal.
<b>Activity orientation</b>	I show drive in my work as a manager. I make unpopular decisions when the situation requires it. I manage to complete my tasks on time.
<b>Leadership effectiveness</b>	I achieve measurable results in my management role. My followers enjoy themselves at work. I get praise for my abilities.

All items are measured by a Likert scale consisting of 5 scores (never, seldom, sometimes, often, and always). The total scores of each variable are measured either by summing the scores of the ten items that indicate one variable or by extracting the mean of each variable. When using total scores, the minimum score of each variable is 10 and the maximum score is 50. The higher the score, the more inclined the respondent is to act in the manner proposed by the variable. For instance, if one manager scores 45 (or 5) on

<sup>42</sup> The instrument is in Norwegian in its original form and no English version is yet available, thus I made the translation of the items. My translation has not been validated and therefore the English version as presented here is not recommendable for further use.

entrepreneurial orientation, this manager is likely to be very entrepreneurially oriented.

In order to investigate the relationship between the variables in the instrument, I conducted a correlation analysis of the variables. The following results emerged:

*Table 10: Correlation variables managerial behavior*

	<b>Entrep.</b>	<b>Task</b>	<b>Power</b>	<b>Relation</b>	<b>Action</b>	<b>Effectiv</b>
<b>Entrep.</b>	1.000					
<b>Task</b>	.377**	1.000				
<b>Power</b>	.128**	.243**	1.000			
<b>Relatio</b>	.430**	.459**	-.044	1.000		
<b>Action</b>	.496**	.475**	.158**	.424**	1.000	
<b>Effectiv</b>	.451**	.346**	.100**	.444**	.480**	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The results from this analysis showed that all variables except relationship orientation and power orientation were positively correlated with each other. However, many of the variables are conceptually related and therefore it is not surprising that they were correlated. None of them were so highly correlated that one could conclude that they were the same variable. In this sense, the correlation matrix gives some support for discriminant validity, but clearly some of the items in the instrument led to relatively high correlation between some of the variables. A PCA was conducted to separate the variables better than what was obtained by the original variables in order to increase the convergent and discriminant validity. I initially conducted a factor analysis with no factor constraints in order to be sure that there were mainly six variables in the instrument. The scree plot from the PCA suggested that the instrument mainly consisted of six factors (see appendix 4, figure II). Since the aim was to use the six original variables, but with better measurement I constrained the PCA to develop six factors. Orthogonal extraction method was chosen since I wanted the best linear combination of variables (Hair et al. 1992). The factors were rotated using the VARIMAX criterion since the aim was to simplify the columns in the factor matrix. The results from the PCA is found in appendix 4, table IV.

The rules for selection of items were based on Hair et al. (1992) who suggest that those items with loadings  $\geq .50$  and where the distance to the other loadings of the chosen item is at least  $\geq .30$  should be chosen as significant items to represent the underlying factor. The items chosen to represent each of the 6 factors are presented in bold in table IV, appendix 4.

The table shows that some of both the selected and removed items do not follow the overall decision rule. The main reason for disregarding the decision rule was due to low reliability of the measures. The following items were used in the further analysis even though the item intercorrelation was too high:<sup>43</sup> 55 (factor 1), 24 and 6 (factor 4), and finally 29 (factor 5). Item 46 (factor 2) was included in further analysis even though it loaded under +.50, but it increased the reliability of factor 2 above .70. In order to control for any change in the factor loadings due to the deletion of some of the items in the instrument, I conducted a PCA with only the selected items. The result of this analysis is found in appendix 4, table V, which shows that the same items loaded on the same factors as in the complete model and that the intercorrelations were more or less the same as in the original factor analysis.

The overall conclusion is that the selection of items representing each factor led to satisfactory reliability and convergent validity. All Cronbach alphas were above .70 (Nunnally and Bernstein 1994) and there was no serious convergence across different measures.

In order to control for nomological validity a correlation analysis between the original variables and their factors was conducted. The main purpose of this analysis was to evaluate the appropriateness of using the old or the new variables (developed from PCA) in further analyses. The following results emerged from the analysis:

*Table 11: Correlation between original variables and their factors, managerial behavior*

	<b>ENTRE</b>	<b>TASK</b>	<b>POWER</b>	<b>RELAT</b>	<b>ACTION</b>	<b>EFFECT</b>
<b>1</b>	<b>.976**</b>	.345**	.147*	.404**	.469**	.420**
<b>2</b>	.469**	<b>.480**</b>	.010	<b>.913**</b>	.477**	.440**
<b>3</b>	.136*	.242**	<b>.961**</b>	-.021	.156**	.095
<b>4</b>	.464**	.380**	.437**	.437**	.480**	<b>.882**</b>
<b>5</b>	.379**	.406**	.065	.412**	<b>.841**</b>	.320**
<b>6</b>	.129*	<b>.803**</b>	.237**	.185**	.200**	.119*

\*\* . Correlation is significant at the 0.01 level (Hair et al. 1992).

\* . Correlation is significant at the 0.05 level (Hair et al. 1992).

The results from the correlation analysis showed that the factors represented their underlying variable. The respective correlations between the original variable and its factor are the bold in table 11. However, as one can see from the correlation matrix, there are still significant correlations among the different factors. After using the factors developed from the PCA the

<sup>43</sup> This decision was made after running PCA for the chosen items (appendix 4, table IV).

correlation between the different variables in the instrument were reduced compared to the initial correlations shown in table 11 (see appendix 4, table VI for further overview).

In the further analyses, the new factors developed representing each variable of the managerial behavior construct were used, because these measures increased the convergent and discriminant validity of the measurements and in addition ensured that the reliability of all the factors was above .70. The total variance explained by the 6 factors was 47.6%.

### **Independent variables**

The independent variables are the managers' educational background and type of work experience. The reasons why these two variables were seen as good indicators of managers' demographic characteristics were discussed in chapter 2. The managers were asked to self-report their educational background and type of work experience. Neither of these variables can be defined as multidimensional constructs. They were, rather, categorical variables and thus only descriptive statistics were used to ensure that the variables were normally distributed and hence suitable for regression analysis (Hair et al. 1992).

Educational background was measured by identifying educational programs completed after obtaining the titles of *sivilokonom* and *sivilingenior*. In addition the type and the amount of management courses were identified.

The managers' work experience consisted of many separate measurements related to the definition of the construct proposed by Finkelstein and Hambrick (1996). They define work experience to be a composite of functional background and tenure. In the questionnaire, the managers were asked to outline their career development. Each position they had hold from graduation until the present position was outlined. Connected to each position, data about the type of position, tenure in position, industry, size of organization, and whether or not the change to next position was a departure or a promotion, were obtained. This information made it possible to develop some new variables that were further used in the analyses.

Type of functional background was represented by four different sets of variables: overall type of work experience, functional background prior to the first management position, type of organizational experience, and finally type of industry experience.

First, an overall analysis of the managers' total career was conducted, thus placing them in four major categories: administrative experience, production

experience, marketing/sales experience and mixed experience. This variable was labeled type of experience.

The second variable developed to define type of work experience was a categorization of the managers' experience before they became managers. The type of experience the managers had had prior to the first management position was categorized according to 5 expertise areas: accounting/finance, marketing/sales, production/operations, science/technology/R&D, and human resource management and management consulting (Hambrick et al. 1993). This variable was labeled functional background. This relatively detailed categorization is based on observations by Waller et al. (1995) in particular, who suggest that in analysis concerning whether or not functional background has an influence on managerial cognitive models, one should use a fine-grained categorization of functional experience.

Third, a categorization of the managers' type of organizational experience was also conducted. This variable defined the size of the organizations where the managers had had their prime experience. This variable was computed by comparing frequencies of experience in organizations of different sizes. The most frequently occurring organizational size in the managers' career was chosen as the indicator of this variable. Organizations were grouped in small, medium and large organizations. I used Spilling's (1998) categorization of small, medium and large firms. What is regarded as small, medium and large firms depends on a country's industrial structure. In Norway, small firms are organizations that consist of 19 employees or less, and medium-sized firms consist of 20-99 employees. Large firms are categorized into three groups, namely 100-299 employees (L1), 300-599 employees (L2), and above 600 employees (L3).

Fourth, the type of industry experience was analyzed based on two industry characteristics: degree of innovativeness and degree of knowledge intensity. The variable connected to degree of industry innovativeness was developed based on the newly published Norwegian innovation index (Maus 2000). This index defines production of chemical and chemical products, electronic and optic industry, and telecommunication as being the most innovative industries in Norway. Subsequently managers with experience from such industries were compared to managers without such industry experience. This was a dichotomous variable: 1 equals no experience from innovative industries and 2 equals experience from innovative industries.

Industries that are considered knowledge intensive were defined in accordance with Alvesson (1995) and Løwendahl's (1992; 2000b) understanding of knowledge intensive industries. Industries categorized by

Løwendahl (2000b:20) as professional business service industries were selected. The labeling of these industries in my sample was organization and management consulting, marketing and promotion, media and publishing industries, consulting engineers, and other types of professional services. This was also a dichotomous variable: 1 equals no experience from knowledge intensive industries and 2 equals experience from knowledge intensive industries.

Tenure was represented by three different sets of variables: average tenure, in-depth knowledge, and frequency of industry change.

The variable average tenure was computed by summing the total time spent in different positions and dividing it by number of positions. The data was grouped based on Hambrick and Fukutomi's (1991) understanding of managerial tenure. Three distinctive groups were used in the analyses: short tenure (0-3 years), medium tenure (4-9 years) and long tenure (10 years or more). The age of the executive is also found to be strongly related to managers' different types of tenure (in position, organization, and industry) (Finkelstein and Hambrick 1996). Hence, age was used as a control variable in the analyses.

In-depth knowledge was measured as a dichotomous variable based on average tenure. If the average tenure was 4 years or more in positions, the managers' experience was defined as in-depth knowledge. This is in line with Hambrick and Fukutomi (1991), who suggested that after 3-4 years CEOs would get more committed to a chosen paradigm, which is an indication of in-depth knowledge. When the score was 1, the manager did not have any in-depth knowledge meaning that the average tenure was less than 4 years, when the score was 2, the manager's experience was defined as being deep. Age may also be related to the extent of in-depth knowledge and thus was included as a control variable.

Frequency of industry change was computed by summing up the total number of industries the managers had been employed in throughout their career. One industry was computed as 0 changes while 2 industries were computed as 1 change, etc. 4 or more changes were considered high frequency of industry change, which meant that the respondent had experience from more than 4 industries.

## Control variables

In order to reduce the risk of attributing explanatory power to independent variables that were not in fact responsible for the variation found in the dependent variables, I included several control variables in the study. A control variable controls for spurious relations between the independent and the dependent variable. There are several other relationships that might explain the causal relations proposed in the hypotheses presented in chapter 6. Based on theoretical considerations, I included the following control variables:

*Table 12: Control Variables*

Control variables
Age
Gender
Graduation year
Managerial level
Characteristics of current employer

Age and gender were used as general control variables for all the hypotheses. On an individual level there is an underlying belief that age and gender predict different management competence (e.g. Finkelstein and Hambrick 1996; Kanter 1977; Loden 1986). For instance managerial age is negatively associated with risk-taking (Vroom and Pahl 1971), product or market innovation strategies (Thomas et al. 1991), strategic change following industry deregulation (Grimm and Smith 1991), and change and diversification profiles (Wiersema and Bantel 1992). Regarding gender, there are also some studies indicating that there are differences between men and women regarding their attitudes towards at least some aspects of managerial behavior. Women are believed to be more relational compared to men (Dawson 1997). They also seem to use mitigating explanations (that minimize threats to employees' self-esteem) more often than male managers (Tata 1998). However, many researchers have also found that there are no differences between female and male managers that can be explained by gender alone. To be on the safe side, I chose to include this variable as a control variable when testing the hypotheses.

Amdam (1999) identifies several shifts in Norwegian business life regarding types of competence requested of managers. Amdam (1999), based on Fligstein (1987), identifies different phases of capitalism and argues that in the Norwegian context management competence on production control was emphasized before the 1960s, whereas the focus shifted to market control between the 1960s and the 1980s, and finance control from the 1980s. This

is discussed in more detail in chapter 3. However, the different phases indicate different types of management knowledge that have been in focus during different periods. Individuals may have been influenced greatly by the spirit of the times in the earlier phases of their business career. To take into consideration that people to some extent are a product of their time, I used this shift model as a control variable in the hypothesis testing. Graduation year was used as an indication of managers belonging to different time periods.

The study consisted of managers at different managerial levels: top, middle, and professional. Previous studies have indicated that management positions on different levels in organizations require different managerial competence (Boyatzis 1982; Collin 1989; Nordhaug 1993). Consequently, managerial level could be a spurious variable explaining the relationship between educational background, work experience and management competence. Thus, managerial level was used as a control variable in the data analyses.

Another set of control variables was related to the nature of the managers' present organization. Since this study did not focus on the use of competence, but rather the content of management competence and where it originates, the role of the organization and task environment was not considered in the main relationships. Regarding the potential influence of the organization on management competence, some variables describing the organization the managers were currently employed in were used as control variables in the data analyses. These variables monitor the systematic effect of the nature of the organization in answers to the management competence questions. One reason for including the control variables was the likelihood that the most recent work experience will have a strong influence on how the respondents answered the contentions presented in the questionnaire.

Situational factors such as task environment and the nature of the organization can modify the type of management that will occur (e.g. Parsons 1951; Selznick 1957; Scott 1995), thus being a situational moderator of management. These situational factors will influence the managers' perceptions of management and how they emphasize different elements of management. Situational moderators from the task environment can be the nature of the environment (stable versus turbulent); economic, political, social and legal influences; and other groups the managers want to compare themselves with (reference groups) (Bass 1990). Factors related to the nature of the organization that can modify the type of management practiced are for example the organization's philosophy, the organization's size, structure, complexity and stability, and the organization's culture (Bass 1990). In this study, I only included organizational factors as control variables. In the

questionnaire, 5 variables characterizing the present employer were included. The items added in the questionnaire concerning the nature of the present employer were closely connected to the variables of the problem solving strategy construct (PSS) and the managerial behavior construct (MB). The table below shows the relationships:

*Table 13: Control variables, nature of present organization*

<b>Item<sup>44</sup></b>	<b>Variables PSS and MB</b>
In my organization, we emphasize the needs of the employees (na1).	Relationship orientation (MB)
In my organization, we emphasis innovation and creativity (na2).	Explorer (PSS) and Entrepreneurial orientation (MB)
In my organization, power games and conflicts characterize the work environment (na3).	Power orientation (MB)
In my organization, we emphasize management-by-objectives and performance (na4).	Assimilator (PSS) and Task orientation (MB)
In my organization, the responsibility is on the individual manager as opposed to the team (na5).	Activity orientation (MB) and Leadership effectiveness (MB)

In the data analyses, the variables describing the present organization were applied to investigate whether managerial characteristics correlated with characteristics of the present organization.

### **7.3 Descriptive statistics**

In this section, the construction of variables is described and descriptive statistics for the entire sets of dependent, independent and control variables are reported.

#### **Dependent variables**

The individual scores for the thirty measures of problem solving strategies and the sixty measures of managerial behavior were computed averaging the ratings across the items comprising ten measures - four of problem solving strategies (structure seeking, novelty seeking, preference for structure, and opposition for structure) and six of managerial behavior (entrepreneurial, task, power, relationship, action orientation, and leadership effectiveness).

The table below shows means, standard deviations, maximum and minimum values along with skewness and kurtosis indicators for all these variables.

---

<sup>44</sup> The items are translated by me and not validated by anyone else.

The number of items and the coefficient alphas for all measures are also reported.

*Table 14: Descriptive statistics for dependent variables*

<b>Constructs and variables</b>	<b>Mean</b>	<b>S.D.</b>	<b>Skew.</b>	<b>Kurt.</b>	<b>Min</b>	<b>Max</b>	<b># items</b>	<b>Alpha</b>
<b>Problem solving strategies</b>								
Structure seeking	3.46	.66	-.26	-.32	2	5	6	.82
Novelty seeking	3.60	.53	-.00	-.05	2	5	5	.74
Pref. for structure	2.72	.61	.32	-.24	1	5	4	.72
Opp. for structure	3.40	.77	-.46	-.05	1	5	2	.73
<b>Managerial behavior</b>								
Entrepreneur	3.50	.43	-.10	.06	2	5	8	.82
Task	3.31	.55	.12	-.23	2	5	4	.75
Power	2.76	.48	.21	.10	2	4	7	.75
Relationship	3.89	.37	-.22	.90	3	5	7	.74
Action	3.91	.51	-.20	.05	2	5	4	.72
Effectiveness	3.72	.38	.00	.81	2	5	5	.71

For most of the variables, the full scale was not in use (1-5). However, reasonable range and standard deviation estimates were presented for all variables. By using the rule of thumb of skewness less than one and kurtosis less than two, all variables were well within this range (Tabachnick and Fidell 1996), suggesting that the variables were more or less normally distributed.

### **Independent variables**

The independent variables were different measures of managers' educational background and work experience. Neither of the independent variables were multidimensional constructs (only categorical variables), therefore coefficient alphas were not computed for these variables (Nunnally and Bernstein 1994).

Table 15: Descriptive statistics for independent variables

Variables	Mean	S.D.	Skewness	Kurtosis	Min	Max
Educational background	.46	.50	.18	.10	0	1
Type of experience (overall)	2.37	1.16	.40	-1.33	1	4
Functional background (before management position)	2.83	1.25	.04	-.55	1	5
Average tenure	1.57	.54	.19	-.103	1	3
In-depth knowledge	1.23	.42	1.28	-.35	1	2
Frequency industry change	1.49	1.34	.70	-.50	1	4
Organizational experience	3.50	1.55	-.40	-1.41	1	5
Experience from innovative industries	1.25	.43	1.17	-.64	1	2
Experience from knowledge intensive industries	1.43	.50	.30	-1.92	1	2

Maximum and minimum values and standard deviation estimates indicate that the variables capture differences in educational background and work experience. As table 15 shows, skewness and kurtosis values are below respectively one and two for all variables except average tenure, in-depth knowledge and experience from innovative industries.

The most frequent work experience among the respondents was experience from production (41.6%) and mixed experience (30%). A vast majority of the respondents had their functional background from production and operations (42.6%), accounting and finance (18.1%) and from human resource management and management consulting (11.1%). The average tenure in position was 4 years.<sup>45</sup> The average tenure variable was grouped into three underlying groups characterizing the respondents' tenure and the following frequency emerged among the groups - 45.2% short average tenure, 51.7% medium average tenure, and finally 2.5% long tenure. Most of the respondents mainly have their organizational experience from large firms (above 600 employees) (43.9%). 23% of respondents could be classified as having in-depth knowledge in a functional area. 24.9% of the respondents had industry experience from industries classified as innovative, and 42.6% of the respondents had experience from industries classified as knowledge intensive. The skewness values of the variables in-depth knowledge and experience from innovative industries were above the recommended area of +/-1.0 (Hair et al. 1992). These two variables are dichotomous variables and the nature of the data caused these high skewness values (the two groups were unequal). Clearly there was no reason of transforming the data of these two variables (Tabachnick and Fidell 1996).

<sup>45</sup> Computed from the exact average tenure of each individual.

Since the sample consisted of two different educational groups - *sivilokonoms* and *sivilingeniors*, a comparison of the characteristics of these two groups was considered necessary in order to investigate the overall variation in the independent variables based on educational background. The means and standard deviations are reported. The following results emerged from this comparison:

*Table 16: Comparison demographic characteristics of sivilokonoms and sivilingeniors*

<b>Variables</b>	<b>Sivilingeniors</b>	<b>Sivilokonoms</b>
Age		
<i>Average</i>	48.09	45
<i>S.D.</i>	8.84	8.29
Gender		
<i>Male</i>	95.7%	89.5%
<i>Female</i>	3.7%	10.5%
Managerial level		
<i>Top</i>	70%	39.8%
<i>Middle</i>	21.7%	46.2%
<i>Professional</i>	8.3%	10.4%
Type of experience		
<i>Administration</i>	2.7%	52.8%
<i>Production</i>	66.3%	12.9%
<i>Marketing/sales</i>	0.7%	4%
<i>Mixed</i>	30.3%	30.2%
Functional background		
<i>Accounting/finance</i>	0%	39.8%
<i>Marketing/sales</i>	1.3%	4%
<i>Production/operations</i>	73.3%	6%
<i>Science/technology/R&amp;D</i>	5.7%	0.8%
<i>Human Resource Management and Management Consultant</i>	0%	23.5%
Average tenure		
<i>Average</i>	4.3	4
<i>S.D.</i>	2.56	1.95
In-depth knowledge		
<i>Has</i>	21%	25.5%
<i>Has not</i>	79%	74.5%
Frequency of industry change		
<i>Average</i>	1.36	1.68
<i>S.D.</i>	1.28	1.38
Organizational experience		
<i>Small</i>	16.8%	14.5%
<i>Medium</i>	16.1%	16.1%
<i>Large 1</i>	12.4%	18.5%
<i>Large 2</i>	9.4%	7.7%
<i>Large 3</i>	45.3%	43.1%
Experience from innovative industries		
<i>Has</i>	29%	19.9%
<i>Has not</i>	71%	80.1%
Experience from knowledge intensive industries		
<i>Has</i>	41.7%	43.8%
<i>Has not</i>	58.3%	56.2%

The most important differences among the two educational groups in the sample are related to their age, gender, managerial level, type of overall work experience, functional background prior to the first management position, and frequency of industry change. The average age of the respondents in the *sivilingenior* group is slightly higher compared to the *sivilokonom* group, 48 years and 45 years respectively. In addition, there are more women managers in the *sivilokonom* group compared to the *sivilingenior* group, respectively 10% and 4%. A higher percentage of the respondents in the *sivilingenior* group are found in top management compared to the *sivilokonom* group (70% versus 40%). Type of work experience and frequency of industry change will be discussed in more detail in the following section of this chapter (data analysis and results) in connection to hypotheses 1<sub>A and B</sub> and 2. Overall, many of the demographic characteristics of these two groups are fairly similar, e.g. average tenure, in-depth knowledge, organizational experience, and experience from innovative and knowledge intensive industries.

### Control variables

The control variables were used to test the possibility of spurious relations between the independent variables and the dependent variables (Frankfort-Nachmias and Nachmias 1996). With the use of control variables it was possible to ensure that there was an inherent causal link between the variables, as stated by the hypotheses. However, the limited number of control variables did not totally rule out the unforeseen connection with some other phenomenon.

Table 17: Descriptive statistics for control variables

Variables	Mean	S.D.	Skewness	Kurtosis	Min	Max
Present age	46.69	8.73	.16	-.54	26	70
Gender <sup>46</sup>	-	-	-	-	1	2
Graduation year	1977.1	8.86	-.14	-.55	1953	1997
Managerial level <sup>49</sup>	-	-	-	-	1	3
Employee orientation (na1)	3.59	.94	-.14	-.55	1	5
Innovation and creativity (na2)	3.71	.90	-.44	-.39	1	5
Power games and conflicts (na3)	1.91	.95	1.09	.82	1	5
Goals and results (na4)	3.97	.85	-1.15	1.88	1	5
Individual leaders (na5)	3.02	1.09	.01	-.86	1	5

The descriptive statistics show that there is large variation in age among the respondents in the sample. So even if the mean age is 47 years, the minimum age of the respondent is 26 years and the maximum age is 70 years. Since age can be an issue connected to management competence, this variable was

<sup>46</sup> No descriptive statistics is presented for the variables on the nominal level.

included as a control variable in all data analyses. Regarding gender, there was a clear over-representation of males in the sample (92.2%) and therefore likely that most of the findings were related to male managers. Only 43 women participated in the survey compared to 508 males. However, this variable was included as a control variable in the analyses since many argue that there are differences between male and female managers. Graduation year is likely to be correlated with age since most of the *sivilokonom* and *sivilingenior* students begin their studies in their early twenties. By comparing the age mean and the graduation year mean, the mean of the respondents' age when they graduated was 25 years. However, the standard deviation is large and thus suggests a great variation in graduation time among the respondents. This variable was used to control to what extent the managers were a product of their time, to investigate if different groups of managers based on graduation year had different types of competence characteristics. In addition, since the managers in the survey were found on different managerial levels, this variable was also included as a control variable. The descriptive statistics show that most of the managers are found in top or middle manager positions (90.7%). 57.7% of the respondents were currently found in the top management positions, 33% were middle managers and 9.3% were professional managers. Last, the nature of the present organization is an important situational moderator of management. The 5 items indicating the present organization show satisfactory skewness and kurtosis although the skewness was slightly above the recommend area for  $na_3$  and  $na_4$ . However, that may only be the way the questions are answered and thus no need for transformation of the variable was considered (Tabachnick and Fidell 1996).

After making slight adjustments of the measurements of the different variables, satisfactory discriminant, convergent and nomological validity were obtained. The next section in this chapter concerns the analyses of the data starting with a presentation of the choices of methods for analyses and then presenting the results of the testing of the hypotheses displayed in chapter 6.

## **7.4 Data analyses and results**

This sub-chapter presents the results of three sets of analyses: the analysis of the interaction effect between educational background and work experience; the relationship between educational background, work experience and preference for problem solving strategies; and the relationship between educational background, work experience and managerial behavior.

### **Methods of analysis**

The major aim of the analyses was to identify whether any significant relationships existed between educational background, work experience and management competence (problem solving strategies and managerial behavior). Additionally, another aim was to identify the joint effect of educational background and work experience on management competence. The final aim was to investigate the extent to which demographic characteristics such as educational background and work experience were good proxies for management competence.

The research model consisted of covariation hypotheses between a number of categorical independent variables and a number of continuous dependent variables. Thus, appropriate statistical methods included canonical correlation, multiple analysis of variance (MANOVA) or structural equation modeling (Hair et al. 1992). Canonical correlation was ruled out primarily because it is viewed as a method which places few restrictions on the types of data on which it operates. It is therefore generally believed that the information obtained from e.g. MANOVA and structural equation modeling are of higher quality compared to results from canonical correlation analysis (Hair et al. 1992). Since both the mentioned methods were possible to use on the sample - given independence among observations, groups of approximately equal size (MANOVA) and large enough N (structural equation modeling) - these two methods were considered better than canonical correlation. Structural equation modeling was ruled out basically for two reasons. First, the study had no particular intention of examining series of dependence relationships simultaneously. Secondly, the measurement of educational background, work experience and management competence were in this study separated in time, and therefore no particular danger existed for dependent variables to become independent variables.

For analyses of variance between groups' means one can either use ANOVA or MANOVA, depending on the characteristics of the dependent variables. MANOVA uses one or more categorical independent variables as predictors, like ANOVA, but unlike ANOVA, there is more than one interval dependent variable. Where ANOVA tests the differences in means of the interval dependent variables for various categories of the independent variables,

MANOVA tests the differences in the centroid (vector) of means of the multiple interval dependent variables for various categories of the independent variables. MANOVA is an appropriate method to apply when there is some degree of intercorrelation among the dependent variables and therefore want to have a tool for effective control over type I error rate (Hair et al. 1992).<sup>47</sup> Regarding the degree of intercorrelation among the dependent variables, the management competence constructs (problem solving strategies and managerial behavior) were different. The factor analysis of the variable preference for problem solving strategies identified four factors - two factors belonged to the assimilator problem solving strategy and the other two factors were included in the explorer problem solving strategy variable. An inspection of the correlation among these four factors showed that they were to some extent correlated (see appendix 4, table VII). In order to determine the appropriateness of using MANOVA to analyze the proposed relationship between educational background, work experience and preference for problem solving strategy, a Bartlett's test for sphericity (Bray and Maxwell 1985; Hair et al. 1992) was conducted. This test identified a significant correlation among the dependent variables and thus MANOVA was considered the appropriate method to use.

The variables in the managerial behavior construct did not show the same degree of intercorrelation as the variables in the problem solving strategy construct. Some of the variables were correlated (see appendix 4, table VIII), but since the six variables were considered theoretically distinctive (Bass 1990; Yukl 1994) and guided by the principle of choosing the simplest possible method providing the possibility of a valid testing procedure, ANOVA was used to identify the group means' differences between educational background, work experience and managerial behavior.

For the MANOVA analyses the multiple general linear model option in SPSS 8.0 was applied in order to analyze group means' difference related to the preference for problem solving strategies. The one-way ANOVA procedure was applied to analyze group means' differences related to managerial behavior.

Neither ANOVA nor MANOVA determine the strength of the relationships between the independent and the dependent variables (rather identifies significant group means' differences and which groups that cause these differences). Since I chose to examine each independent variable individually (each set of groups), the overall effects of all the independent variables on the dependent variables were not estimated in the MANOVA or

---

<sup>47</sup> Rejecting the null hypothesis when it should be accepted.

the ANOVA analyses for either of the dependent variables. In addition, control variables could not be included in MANOVA/ANOVA. Thus, multiple regression analyses were conducted for each of the dependent variables, the predictor variables and the control variables. The predictor variables used in the regression analyses were the independent variables that had significant group means' differences from the MANOVA or the ANOVA analyses. All the significant predictor variables were included in one block (model 1). In addition, a second model containing the predictor variables (block 1) and the full set of control variables (block 2) was regressed on the dependent variables.

Collinearity diagnostics were performed for all regressions. All tolerance levels were within the cutoff threshold set by Hair et al. (1992) of .10 indicating that no independent variable was a linear combination of the other independent variables.

Homoscedasticity was inspected through the Box's M test and the Levene test, which are available in SPSS. The Box's M tests the homogeneity of the covariance matrices of the dependent variables across all level combinations of the between-subjects factors. The Levene test inspects the homogeneity of variance for each dependent variable across all level combinations of the between-subjects factors, for between-subjects factors only. The overall results from the analyses suggested that the models on the average were satisfactory.

Some cases were outliers and since both MANOVA and ANOVA analyses are sensitive to outliers (Hair et al. 1992; Tabachnick and Fidell 1996), these cases were excluded in the analyses. For the analyses of the relationships between preference for problem solving strategies and educational background and work experience, cases 193 and 197 were excluded. The casewise diagnostics function in the multiple regression procedure showed that these two cases had high standardized residual on the dependent variables "opposition for structure" and "structure seeking" respectively. Before the analyses of the relationships between educational background, work experience and managerial behavior, cases 456 (entrepreneurial orientation and action orientation) and 405 (task orientation) were excluded due to standardized residuals above  $\pm 3$ . By excluding these cases from the analyses of problem solving strategies and managerial behavior respectively, the rest of the cases were well within the SPSS default range of 3 standard deviations.

## Hypothesis testing

The testing of the hypotheses was divided into three groups. First, the relationship between educational background and work experience was examined. The second group of hypotheses examined the relationship between educational background, work experience and preference for problem solving strategies. The last group of hypotheses examined the relationship between educational background, work experience and behavior.

### *Educational background and work experience*

In this section the following hypotheses were tested:

**H<sub>1A</sub>: Managers with a business education primarily have their previous work experience from accounting, consulting and finance.**

**H<sub>1B</sub>: Managers with an engineering education primarily have their previous work experience from manufacturing and engineering related areas.**

**H<sub>2</sub>: Business-educated managers have a greater degree of mobility between industries compared to engineering-educated managers.**

In order to investigate the relationship between educational background and work experience, a bivariate correlation analysis was conducted on the two variables. The following results were obtained:

*Table 18: Educational background and type of work experience, bivariate correlation analysis*

	EDU	TWO	FUNB	ORG	KNOI	INNO	TENU	DEX	IND
EDU	1.00								
TWO	-.201**	1.00							
FUNC	-.221**	.205**	1.00						
ORG	-.005	.014	-.040	1.00					
KNOI	.022	.168**	.128**	-.196**	1.00				
INNO	-.105*	.140**	.021	.098*	-.080	1.00			
TENU	-.086*	-.056	.062	-.150**	.073	-.033	1.00		
DEX	.053	-.078	.077	-.082	.068	-.016	.481**	1.00	
IND	.120**	.402**	-.010	.010	.433**	.186**	-.003	-.015	1.00

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

The following significant correlations emerged between educational background and work experience: overall type of work experience (-.201), functional background prior to the first management position (-.221), experience from innovative industries (-.105), average tenure (-.086), and frequency of industry change (.120). The minuses are in favor of the engineers and the pluses are in favor of the business-educated managers. Deeper analysis of the correlation leads to some interesting findings. The first and the second job position were for both educational groups strongly related to the individuals' educational background. Business graduates primarily had their early work experience in accounting, consulting and finance, but from the third job position most of them were middle managers or top managers (70.5%). Many of the respondents in this group were from the third job position onwards classified as general managers. General managers are defined as "individuals who hold positions with some multifunctional responsibilities for a business (or businesses)" (Kotter, 1982:2). When I ran a life cycle analysis of the business-educated managers' tenure in position, I found that they had a median survival time of 3.72 years before they became managers, meaning that they on the average worked 3.72 years after graduation before they entered some managerial position.

If we then turn to the engineering-educated managers, more or less the same pattern occurs. On the average, however, they stayed a bit longer in positions directly connected to their educational specialization compared to the business-educated managers. In the fourth job position a large proportion of the engineers were found in general management positions (70.7%). The median survival time for engineering-educated managers before they became managers was 3.96 years. However, the difference between the two educational groups is so minor that random variance may be the main cause of the slightly different median survival time. A conclusion of this analysis is that engineering- and business-educated managers have 3-4 years of work experience following graduation before they become managers.

In order to classify the respondents in discriminant groups based on educational background and work experience I used general loglinear analysis. The following results emerges:

Table 19: Grouping of respondents based on educational background and work experience

Factor	Value	N	%
<b>Education</b>	<b>Engineer</b>		
<b>Type of experience</b>	administration	8.50	2.84
	production	197.50	66.05
	marketing/sales	2.50	.84
	mixed	90.50	30.27
<b>*N</b>		299	100
<b>Education</b>	<b>Business</b>		
<b>Type of experience</b>	administration	131.50	52.60
	production	32.50	13.00
	marketing/sales	10.50	4.20
	mixed	75.50	30.20
<b>*N</b>		250	100

\*2 respondents came out ungrouped.

The results presented in table 19 give support to hypotheses 1<sub>A</sub> and 1<sub>B</sub>. Business-educated managers have, to a large extent, their overall work experience from administrative functions like accounting and finance (53% of the sample). Engineering-educated managers, on the other hand, have frequently worked in manufacturing related areas before they became managers (66% of the sample). This experience is often closely related to their educational specialization. Another interesting observation connected to the engineers was that a fairly large proportion of the newly graduated students started their careers as research assistants at NTNU (24%), suggesting that these graduates were highly professionally oriented when they graduated. 56% started working in production and in a professional area closely connected to their educational specialization. However, a fairly large proportion of both educational groups have mixed working careers: 30% in the engineering group and also 30% in the business group, suggesting that these individuals also have the opportunity to move between different industries and functions outside the area of their professional training.

Regarding hypothesis 2, which concerns the degree of mobility between industries, a cross-tabulation between educational background, frequency of industry change and managerial level was conducted. Since there are imbalances between respondents in the two educational groups when it comes to managerial level, I needed to account for this in the analysis. There is reason to assume that there may be differences between managers at different managerial levels regarding their degree of industry mobility (Finkelstein and Hambrick 1996). The following results emerged from the analysis:

Table 20: Degree of mobility between industries

Educational background	Industry change	Managerial level		
		Top	Middle	Professional
Engineer	0	31.4%	32.3%	20%
	1	26.2%	32.3%	48%
	2	29%	20%	20%
	3	0.5%	-	-
	4 or more	12.9%	13.8%	12%
	Missing	-	1.5%	-
	<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Business	0	19%	20.7%	34.6%
	1	31%	37.1%	23.1%
	2	26%	24.1%	26.9%
	3	-	0.9%	-
	4 or more	23%	17.2%	15.4%
	Missing	1%	-	-
	<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

The results from this analysis support hypothesis 2 in that business-educated managers on the average have greater mobility between industries compared to their engineering-educated counterparts. This was also visible in the correlation analysis presented in table 18 between educational background and frequency of industry change (.120). This finding is true regardless of managerial level. By comparing top managers and middle managers in the two educational groups, middle managers in the engineering group shifted industries more frequently compared to top managers. The opposite is true for business-educated managers. This result makes sense if we compare the promotion frequency between the educational groups. The mean promotion frequency among *sivilingeniors* is 2.08 times while the same mean is 1.68 times for *sivilokonoms*. This suggests that *sivilingeniors* are internally promoted to managerial positions to larger extent compared to *sivilokonoms*.

**Key Findings:**

**There is a significant relationship between educational background and work experience for the two educational groups in the study.**

**Business-educated managers in top management positions have a higher degree of mobility between industries compared to engineering-educated managers.**

*Educational background, work experience and problem solving strategies*

Multivariate analysis of variance (MANOVA) and multiple regression were applied to investigate whether there are significant relationships between educational background, work experience and preference for problem solving strategies. In chapter 6, four hypotheses concerning the relationship between educational background, work experience and preference for problem solving strategies were proposed. Two hypotheses concerned the proposed effect of educational background, while the two other hypotheses focused on the effect of work experience. Each independent variable was tested on the dependent variables as a group, basically because the dependent variables were highly correlated (e.g. Hair et al. 1992; Tabachnick and Fidell 1996). The  $H_0$  in MANOVA is that for each variable all  $k$  groups have the same population mean. The alternative hypothesis is that at least one of the groups has a population mean different from the others.

Multiple regression analysis was used to identify the strength of the relationships between the significant independent and dependent variables. In addition, spurious relationships were explored by including control variables in the regression analysis. This sub-chapter ended with 2 x 4 sets of multiple regression analyses of each of the dependent variables, investigating the relationships between educational background, work experience and problem solving strategies. One set contained the significant model and the other set included the significant model and the control variables.

There are several assumptions about the data that need to be fulfilled in order to apply MANOVA as a method for analyzing the variance across groups (Hair et al. 1992). The assumption of independence among observations should be covered due the survey design of the study. Another assumption concerns the degree of variance in the answers among the two groups in the study. If the two groups are of fairly equal size this should not be a major problem.<sup>48</sup> However, if the group sizes are unequal there are several statistical procedures available to test whether or not the homoscedasticity are present. The Box's T test<sup>49</sup> and the Levene test<sup>50</sup> were used in these analyses. The Box's tests in the different analysis all came out with non-significant results, thus, rejecting the null hypothesis that the variances

---

<sup>48</sup> Hair et al. (1992) suggests that if the largest group size divided by the smallest group size is less than 1.5 there should be no major problem of inequality of variance. In this study the difference between the two educational groups is 0.85.

<sup>49</sup> The Box's test of equality of covariance matrixes examines the similarity of the covariance matrixes between the different groups on the dependent variables.

<sup>50</sup> Levene's test tests the assumption that each dependent variable has similar variance for all groups.

among the groups in the analyses regarding the dependent variables were not homogenous. The Levene test also showed non-significant results, suggesting that all groups in the analyses had equal variance on each of the dependent variables. The last assumption is connected to the normality of the dependent measures. As one can see from table 21, there are no major problems with the normal distribution of the dependent variables in this study.

Table 21: Descriptive statistics Assimilator - Explorer styles - separate scales

	Structure		Novelty		Pref. structure		Opp. structure	
	Eng	Bus	Eng	Bus	Eng	Bus	Eng	Bus
<b>Mean</b>	3.48	3.45	3.68	3.51	2.74	2.71	3.50	3.29
<b>Std.</b>	.66	.64	.51	.54	.60	.63	.73	.79
<b>Variance</b>	.438	.412	.256	.296	.363	.396	.538	.625
<b>Kurtosis</b>	-.382	-.364	-.034	.051	-.265	-.228	.075	-.237
<b>Skewness</b>	-.300	-.145	-.089	.148	.396	.236	-.523	-.330

Engineering: N = 284

Business: N = 241

As advised by Bray and Maxwell (1985), the following MANOVA analyses contain three steps. First, an omnibus MANOVA test was conducted. Second, the dependent variable(s) that had different means compared to the overall sample were identified. At the end, post hoc tests of the independent variables that caused the differences in the means of the dependent variables were conducted. This was done in order to identify the groups responsible for the significant omnibus results.

Educational background and problem solving strategies

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>3A</sub>: Engineering-educated managers more often use an explorer problem solving strategy compared to business-educated managers.**

**H<sub>3B</sub>: Business-educated managers more often use an assimilator problem solving strategy compared to engineering-educated managers.**

Based on content analysis of business and engineering schools' curricula, the respective graduates seem to be trained in different types of problem solving during their education. Engineering graduates are trained in problem solving in the sense that the curricula in engineering schools focus on training the

students in finding good technological solutions to problems. Business graduates, on the other hand, are believed to be more problem analysis oriented since they are trained in methods and tools for analyzing organizational problems. The essential question is whether or not the particular training has had any significant effect on the respective managers' preferred problem solving strategies.

Hypotheses 3<sub>A</sub> and 3<sub>B</sub> suggested that there should be differences among the two educational groups when it comes to their preference for problem solving strategies. The first step of the analysis was to identify whether there were any significant differences among the two educational groups (omnibus test). Table 22 reports the results from the overall significant test.

Table 22: Educational background and preference for problem solving strategies

Effect	Value	F	df	Sig.	Eta Squared	Observ. Power
Intercept	55.503	7215.4	4/520	.000	.982	1.000
Educatio	.039	5.0	4/520	.001	.037	.963

There are several multivariate test statistics to use in order to measure whether there are any differences between the groups' means on the dependent variable: Pillai's trace, Wilks' Lambda, Hotelling's trace and Roy's largest root. As advised by Hair et al. (1992) the measure to use is the one most immune to violations of the assumptions underlying MANOVA and yet maintaining the greatest power. The Hotelling's trace square and Wilks' Lambda are considered the most powerful and are also the most frequently used multivariate test statistics (Olson 1976; Olson 1979; Stevens 1979). Since the following hypotheses compared two educational groups, Hotelling's T-square<sup>51</sup> (Hotelling's Trace in SPSS) was used as the overall measure to test group differences (Bray and Maxwell 1985).

The F-test showed that there were some differences between the means of the preference for problem solving strategies, which were caused by educational background.<sup>52</sup> The eta-square<sup>53</sup> showed that only 3.7% of the variation in preference for problem solving strategies were explained by educational background.

<sup>51</sup> The same results were obtained from the other tests available in SPSS (Pillai's Trace, Wilks' Lambda and Roy's Largest Root).

<sup>52</sup> The critical value of F is above 3.36 (5.0), which is proposed to be the minimum value of F at the 0.01 level of significance.

<sup>53</sup> The eta square estimates the variation caused by the independent variables on the dependent variable.

The next step was to identify which dependent variables educational background caused any variation of. The estimates of the between-subjects effects reveal the following answers to this question:

Table 23: Test of between-subjects effects, educational background

Source	Dependent variable	Type III Sum of Squares	df	F	Eta	Obs. Power <sup>a</sup>
Corrected Model	Structure seeking	.145 <sup>b</sup>	1	.346	.001	.090
	Novelty seeking	3.769*** <sup>c</sup>	1	13.540	.025	.957
	Preference for structure	.110 <sup>b</sup>	1	.287	.001	.083
	Opposition for structure	6.087*** <sup>d</sup>	1	10.436	.020	.897
Intercept	Structure seeking	6282.7***	1	15001.4	.966	1.000
	Novelty seeking	6737.9***	1	24204.7	.979	1.000
	Preference for structure	3869.6***	1	10115.6	.951	1.000
	Opposition for structure	5993.6***	1	10275.4	.952	1.000
Education	Structure seeking	.145	1	.346	.001	.090
	Novelty seeking	3.769**	1	13.540	.025	.957
	Preference for structure	.110	1	.287	.001	.083
	Opposition for structure	6.087**	1	10.436	.020	.897
Error	Structure seeking	219.038	523			
	Novelty seeking	145.590	523			
	Preference for structure	200.068	523			
	Opposition for structure	305.062	523			
Total	Structure seeking	6549.333	525			
	Novelty seeking	6959.120	525			
	Preference for structure	4099.313	525			
	Opposition for structure	6376.750	525			

\*p<.05; \*\*p<.025; \*\*\*p<.01

<sup>a</sup>. Computed using alpha =.05, <sup>b</sup>. R<sup>2</sup> = .001 (Adjusted R<sup>2</sup> = -.001), <sup>c</sup>. R<sup>2</sup> = .025 (Adjusted R<sup>2</sup> = .023), <sup>d</sup>. R<sup>2</sup> = .020 (Adjusted R<sup>2</sup> = .018)

This analysis shows significant differences in the means of novelty seeking and opposition for structure among the two educational groups. Even though these findings are highly significant, the fairly large sample can make trivial differences statistically significant (Bray and Maxwell 1985; Mohr 1990). Thus, eta-square was used to estimate the strength of the relationship between each independent variable and a set of dependent variables. The eta-square is a measure not directly influenced by sample size (Mohr 1990). The eta-squares showed that 2.5% of the variance in preference for novelty seeking was explained by educational background, while educational background explained 2% of the variance in opposition for structure.

The subsequent analysis determined which groups were responsible for the results from the significant omnibus test. There are several ways to determine which groups cause the group means' differences, e.g. post hoc tests, parameter estimates and k-matrix estimates (Bray and Maxwell 1985;

Hair et al. 1992). Since the independent variable only contained two groups, post hoc tests could not be conducted. The parameter estimates and the k-matrix showed that engineers were both more novelty seeking and had stronger opposition to structure than their business-educated counterparts.

*Table 24: Parameter estimates educational background and problem solving strategies*

Dependent variable	Parameter	B	Std. error	t	Sig.
Structure seeking	Intercept	3.454	.042	82.864	.000
	Education	.033	.057	.588	.557
Novelty seeking	Intercept	3.510	.034	103.263	.000
	Education	<b>.170</b>	<b>.046</b>	<b>3.680</b>	<b>.000</b>
Preference for structure	Intercept	2.710	.040	68.009	.000
	Education	.029	.054	.536	.592
Opposition for structure	Intercept	3.282	.049	66.715	.000
	Education	<b>.216</b>	<b>.067</b>	<b>3.230</b>	<b>.001</b>

For structure seeking and preference for structure there were no significant differences among the two educational groups. Novelty seeking and opposition for structure are two factors connected to the explorer problem solving strategy, while structure seeking and preference for structure are the factors connected to the assimilator problem solving strategy (Martinsen 1994). This means that there are group mean differences between the two educational groups regarding their preference for explorer problem solving strategies, but no differences regarding their preference for assimilator problem solving strategies. These results led to support for hypotheses 3<sub>A</sub> - that engineering-educated managers more often prefer an explorer problem solving strategy. However, no support was found for hypotheses 3<sub>B</sub> - that business-educated managers more often prefer an assimilator problem solving strategy.

**Key Findings:**

**Managers with an engineering education are more inclined to prefer an explorer problem solving strategy compared to their business-educated counterparts.**

**There are no significant differences between the two educational groups regarding their preference for an assimilator problem solving strategy.**

### Tenure and problem solving strategies

The results of the hypothesis testing of the following hypothesis is presented in this section:

**H<sub>3C</sub>: The more extensive the experience of managers in specific areas, the more likely they are to prefer an assimilative problem solving strategy.**

The next hypothesis concerns the relationship between the managers' tenure and their preference for problem solving strategies. Tenure was defined as a variable connected to the work experience variable and was operationalized by the following variables: average tenure in position, frequency of industry change and in-depth knowledge, which is related to tenure in position and industry (Finkelstein and Hambrick 1996). The descriptive statistics of these variables were presented in table 15, in this chapter.

I used Wilks' Lambda to measure the significance of the multivariate tests. The major reason for applying Wilks' lambda to test the multivariate differences across the groups is that this measure is most commonly used when the analysis consists of independent variables with more than two distinctive groups (Bray and Maxwell 1985; Hair et al. 1992). Both average tenure and frequency of industry change has more than two groups. In-depth knowledge is a variable consisting of two groups. The following results emerged from the omnibus test:

*Table 25: Tenure and preference for problem solving strategies*

Effect	Value	F	df	Sig.	Eta Squared	Observ. Power
AVETENUR	.969	2.081	8/1032	.035	.016	.844
CHANINDU	.924	2.582	16/1573	.001	.020	.969
INDEPKNO	.994	.784	4/520	.520	.006	.252

The omnibus test showed that there were significant differences between groups' means of preference for problem solving strategy and average tenure and frequency of industry change. However, the independent variable in-depth knowledge did not reveal any differences between the group means concerning preferred problem solving strategies. Therefore I decided to go on with further analysis without the in-depth knowledge variable.

The subsequent analysis was to determine for which of the factors of the problem solving strategy construct the means of the different groups (independent variables: average tenure and frequency of industry change) varied. The following results emerged from the test of the between-subjects effects:

Table 26: Test of between-subjects effects, average tenure and frequency of industry change

Source	Dependent variable	Type III Sum of Squares	df	Mean Square	F	Eta	Obs. Power <sup>a</sup>
Avetenur	Structure seeking	2.158	2	1.079	2.588	.010	.516
	Novelty seeking	1.015	2	.508	1.777	.007	.372
	Preference for structure	1.741	2	.871	2.318	.009	.470
	Opposition for structure	5.768*** <sup>b</sup>	2	2.884	4.910	.019	.806
Chanindu	Structure seeking	8.852*** <sup>c</sup>	4	2.313	5.464	.040	.976
	Novelty seeking	2.552	4	.638	2.252	.017	.659
	Preference for structure	1.991	4	.498	1.323	.010	.415
	Opposition for structure	4.342	4	1.086	1.836	.014	.558

\*p<.05; \*\*p<.025; \*\*\*p<.01

Computed using alpha=.05, <sup>b</sup> R<sup>2</sup> = .019 (adjusted R<sup>2</sup> = .015) <sup>c</sup> R<sup>2</sup> = .040 (adjusted R<sup>2</sup> = .033)

Average tenure caused significant differences in the means of opposition for structure. In order to determine which groups caused the mean differences a post hoc test using the Tukey honestly significance difference method (HSD) was applied. This test revealed that managers with long tenure have more opposition for structure compared to managers with short and medium tenure. These mean differences were significant at the .05 level. This result is quite contradictory to what we know about tenure and commitment to paradigms and present structure (e.g. Hambrick et al. 1993). However, the results may be caused by the fact that there were only 13 respondents in the group of managers who had average tenure above 10 years. A further inspection of the managers in this group showed that a large proportion of them worked in small firms and that 9 of them had their own business. Therefore it may be no surprise that they have opposition for structure even though they have long tenure in position on the average.

The independent variable, frequency of industry change, showed significant differences in the means of structure seeking. The post hoc tests revealed that there was a significant difference between the scores of structure seeking for those with many (2 or more) industry changes throughout their career compared to those who had few industry changes (0-1). The ones with low frequency of industry change were on the average more structure seeking compared to those with high frequency of industry changes.

The eta-squares indicate how much of the variation of the dependent variables that is caused by the independent variables. Since only structure seeking and opposition for structure showed any significant results, the eta-squares for these two variables were reported. Frequency of industry change explained 3.3% of the variation in structure seeking. However, the result yield from average tenure was highly suspect as discussed above, so even if this was a significant finding this result was not taken into account in the further analysis. However, since structure seeking is one factor of the assimilator variable, support for hypothesis 3 was given, and frequency of industry change was the variable that led to significant results.

**Key Findings:**

**A relationship between long tenure and structure seeking was identified. Managers who have low frequency of industry change are more inclined to prefer an assimilator problem solving strategy compared to managers who have higher frequency of industry change.**

Functional background and problem solving strategies

The results of the hypothesis testing of the following hypothesis is presented in this section:

**H<sub>3D</sub>: Managers with experience from R&D, marketing and production are more inclined to apply an explorative problem solving strategy compared to managers with experience from finance, accounting and general administration.**

The next hypothesis was related to the influence of functional background on preference for problem solving strategies. Previous studies have identified a possible link between functional background and cognitive bases and values (e.g. Gupta and Govindarajan 1984; Song 1983; Tyler and Steensma 1998). However, none of these studies have found any conclusive support for the relationship between functional background and cognitive bases and values. Functional background was measured by five variables (type of experience, functional background prior to the first management position, experience from innovative industries, experience from knowledge intensive industries, and organizational experience).

MANOVA for each of the independent variables was conducted to identify whether any differences between group means were present. Again Wilks' Lambda was used as the multivariate test measure since several of the variables contained more than two groups (Bray and Maxwell 1985).

*Table 27: Functional background and preference for problem solving strategies*

<b>Effect</b>	<b>Value</b>	<b>F</b>	<b>df</b>	<b>Sig.</b>	<b>Eta Squared</b>	<b>Observ. Power</b>
<b>TYPEEXP</b>	.061	2.676	12/1355	.001	.021	.984
<b>FUNCBACK</b>	.921	2.092	16/1223	.007	.020	.915
<b>ORGEXP</b>	.937	2.089	16/1565	.007	.016	.916
<b>INNODUM</b>	.968	4.234	4/520	.002	.032	.926
<b>KNOWDUM</b>	.992	.999	4/520	.408	.008	.317

The results from the omnibus test suggested that type of experience, functional background prior to the first management position, organizational experience and experience from innovative industries caused group means' differences in preference for problem solving strategies. However, experience from knowledge intensive industries did not have any significant effect on preference for problem solving strategies. Consequently, this variable was withdrawn from further analysis.

In order to identify which of the dependent variables showed different means based on the characteristics connected to functional background, a new MANOVA for each of the significant independent variables was conducted (type of experience, functional background prior to the first management position, organizational experience, and experience from innovative industries). The following results emerged from the analysis:

Table 28: Test of between-subjects effects, type of experience, functional background prior to the first management position and organizational experience

Source	Dependent variable	Type III Sum of Squares	df	Mean Square	F	Eta	Obs. Power <sup>a</sup>
Typeexp	Structure seeking	4.578*** <sup>b</sup>	3	1.526	3.718	.021	.807
	Novelty seeking	4.412*** <sup>c</sup>	3	1.471	5.250	.030	.928
	Preference for structure	.166	3	.055	.144	.001	.076
	Opposition for structure	6.902*** <sup>d</sup>	3	2.301	3.945	.022	.832
Funcback	Structure seeking	.338	4	.0844	.196	.002	.092
	Novelty seeking	3.883*** <sup>e</sup>	4	.971	3.679	.035	.880
	Preference for structure	.891	4	.223	.576	.006	.191
	Opposition for structure	5.980*** <sup>f</sup>	4	1.495	2.549	.025	.720
Orgexp	Structure seeking	5.475*** <sup>g</sup>	4	1.369	3.309	.025	.841
	Novelty seeking	.421	4	.105	.365	.003	.134
	Preference for structure	.931	4	.233	.614	.005	.202
	Opposition for structure	1.714	4	.428	.716	.006	.232
Innodum	Structure seeking	4.827*** <sup>h</sup>	1	4.827	11.778	.022	.929
	Novelty seeking	2.539*** <sup>i</sup>	1	2.539	9.046	.017	.851
	Preference for structure	3.202*** <sup>j</sup>	1	3.202	8.503	.016	.829
	Opposition for structure	4.801*** <sup>k</sup>	1	4.801	8.196	.015	.815

\*p<.05; \*\*p<.025; \*\*\*p<.01

<sup>a</sup>. Computed using alpha = .05, <sup>b</sup>. R<sup>2</sup> = .021 (adjusted R<sup>2</sup> = .015), <sup>c</sup>. R<sup>2</sup> = .030 (adjusted R<sup>2</sup> = .024), <sup>d</sup>. R<sup>2</sup> = .022 (adjusted R<sup>2</sup> = .017), <sup>e</sup>. R<sup>2</sup> = .055 (adjusted R<sup>2</sup> = .028), <sup>f</sup>. R<sup>2</sup> = .035 (adjusted R<sup>2</sup> = .026), <sup>g</sup>. R<sup>2</sup> = .025 (adjusted R<sup>2</sup> = .015), <sup>h</sup>. R<sup>2</sup> = .022 (adjusted R<sup>2</sup> = .020), <sup>i</sup>. R<sup>2</sup> = .017 (adjusted R<sup>2</sup> = .015), <sup>j</sup>. R<sup>2</sup> = .016 (adjusted R<sup>2</sup> = .014), <sup>k</sup>. R<sup>2</sup> = .015 (adjusted R<sup>2</sup> = .014).

The results from the analysis identified significant differences between the groups' means of the relationship between type of work experience, structure seeking, novelty seeking and opposition for structure; between functional background prior to the first management position, novelty seeking and opposition for structure; between organizational experience and structure seeking; and finally between experience from innovative industries and all problem solving factors.

The Tukey HSD method was used to identify which groups that caused the group means' differences in the between-subject analyses. The Tukey HSD showed significant (p<.05) differences between managers with administrative experience versus managers with mixed experience in the relationship between structure seeking and type of experience. The managers with administrative experience were more structure seeking than managers with mixed experience. Regarding the relationship between novelty seeking and type of work experience, there was a significant difference between managers with an administrative experience compared to managers with their prime experience from production and those who had a mixed experience. The managers with a mixed experience and background from production were more novelty seeking compared to managers with their prime background from administration. The final significant groups' mean

difference was on the relationship between type of work experience and opposition for structure. The significant difference was between managers with experience from marketing and sales and managers with experience from administration. Managers with background from marketing and sales had greater opposition for structure compared to their administrative counterparts.

The results from the Tukey HSD test regarding functional background prior to the first management position and preference for problem solving strategy showed significant group mean differences between managers with their experience from accounting/finance and production/operations ( $p < .05$ ). The results revealed that managers with their prime experience from production/operations were more novelty seeking compared to the managers with their prime experience prior to their first management position from accounting/finance. However, comparing them pair by pair did not reveal any significant difference among the group means for opposition for structure although overall this came out as a significant finding, suggesting that this finding may not be robust.

The between-subjects analysis showed a significant difference between type of organizational experience and structure seeking. The Tukey HSD test revealed that managers with their prime experience from large organizations (above 400 employees) were more structure seeking compared to managers with their prime experience from small organizations ( $p < .05$ ).

Also, experience from innovative industries showed significant group means' differences for all the dependent variables. A further inspection of the means through pair by pair comparison revealed that managers with experience from innovative industries were more novelty seeking and had larger opposition for structure compared to the managers that did not have any such experience. On the other hand, managers without experience from innovative industries were more structure seeking and had higher preference for structure compared to managers with experience from innovative industries. All the findings were significant at the .05 level.

Regarding hypothesis 3<sub>D</sub>, this study found support for the effect of functional background on preference for problem solving strategies. The analysis of type of experience suggested in particular that managers with their prime experience from production and marketing were more novelty seeking and had higher opposition towards structure compared to managers with a primarily administrative background. Also managers with mixed experience were on the average more novelty seeking than the ones who had primarily administrative backgrounds. Experience from a functional area in production

and operations prior to the first management position was also positively related to preference for novelty seeking. Managers that had their prime experience from large organizations seemed on the average to be more structure seeking compared to managers with prime experience from small organizations. Experience from innovative industries was the strongest indicator of preference for problem solving strategies. The managers with such experience were both more novelty seeking and had greater opposition for structure compared to the ones who did not have such experience. The opposite was true when it came to structure seeking and preference for structure.

**Key Findings:**

**Managers with functional backgrounds in production, marketing and that have a mixed experience are more inclined to prefer an explorer problem solving strategy. Also, experience from innovative industries and small organizations strengthens the preference for an explorer problem solving strategy. The managers who do not have such experience are on the average more likely to prefer an assimilator problem solving strategy.**

In order to estimate the strength of the relationship between the different independent variables and dependent variables, multiple regression analysis was conducted. The regression procedure applied, regressed each dependent variable onto the full set of independent variables that had caused different groups means in the MANOVA on the subsequent dependent variable. In these analyses, the control variables were also included in order to control for spurious relationships between the dependent and independent variables. Thus two regression models were run for each of the dependent variables in the problem solving strategy construct. The following table gives an overview of the variables in the regression models:

Table 29: Regression models, preference for problem solving strategies

Dependent variable	Independent variables
Structure seeking	<b>Model 1:</b> Average tenure, frequency industry change, type of experience, organizational experience, and experience from innovative industries. <b>Model 2:</b> The above variables and the control variables.
Novelty seeking	<b>Model 1:</b> Educational background, types of experience, functional background, and experience from innovative industries. <b>Model 2:</b> The above variables and the control variables.
Preference for structure	<b>Model 1:</b> Experience from innovative industries. <b>Model 2:</b> The above variable and the control variables.
Opposition for structure	<b>Model 1:</b> Educational backgrounds, type of experience, functional background, and experience from innovative industries. <b>Model 2:</b> The above variables and the control variables.

The independent variables were entered into the regression model in two blocks, one consisting of the independent predictor variables that had caused different group means in the multivariate analysis, and the other block consisting of the control variables (age, gender, graduation year, managerial level, and characteristics connected to the current employer). The enter-method<sup>54</sup> was used to include the independent variables in the regression model. The following results emerged from the regression analysis:

---

<sup>54</sup> This method enters the variables in the block in a single step.

Table 30: Educational background, work experience and preference for problem solving strategies with control variables

Independents	Dependents			
	Structure seeking	Novelty seeking	Preference for structure	Opposition for structure
Constant	3.004***	3.541***	2.684***	3.154***
Educational background	-	-.120**	-	-.082
Average tenure	-.073	-	-	-
Frequency indu. change	.040	-	-	-
Functional background	-	.014	-	.035
Type of experience	.056**	.041	-	.038
Organizational exp.	.047**	-	-	-
Exp. innovative indus.	.169**	.074	.052***	.138
<b>Overall model 1</b>				
F	6.673***	3.865***	10.156***	2.177
R <sup>2</sup>	.063	.037	.019	.021
Adjusted R <sup>2</sup>	.053	.027	.017	.011
<b>Overall model 2</b>				
F	3.751***	5.663***	3.767***	2.124**
R <sup>2</sup>	.097	.158	.069	.065
Adjusted R <sup>2</sup>	.071	.130	.051	.034
R <sup>2</sup> change	.034	.121	.050	.044

\*\*p<.05; \*\*\*p<.01

The results from the regression analysis revealed that the preference for structure seeking is significantly related to type of experience, organizational experience and experience from innovative industries ( $p<.05$ ). All these variables are related to functional background. 5.3% of the variation in preference for structure seeking was explained by functional background. Model 2, which included the control variables, explained 3.4% more of the variation of preference for structure seeking than model 1. The control variable primarily responsible for the increasing  $R^2$  in model 2 was the nature of present employers emphasizing innovation and creativity ( $p<.001$ ). Managers working in such organizations were less structure seeking compared to the managers who did not work in such organizations.

2.7% of the variation in preference for novelty seeking was explained by the independent variables presented in table 30. However, only educational background had a significant influence on preference for novelty seeking ( $p<.023$ ). Model 2 added extensive explanatory power to the relationship (12.1% in addition). Managers working in organizations emphasizing innovation and creativity mainly caused this additional explanatory power ( $p<.000$ ). These managers were clearly more novelty seeking compared to managers who were not working in such organizations. This finding will be further discussed in the next chapter.

Only one independent variable revealed any group mean differences in preference for structure (experience from innovative industries). This variable explained 1.7% of the variation in preference for structure among the respondents. By adding the control variables in model 2, a significant increase in the explanatory power was obtained (6.9%). The main reason for this increase was connected to characteristics of the current employer. Managers working in organizations emphasizing innovation and creativity showed less preference for structure than the rest of the sample. In addition, managers working in organizations emphasizing goals and results had higher preference for structure than managers working in other types of organizations.

Model 1 concerning opposition for structure showed non-significant results meaning that neither of the independent variables in the overall model explained any significant variation in opposition for structure. However, model 2 was overall significant ( $p < .012$ ). Again, managers working in organizations emphasizing innovation and creativity seemed to be the major explanatory factor of opposition for structure.

#### *Educational background, work experience and managerial behavior*

The final section of this sub-chapter focuses on the relationship between educational background, work experience and managerial behavior. Analyses of variance (ANOVA) were run for the six variables in the managerial behavior construct to identify any significant group mean differences between the categorical independent variables and the continuous dependent variables. Based on ANOVA, significant independent variables were identified and analyzed by multiple regression analyses in order to estimate the strength of the relationship between the significant independent variables and the variables in the managerial behavior construct. For each of the regression analyses two models were computed: one containing the significant independent variables and the second model containing both the predictor variables and the control variables.

There are several assumptions connected to the data that need to be fulfilled in order to apply ANOVA as a method for analyzing the variance across groups (Hair et al. 1992; Newbold 1988). These assumptions are basically the same as for MANOVA - independence among observations, homogeneity of variance, and normality. The assumption connected to the independence among the observations was discussed in the previous section and the same answer applies for the ANOVA as well. The assumption that the variance should be equal across groups was tested using the Levene test procedure available in SPSS. When the findings of the Levene test are non-significant, the assumption of homogeneity of variance is fulfilled for the

dependent variables. All the Levene tests came out with non-significant results suggesting that the variance was equal for all groups related to the dependent variables. Regarding the assumption of normality, ANOVA is known to be quite robust to violations of this assumption (Hair et al. 1992; Iversen and Norpoth 1987). However, as the descriptive statistics presented previously in this chapter as table 14 showed, there were no major problems of normality among the dependent measures of managerial behavior.

The analyses that follow consisted of two steps. The first step identified whether group means differed on the dependent variables. The second step estimated the strength of the relationships between the significant independent variables (variables that had group means differences in the ANOVA) and the respective dependent variable through multiple regression analyses. The independent variables were entered into the regression model in two blocks - one block including all the predictor variables and the other block included the predictor variables and the control variables (age, gender, graduation year, managerial level, and characteristics of current employer). Thus, two regression models were estimated for each of the dependent variables.

Entrepreneurial orientation

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>4A</sub>: Engineering-educated managers are more entrepreneurially oriented compared to business-educated managers.**

**H<sub>4B</sub>: Managers with diverse functional experience are more entrepreneurially oriented compared to managers with more homogeneous functional experience.**

**H<sub>4C</sub>: Managers with their prime experience from large companies in innovative industries are more entrepreneurial compared to managers with experience from small companies in less innovative industries.**

**H<sub>4D</sub>: The manager's entrepreneurial orientation declines with tenure, both in position and in organization.**

In order to investigate group mean differences based on characteristics of educational background, functional background and tenure on

entrepreneurial orientation, one-way-analysis of variance was conducted. Since I was primarily interested in the between-groups variability (variability among the k group means), such analyses were conducted on the sample. The results of the analysis are presented in the following table:

*Table 31: Between-groups analysis, entrepreneurial orientation, educational background and work experience*

<b>Independents</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>
Educational background	2.349***	1	2.349	12.99
Type of experience	2.844***	3	.948	5.23
Functional background	2.496***	4	.624	3.54
Organizational experience	1.246	4	.312	1.69
Experience from innovative industries	2.781***	1	2.781	15.45
Experience from knowledge intensive indust.	.011	1	.011	.060
Average tenure	.132	2	.068	.356
In-depth knowledge	.021	1	.021	.113
Frequency industry change	1.130	5	.226	1.225

\*p<.05; \*\*p<.025; \*\*\*p<.01

The results revealed observable differences between the group means of educational background (p<.000), type of experience (p<.001), functional background (p<.007), and experience from innovative industries (p<.000) regarding entrepreneurial orientation, thus indicating that educational background and functional background were related to degree of entrepreneurial orientation.

For the significant group means differences, post hoc tests were run to determine which groups caused the differences. The Tukey HSD method was applied. The results from the analysis of the relationship between educational background and entrepreneurial orientation revealed that engineers were more entrepreneurially oriented compared to business-educated managers. In addition, managers with overall work experience from production and who had varied work experience were on the average more entrepreneurially oriented compared to managers with their prime experience from administration (p<.005 and p<.001). Functional background prior to the first management position from production/operations was also significantly related to entrepreneurial orientation compared to experience from accounting and finance (p<.006). Finally, managers with experience from innovative industries were more entrepreneurially oriented compared to managers who did not have any such experience.

Hypothesis 4<sub>A</sub> concerned the relationship between educational background and entrepreneurial orientation. Overall, engineering-educated managers

were found to be more entrepreneurially oriented compared to their business-educated counterparts.

Hypothesis 4<sub>B</sub> focused on the relationship between type of overall work experience and entrepreneurial orientation. The proposed relationship that managers with diverse functional experience were more entrepreneurially oriented compared to managers with more homogeneous work experience was supported. However, the ANOVA results also revealed that managers with experience from production were on the average more entrepreneurially oriented compared to managers who had their prime work experience from administration. In contrast to previous studies (e.g. Barbosa 1985; Gupta and Govindarajan 1984), functional experience from marketing and sales were not significantly related to entrepreneurial orientation. A major reason for this non-finding might be the fact the N was quite small for the marketing and sales functional experience (12).

Hypothesis 4<sub>C</sub>, which proposed that managers with work experience from large firms in innovative industries were more entrepreneurially oriented compared to managers with experience from small firms in non-innovative industries was to some extent supported. However, no relationship was identified between size of organization and entrepreneurial orientation, meaning that even if large firms were more innovative overall, this seems not to have any direct effect of the managers' entrepreneurial orientation.

Hypothesis 4<sub>D</sub> proposed that entrepreneurial orientation declined with long tenure in position and organization. No support was found for this hypothesis.

The strength of the various relationships elaborated above was identified through multiple regression analysis. In this analysis the control variables were included in model 2. The following results emerged from the analysis:

Table 32: Entrepreneurial orientation, educational background and work experience, regression analysis

Independents	Entrepreneurial orientation
Constant	3.291***
Educational background	-.075
Functional background	.020
Type of experience	.042**
Experience from innovative industries	.136***
<b>Overall model 1</b>	
F	6.327***
R <sup>2</sup>	.061
Adjusted R <sup>2</sup>	.051
<b>Overall model 2</b>	
F	8.637***
R <sup>2</sup>	.226
Adjusted R <sup>2</sup>	.200
R <sup>2</sup> change	.166

\*\*p<.05; \*\*\*p<.01

The results from the regression analysis showed that when all the independent variables that caused group means' difference in the ANOVA were included, educational background and functional background ended with non-significant betas (no significant explanatory power). Experience from innovative industries had greatest power in order to explain managers' attitudes towards entrepreneurship. 5.1% of the variation of entrepreneurial orientation was explained by the independent variables in model 1. However, the explanatory power increased by 16.6% by including the control variables in model 2. The major variables affecting this result were the characteristics of the managers' current employer. Managers that were employed in organizations which emphasized creativity and innovation, goals and results were far more entrepreneurially oriented compared to the managers who were not employed in such organizations.

**Key Findings:**

**Engineering-educated managers are more entrepreneurially oriented than their business-educated counterparts (this finding was non-significant in the multiple regression model).**

**Managers with diverse functional experience and experience from production are more entrepreneurially oriented compared to managers with their prime experience from administration.**

**Managers with experience from innovative industries are more entrepreneurially oriented compared to managers who do not have such experience.**

**Size of organization does not have any significant influence on entrepreneurial orientation.**

**Length of tenure does not have any significant influence on entrepreneurial orientation.**

Task orientation

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>5A</sub>: Business-educated managers are more task oriented compared to engineering-educated managers.**

**H<sub>5B</sub>: The shorter tenure the managers have in the same position and organization, the more task oriented they are.**

Task orientation is related to the degree of awareness managers put on production and that the organization reaches its goals. The ANOVA revealed the following results for the relationships between task orientation, educational background and work experience:

Table 33: Between-groups analysis, task orientation, educational background and work experience

Independents	Sum of Squares	df	Mean Square	F
Educational background	.172	1	.172	.578
Type of experience	.926	3	.309	1.037
Functional background	1.718	4	.429	1.439
Organizational experience	.725	4	.181	.608
Experience from innovative industries	.041	1	.041	.136
Experience from knowledge intensive indust.	.006	1	.006	.020
Average tenure	.607	2	.304	1.025
In-depth knowledge	1.222*	1	1.222	4.136
Frequency industry change	2.152	5	.430	1.454

\*p<.05; \*\*p<.025; \*\*\*p<.01

Only in-depth knowledge showed significant differences between the group means for task orientation. Further analysis of the variable revealed that managers who did not have in-depth knowledge in specific areas or in positions were more tasks oriented compared to those who had in-depth knowledge.

Hypothesis 5<sub>A</sub>, which concerned the relationship between educational background and task orientation, was not supported by the findings. However, hypothesis 5<sub>B</sub>, which proposed that managers with shorter tenure in position and organization are more tasks oriented, was supported.

The strength of the relationship between task orientation and in-depth knowledge was estimated by the regression analysis.

Table 34: Task orientation, educational background and work experience, regression analysis

Independents	Task orientation
Constant	3.428***
In-depth knowledge	-.104*
<b>Overall model 1</b>	
F	3.286*
R <sup>2</sup>	.006
Adjusted R <sup>2</sup>	.004
<b>Overall model 2</b>	
F	3.246***
R <sup>2</sup>	.060
Adjusted R <sup>2</sup>	.042
R <sup>2</sup> change	.054

\*p<.1; \*\*p<.05; \*\*\*p<.01

The regression analysis showed that quite little of the variance in task orientation was explained by in-depth knowledge; 0.4%.

The ANOVA and the multiple regression analysis showed a significant relationship between task orientation and in-depth knowledge. However, this result was only significant at the .05 level (ANOVA) and .1 level (multiple regression analysis). Due to the large sample size and the problem connected to the easy achievement of significant findings (Cohen 1988), I ran a power analysis of the finding. The identified power was 0.4333 and the effect size was 0.0060. Power below 0.5 is under the recommended level proposed by Cohen (1988) and in addition the effect is very small (below 1%). Therefore this result could not be regarded significant.

However, when the control variables were included in model 2, the explanatory power increased with 5.4%. Most of the increase in the explanatory power was due to the characteristics of the managers' current employer. Managers working in organizations that focused on goals and results were more task oriented compared to managers who did not work in such organizations.

**Key Findings:**

**There is no significant difference between engineering-educated managers and business-educated managers regarding their task orientation.**

**There is no significant difference between managers regarding their length of tenure and task orientation.**

Power orientation

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>6A</sub>: Business-educated managers are on the average more power oriented compared to their engineering-educated counterparts.**

**H<sub>6B</sub>: The shorter the managers' average tenure in the position, the more authoritarian they are.**

Power orientation is related to the managers' use of power and political maneuvering in influencing followers. The following results emerged from the ANOVA of power orientation:

*Table 35: Between-groups analysis, power orientation, educational background and work experience*

<b>Independents</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>
Educational background	.003	1	.003	.014
Type of experience	.308	3	.103	.455
Functional background	1.120	4	.280	1.172
Organizational experience	.644	4	.161	.707
Experience from innovative industries	.106	1	.106	.466
Experience from knowledge intensive indust.	.096	1	.096	.423
Average tenure	.143	2	.072	.313
In-depth knowledge	.018	1	.018	.078
Frequency industry change	.651	5	.130	.571

\*p<.05; \*\*p<.025; \*\*\*p<.01

The results from the analysis showed that none of the observable experience variables revealed any significant differences in the group means of power orientation. Consequently, hypotheses 6<sub>A</sub> (business-educated managers more power-oriented) and 6<sub>B</sub> (managers with short tenure more power-oriented) were not supported by data.

None of the variables connected to educational background, functional background and tenure had any significant influence on power orientation in the regression analysis either. However, when the control variables were included, model 2 came out with a significant result (p<.043). Again, characteristics of the present employer counted for most of the explanatory power of the model. The two variables that mainly contributed to the significant result were for managers working in organizations characterized by conflict and power games, and managers working in organizations where individual managers were held accountable instead of management teams.

On the average, the managers who participated in the study had low power orientation. This may be a cultural phenomenon connected to the Norwegian business culture, which is known for being egalitarian and democratic (e.g. Hofstede 1981; Sejersted 1997).

**Key Findings:**

**No significant relationships were identified between power orientation, educational background and work experience for these two groups of managers.**

Relationship orientation

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>7A</sub>: Engineering-educated managers are more relationship oriented compared to business-educated managers.**

**H<sub>7B</sub>: Managers working in knowledge intensive firms are more relationship oriented compared to managers working in less knowledge intensive firms.**

**H<sub>7C</sub>: The longer the tenure both in position and in organization, the more relationship oriented the managers.**

The managers' relationship orientation is a measure of how concerned the managers are with the well-being of people in their organizations. The results from the ANOVA showed the following results:

Table 36: Between-groups analysis, relationship orientation, educational background and work experience

Independents	Sum of Squares	df	Mean Square	F
Educational background	.116	1	.116	.839
Type of experience	.749	3	.250	1.809
Functional background	.789	4	.197	1.487
Organizational experience	.413	4	.103	.746
Experience from innovative industries	.009	1	.009	.065
Experience from knowledge intensive indust.	.000	1	.000	.001
Average tenure	.211	2	.106	.761
In-depth knowledge	.194	1	.194	1.402
Frequency industry change	.595	5	.119	.858

\*p<.05; \*\*p<.025; \*\*\*p<.01

The f-tests identified no significant differences between group means for either of the independent variables. This also led to no support for either of the hypotheses proposed in chapter 6 concerning relationship orientation. Neither educational background, experience from knowledge intensive industries, nor long tenure in position and organization had any significant influence on relationship orientation of the two educational groups.

However, the regression analysis of model 2 revealed that characteristics connected to the present employer influenced relationship orientation to a great extent. Managers working in organizations emphasizing the employees' needs, organizations focusing on innovation and creativity, and goals and results were more relationship oriented compared to managers who did not work in such organizations. Model 2<sup>55</sup> was significant at the .01 level and had an explanatory power of 11.4% (adjusted R<sup>2</sup>).

**Key Findings:**

**No significant relationships were found between relationship orientation, educational background and work experience for these two groups of managers.**

<sup>55</sup> In comparison: Model 1 (relationship orientation, educational background and work experience ) had an adjusted R<sup>2</sup> of -1.3%.

Activity orientation

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>8A</sub>: Business-educated managers are more activity oriented compared to engineering-educated managers.**

**H<sub>8B</sub>: Managers with their prime functional background from throughput functions are more activity oriented compared to managers who have their prime experience from output functions.**

**H<sub>8C</sub>: The longer the managers' tenure both in the position and in the organization, the lower the managers' activity orientation.**

The managers' activity orientation is related to traits such as being preoccupied with results, assertiveness, ability to make decisions, and ability to handle difficult managerial situations. The ANOVA revealed the following results:

*Table 37: Between-groups analysis, activity orientation, educational background and work experience*

Independents	Sum of Squares	df	Mean Square	F
Educational background	.031	1	.031	.121
Type of experience	2.293*	3	.764	3.051
Functional background	3.250**	4	.813	3.250
Organizational experience	4.444***	4	1.111	4.516
Experience from innovative industries	.121	1	.121	.479
Experience from knowledge intensive indust.	.024	1	.024	.093
Average tenure	1.409	2	.705	2.801
In-depth knowledge	.133	1	.133	.527
Frequency industry change	.287	5	.057	.225

\*p<.05; \*\*p<.025; \*\*\*p<.01

The group means differed significantly for functional background (p<.012), type of experience (p<.001) and organizational experience (p<.001). All these variables were classified under functional background. The post hoc tests showed that managers with their prime experience from production and operations were more activity oriented compared to managers who had their prime experience from accounting and finance. In addition, managers who

had their prime experience from large organizations were on the average more activity oriented compared to managers who had the bulk of their experience from small and medium sized organizations.

With regard to the hypotheses proposed in chapter 6, this study found support for hypothesis 8<sub>B</sub> (experience from throughput functions correlated with activity orientation). However, no support was found for hypothesis 8<sub>A</sub> (business-educated managers are more activity oriented than engineering-educated managers are) and 8<sub>C</sub> (long tenure decreases activity orientation).

The independent variables that caused group means' differences were investigated through a multiple regression analysis in order to estimate the strength of the relationship between activity orientation and functional background. The following results emerged from the regression analysis:

*Table 38: Activity orientation, educational background and work experience, regression analysis*

<b>Independents</b>	<b>Activity orientation</b>
Constant	3.519***
Functional background	.049**
Type of experience	.022
Organizational experience	.040**
<b>Overall model 1</b>	
F	4.603***
R <sup>2</sup>	.033
Adjusted R <sup>2</sup>	.026
<b>Overall model 2</b>	
F	4.803***
R <sup>2</sup>	.128
Adjusted R <sup>2</sup>	.102
R <sup>2</sup> change	.095

\*\*p<.05; \*\*\*p<.01

The regression analysis showed that 2.6% of the variation in activity orientation was explained by functional background prior to the first management position. However, type of experience came out with a non-significant result in the regression model. The explanatory power was increased significantly with the addition of the control variables (with 9.5%).<sup>56</sup> The variables that mainly contributed to this increase were again characteristics connected to the present employer. In particular, employment in organizations which emphasized employees' needs, innovation and creativity, and goals and results, increased the probability of the managers being activity oriented.

<sup>56</sup> Model 2 explained 10.2% of the variation in activity orientation.

**Key Findings:**

**There is no significant relationship between educational background and activity orientation.**

**Functional background and in particular experience from throughput functions (i.e. production and operations) and large organizations have significant influence on the managers' activity orientation.**

**There is no significant relationship between tenure characteristics and activity orientation.**

Leadership effectiveness

The results of the hypothesis testing of the following hypotheses are presented in this section:

**H<sub>9A</sub>: Business-educated managers perceive themselves as more effective leaders compared to their engineering-educated counterparts.**

**H<sub>9B</sub>: The more in-depth knowledge the managers have of the value creation processes in the organization where they are managers, the higher score they achieve on their own perception of leadership effectiveness.**

An effective leader is understood as a leader who gains results in management position and who is looked upon as effective by others (superiors and subordinates). The following results emerged from the ANOVA:

Table 39: Between-groups analysis, leadership effectiveness, educational background and work experience

Independents	Sum of Squares	df	Mean Square	F
Educational background	.085	1	.085	.586
Type of experience	.994	3	.331	2.285
Functional background	.830	4	.208	1.533
Organizational experience	1.426*	4	.357	2.466
Experience from innovative industries	.165	1	.165	1.133
Experience from knowledge intensive indust.	.099	1	.099	.680
Average tenure	.232	2	.116	.798
In-depth knowledge	.001	1	.001	.004
Frequency industry change	.238	5	.048	.325

\*p<.05; \*\*p<.025; \*\*\*p<.01

The results revealed only one independent variable where the group means differed regarding leadership effectiveness, and that was organizational experience. Organizational experience measured the size of the organization(s) where the managers had their main work experience. The Tukey HSD (post hoc test) revealed that managers with work experience primarily from large organizations (above 400 employees) on the average viewed themselves as more effective in leadership positions compared to the managers that primarily had been working in small organizations (0-19 employees).

The analysis gave no support to hypothesis 9<sub>A</sub>, which proposed that business-educated managers viewed themselves as more effective compared to engineering-educated managers. Hypothesis 9<sub>B</sub> was not supported either, which proposed that managers who had in-depth knowledge in specific areas viewed themselves as more effective compared to the ones who did not have such experience.

Since organizational size was the only variable with a significant group means difference, this variable was included in the regression model in order to estimate the strength of the relationship between type of major organizational experience and leadership effectiveness (model 1). In this analysis, the control variables were also included (model 2). The following results emerged:

Table 40: Leadership effectiveness, educational background and work experience, regression analysis

Independents	Leadership effectiveness
Constant	3.614***
Organizational experience	.028**
<b>Overall model 1</b>	
F	6.188**
R <sup>2</sup>	.012
Adjusted R <sup>2</sup>	.010
<b>Overall model 2</b>	
F	4.762***
R <sup>2</sup>	.090
Adjusted R <sup>2</sup>	.071
R <sup>2</sup> change	.077

\*\*p<.05; \*\*\*p<.01

1% of the variation of the self-perception of leadership effectiveness was explained by managers' experience from large organizations. However, as with many of the previous relationships the explanatory power increased fundamentally by including the control variables and in particular the variables that measured the characteristics of the present employer. For leadership effectiveness the variation explained by the data in the study increased by 7.7% by adding the control variables. Managers working in organizations emphasizing the employees' needs, innovation and creativity, and goals and results, on the average viewed themselves as more effective in the leadership position compared to managers who did not work in such organizations.

**Key Findings:**

**There is no significant relationship between educational background and perception of leadership effectiveness.**

**There is no relationship between perception of leadership effectiveness and in-depth knowledge.**

**Managers with their prime work experience from large organizations on the average view themselves as more effective in leadership positions compared to managers who have their prime work experience from small organizations.**

## 7.5 Validity

The study has several limitations that should be considered when interpreting the results. These limitations are considered along four dimensions of validity as presented by Cook and Campbell (1989): statistical conclusion validity, internal validity, construct validity of putative causes and effects, and external validity.

### Statistical conclusion validity

Statistical conclusion validity refers to inferences about whether it is likely to draw false conclusions about covariation between the dependent and independent variables (Cook and Campbell 1979). This is related to whether it is reasonable to presume covariation given a specified significance level and obtained variances. Hence the power of the results obtained are of particular interest.

In order to estimate statistical power of the significant findings I conducted post-hoc power analyses for the significant regression models presented in this chapter. Cook and Campbell (1989:40) advise that "power analyses are desirable in any report of a study where the major research conclusion is that one variable does not cause another". Statistical power analyses are primarily conducted in order to rule out Type I and Type II errors.<sup>57</sup>

With large samples, statistical tests of the traditional null hypothesis become so sensitive that they can detect any difference between a sample result and the specific value that characterized the null hypothesis, even if this difference is negligibly small (Cohen 1988; Murphy and Myers 1998). The chance of Type I errors was likely to occur in this study since the sample was fairly large (551 managers), the findings were highly significant (often at the 0.00 level), and eta-squares were fairly low (percentage of the variance explained by the independent variables). Power analyses were conducted in order to rule out the chance of committing Type I errors regarding the conclusions drawn from the study (Cohen 1988). Global post-hoc tests were performed on the different regression models (f-tests multiple regression). A computer program called G\*Power was used in order to test the power of the conclusions.<sup>58</sup> The following results were obtained:

---

<sup>57</sup> Type I error - the likelihood of falsely concluding that covariation exists when it does not. Type II error - the likelihood of not concluding that covariation exists when it does.

<sup>58</sup> <http://www.psychologie.uni-trier.de:8000/projects/gpower.html>  
developed by Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. Behavior Research Methods, Instruments, & Computers, 28, 1-11.

Table 41: Power analyses of significant multiple regression models

Regression model	Effect size ( $f^2$ )	Power
Educational background and work experience - structure seeking (table 30)	0.0672	0.9988
Educational background and work experience - novelty seeking (table 30)	0.0384	0.9638
Educational background and work experience - preference for structure (table 30)	0.0193	0.8883
Educational background and work experience - entrepreneurial orientation (table 33)	0.0649	0.9989
Educational background and work experience - task orientation (table 35)	0.0060	0.4333
Educational background and work experience - activity orientation (table 39)	0.0341	0.9019
Educational background and work experience - leadership effectiveness (table 41)	0.0121	0.7042

Statistical power above .80 is viewed as highly satisfactory, and statistical power between .50 - .80 is in many instances viewed as satisfactory (Cohen 1988). The results from the power analyses revealed that most of the effects identified had highly satisfactory power - above .80 (Cohen 1988). The results presented above revealed that only one of the relationships had power beyond .50 - educational background, work experience and task orientation. This suggests that the research model used in this study did not reveal any powerful relationship between educational background, work experience and task orientation. This was also further elaborated in the presentation of the results in section 7.4.

Independent variables which explain less than 2% of the variance of the dependent variable are often described as having small effects, and those that account for less than 5% of the variance in outcomes as having small to medium effects (Cohen 1988). According to conventions established by Cohen (1988), all the effect sizes are small (below 0.02) to medium (below 0.15). This suggests overall relationships between educational background, work experience, preferences for problem solving strategies and managerial behavior, but the variations explained by educational background and work experience on the two management competence variables are small to medium. However, as stated by Murphy and Myers (1998) when independent variables' effects are known or thought to be large, there is often no point in conducting the research. Large effects are usually so obvious that a study confirming their existence is unlikely to make much of a contribution. When the effects under consideration are large, statistical power is unlikely to be a problem unless the samples are very small.

Another element that can explain the relatively low effects of educational background and work experience on management competence may be the degree of heterogeneity of the respondents. Maybe managers with *sivilokonom* and *sivilingenior* degrees are too similar, thus leading to lack of variation in the independent variables. There are several indications that these two groups of managers have several similar characteristics, e.g. fast advancement to management position, quantitative educational background, gender (men), similar social background and experience from large organizations, etc. However, there are also several differences among the groups of managers in the study, e.g. experience from various industries, differences in age and tenure characteristics, etc. The descriptive statistics (table 15 and table 16) showed some variation. However, I do not know how much additional variation that could have been obtained by including other types of managers in the sample.

### **Internal validity**

The evaluation of statistical conclusion validity provides information regarding whether the independent and the dependent variables covary. However, evaluations of internal validity are concerned with the causality of the observed relationships. Internal validity refers to the approximate validity with which statements can be made about whether there is a causal relationship from one variable to another given the measurement of the relationship (Cook and Campbell 1979). Related to threats of internal validity as emphasized by Cook and Campbell (1989) this study has particular problems with history and ambiguity about the direction of causal influence.

History is an issue due to the fact that experience is achieved in fits and starts throughout a person's life (Dewey 1958). What types of experience that have had an enduring influence on individuals also differs (led to some kind of learning). The relationship between experience and learning is among others described by experiential learning theorist (e.g. Dewey 1958; Kolb 1984; Lewin 1951) as an interaction between impulses, observation, knowledge (frames, mental models) and judgement. In this sense learning is a function of the impulses that the individual is exposed to and the individual's ability to place these impulses in his/her already existing knowledge (frames, mental models) and create new knowledge. Experience from education and work experience can be many-sided, so even though the students have completed the same type of educational program and have similar types of work experience the competence that they have achieved from these experience bases can be different. Even though a causal design was chosen for the survey study the exact effect of the independent variables on the dependent variables was impossible to measure due the complexity of

the constructs of educational background, work experience and management competence. The main reason for this problem was the cross sectional design of the study. The cross sectional design did not permit formal tests of causality since causes and effects are not separated in time and because other factors cannot be ruled out as rival explanations of observed associations between the independent and the dependent variables. It was difficult to explain exactly which of the independent variables (educational background and type of work experience) that caused the variations in the dependent variables (management competence) since the direct contribution of each of the independent variables on management competence could not be measured over time. Although one can test whether the observed relations are non-spurious by using control variables, the control variables included in the study did not rule out the effects of known and unknown third variables that may be related to the relations under investigation. However, to determine which of independent variables contributed to the development of managers' competence was impossible to measure in a strict cause and effect relationship. In order to do so, a longitudinal study that follows the managers from their graduation to management positions and measures the changes in competence in different time periods would be more appropriate. However, the aim with the study was not to predict the exact effect different experience bases had on management competence. The aim was rather to identify if there were any significant relationships between educational background, work experience and management competence. Since I knew the time sequence of some elements of the independent variable (graduation time, time in each position and the sequence of positions), it was possible to some extent to infer causal links. Examples of such cause and effect relations were conclusions drawn on the links between educational background and type of occupational careers, and the relationship between sets of educational background and work experience characteristics and characteristics of management competence.

Another important threat to internal validity is ambiguity concerning the direction of causal influence. This is particularly important in the relationship between educational background, work experience and preference for problem solving strategies. Preference for problem solving strategy is a cognitive style measurement and cognitive style is strongly connected to personality (Kaufmann 1995; Kirton 1989; Martinsen 1994). Personality influences vocational choices (Holland 1985), thus a person's cognitive style is likely to influence the types of vocational choices the individual makes (Holland 1985), i.e. a novelty seeking individual is likely to attend an educational program that fits his/her interests. The same may be the case with vocational choices. If this relationship is true, the dependent variable "preference for problem solving strategies" may as well be an

independent variable influencing educational choices and career preferences as a dependent variable influencing educational background and work experience. However, the aim was not to investigate the relationship between vocational choices and cognitive styles in general. The aim was rather to identify if there were any relations between the two sets of variables.

As stated by Cook and Campbell (1989) many threats to internal validity are ruled out by randomization. Since the sample was randomly drawn from a larger population of managers many of the traditional threats to internal validity should not be present.

Also, the fact that previous research has identified relations between educational background, work experience and cognitive bases and values (e.g. Finkelstein and Hambrick 1996; Hitt and Tyler 1991; Markóczy 1997; Tyler and Steensma 1998; Wiersema and Bantel 1992) suggests that relations between the two sets of variables are present.

### **Construct validity of putative causes and effects**

The construct validity of putative causes and effects refers to the possibility that the operations which are meant to represent a particular cause or effect construct can be construed in terms of more than one construct, each of which is stated at the same level of reduction (Cook and Campbell 1979). Hence, construct validity is concerned with the whole research process from planning to tests of measures, and to data analyses.

The first issue related to construct validity concerns the definition of the constructs used in the study. In developing measurements for management competence I used already developed and tested instruments to measure this variable (Kaufmann and Martinsen 1991; Martinsen 1999). These instruments are based on well-known, established research on management and management competence (Bass 1990; Yukl 1994) and thus the considerations related to how the constructs should be defined were taken care of in the initial design of the study. Hence, the study should have satisfactory content validity.<sup>59</sup> However, this study does not measure all central dimensions of management competence (e.g. Boyatzis 1982; Collin 1989). The study measures one element of cognitive style (preference for problem solving strategies) and six dimensions of managerial behavior.

---

<sup>59</sup> Content validity is a qualitative type of validity where the researcher judges whether the measures fully represent the domain.

The next issue in the evaluation of construct validity is related to decision of which measurements to use to appropriately measure the construct of management competence (Cook and Campbell 1979). Convergent and discriminant validity, which are important elements of construct validity, were taken care of through factor analyses and reliability analyses of the multidimensional constructs. Reliability analysis does not assess the convergence of results across methods, but it provides some evidence of convergent validity as it estimates convergence across different variations of the same method represented by items with different wordings tapping into different parts of the construct domains (Lines 1992). The patterns of factor loadings may be taken as indicators of whether items reflect different dimensions of construct in a way which is postulated by theory (e.g. Carmines and Zeller 1979; Nunnally and Bernstein 1994).

The third issue is related to the need of multiple measures of the constructs (Cook and Campbell 1979). Only one instrument (the questionnaire in the survey study) was used to measure the relationships under investigation. This may indicate mono-method bias in the study. However, the exploratory study guided to a great extent the selection of the instruments. In addition, the use of preference for problem solving strategies and managerial behavior as indicators of management competence were considered valid choices due to theoretical (e.g. Bass 1990; Boyatzis 1982; Collin 1989; Yukl 1994) and empirical investigation. Another problem related to the use of one data collection method is the common method variance, where two or more variables are collected from the same respondents and the attempt is made to interpret any correlations among them. For instance, the managers' ability to be innovative and change oriented (explorer problem solving strategy, entrepreneurial orientation and characteristics of the present employer as emphasizing innovation and creativity) were measured in the study. These variables contributed to most of the variation among the different groups. The major question concerns whether these variables are discriminant or not. Based on the advice of Podsakoff and Organ (1986), Harman's one-factor test<sup>60</sup> was conducted. The results from this analysis revealed that entrepreneurial orientation, explorer problem solving strategy and emphasis on innovation and creativity did not suffer from any common method variance since no single factor or one general factor emerged from the PCA. Since the sample was large (increase randomness) and the questionnaire

---

<sup>60</sup> Harman's one-factor test enters all of the variables of interest into a factor analysis, in this case all the variables connected to the ability of being innovative and change oriented (entrepreneurial orientation, explorer problem solving strategy and the characteristics of the present employer as emphasizing innovation and creativity). If a single factor or a general factor emerges from the factor analysis, the study suffers from common method variance.

relatively detailed, I decided that one primary method of measurement was satisfactory although mono-method biases may be present in the study.

The last issue under discussion is connected to the ability of the instrument to isolate the constructs under investigation from any cognate constructs. This is overall a general problem in social sciences (Frankfort-Nachmias and Nachmias 1996). The data was collected through reports from managers. The self-reporting of management competence may influence the instrument's ability to isolate the construct under investigations from other constructs mainly for two reasons. First, the managers may have provided answers that support their image and what is perceived as socially acceptable. Subordinates and peers may view the managers' competence in quite another way compared to the managers' perceptions. Second, a vast amount of managers have not answered the questionnaire and these managers may be distinctively different from those who have responded to the questionnaire. Hence, there are two major problems with self-report data – that survey participants do not tell the truth (response error) and a vast amount of the respondents who do not answer the questionnaire (non-response error) (Peterson and Kerin 1981). Both non-response and response error are discussed in the following section.

Response error consists of two elements – response bias and response variance. Response biases occur when it is difficult to identify the “true values”. According to Peterson and Kerin (1981:6) “a true value should be viewed as a characteristic that is independent of survey conditions which may influence the participants answer”. In order to know whether or not a true value was present, the data was validated. Peterson and Kerin (1981) suggest that the following sources are appropriate when validating data collected from individual self-reports: public and governments records, commercial records, and personal observations (Peterson and Kerin 1981). First, I compared the answers given in my survey with ones obtained from other studies of Norwegian managers with the same educational backgrounds. Particularly observable characteristics were investigated, such as how soon they had become managers after graduation, and by comparing type of work experience. Other studies of these managers had observed more or less the same pattern as I found of the observable characteristics (e.g. Colbjørnsen, Drake, and Haukedal 1999; Mardal 1998; Skaalebraaten 1996), suggesting that the managers participating in the study were not distinctively different from other managers in these two educational groups. However, there was one problem with the sample of business-educated managers. The proportion of managers at the top management level was perhaps too small compared to the results from the studies of Skaalebraaten (1996) and Amdam (1999), who suggest that in top management positions the

proportion of managers in each of the educational groups is fairly equal. In my study, 70% of the engineering-educated managers were on the top management level, while 40% of business-educated managers were on the top management level. This characteristic of the sample was taken into consideration during the analysis of the results. Second, my personal observations from doing the exploratory study were also used to validate the data. The conclusion was that the data made sense compared to what I had elaborated during the exploratory study. Based on these tests, I concluded that the managers participating in the survey study overall could be seen as being representative for business and engineering-educated managers in the private sector in Norway. However, one should bear in mind that the *sivilkonoms* are underrepresented at the top management level.

The intentional response error (Peterson and Kerin 1981) may have occurred in the study as the survey participants have provided socially desirable responses to the different variables they were exposed to. For example, the use of power to get your viewpoints through in the organization or in relation to your subordinates, is not regarded as very appropriate in the Norwegian business culture (Hofstede 1991; Sejersted 1997). This cultural aspect may have led to overall less power orientation among Norwegian managers than what is actually true. This bias could have been dealt with by asking subordinates and peers of the managers to evaluate their managers' competence. However, the main aim was not to examine whether managers told the truth, therefore asking peers and subordinates to evaluate the managers' competence in addition was viewed as too costly vis-à-vis the usefulness of it for the study. Also, the fact that the managers made self-report on individual experience (observable experience) may have reduced the bias of self-report data in this study (Peterson and Kerin 1981). In addition, the fact that all the constructs were measured with several items (no less than 10) and the fact that the sample was large decreases the chance of systematic error (Frankfort-Nachmias and Nachmias 1996). Also, the fact the data was collected through an anonymous survey may have eased the constraint of providing socially acceptable answers to the different contentions, as the case would have been had the interviews had been applied as the primary data collection method (Cannell, Oksenberg, and Converse 1977).

Response variance, which is defined as variance that is a function of fluctuations within the specific study conditions, such as influences from the data collector, the setting which data collection is conducted in, etc, was also examined. The questionnaire was sent to the participants by mail and hence the influence from the data collector should be quite small (no interviewer variability). In addition, the questionnaire was sent to the respondents' home

address and therefore "noise" and interruption from the work place should not be a big issue influencing the completion of the questionnaire. The extensive nature of the questionnaire may have led to accidental response errors. There are 94 items that measure the dependent variable. In addition, the load of completing the information of the independent variables is also quite extensive. This may have led to some accidental response errors in the completion process of the questionnaire. However, in the data analyses all questionnaires that missed answers on some of the contentions of the dependent variables were ruled out from further analyses, thus reducing the chance of applying questionnaires that were completed too quickly and without considerations.

Non-response error is another important aspect to take into consideration. Non-response error can be found on two different levels – item non-response and survey non-response. Item non-response is related to the individual's ability or willingness to answer specific types of questions (Peterson and Kerin 1981). The questionnaire was tested on experts<sup>61</sup> and managers<sup>62</sup> (pretest of survey instrument) in order to prepare for item non-response. Additionally, already developed and tested instruments were used to account for the variables related to management competence: problem solving strategies (Kaufmann and Martinsen 1991) and managerial behavior (Martinsen 1999). These instruments had previously been tested on various samples and been shown to be understandable for different groups of respondents (e.g. Kaufmann 1979; Martinsen 1993; Martinsen 1995a). As I mentioned previously, questionnaires that were not complete on the management competence variables were not used in the data analysis. The total amount of incomplete questionnaires was 16 for the engineering-educated managers and 9 for the business-educated managers.

In order to control for survey non-response, NSF and NIF contributed with some additional information about the whole sample in addition to names and addresses. Types of additional information I got on the whole sample was age, management level, educational institution and educational specialization. This information made it possible to compare the ones who responded with the ones who did not.

---

<sup>61</sup> 8 experts (people with knowledge of questionnaire development) were asked to evaluate the questionnaire.

<sup>62</sup> 10 managers were asked to give their feedback on the questionnaire.

A comparison of the response and non-response sample are found in the following table:

Table 42: Comparison response and non-response sample

Variable	Response sample		Non-response sample	
	Business	Engineering	Business	Engineering
Age	45 years	48 years	45 years	49 years
Gender <sup>63</sup>				
<i>Male</i>	88%	96%	88%	97%
<i>Female</i>	10%	4%	12%	3%
Management level				
<i>Top</i>	40%	70%	44%	79%
<i>Middle</i>	45%	22%	50%	17%
<i>Professional</i>	11%	8%	4%	4%
<i>Other</i>	4%	0%	1%	
Educational institution <sup>64</sup>				
<i>NHH</i>	55%		63%	
<i>BI</i>	45%		37%	
Educational specialization <sup>65</sup>				
<i>Civil engineering</i>		23%		24%
<i>Electronics</i>		17%		22%
<i>Machine</i>		25%		20%
<i>Physics and mathematics</i>		2%		3%
<i>Geology and petroleum engineering</i>		3%		10%
<i>Chemistry</i>		15%		11%
<i>Marine technology</i>		7%		9%
<i>Economics and industrial management</i>		3%		0%
<i>Other</i> <sup>66</sup>		1%		0%
<b>N</b>	<b>251</b>	<b>300</b>	<b>349</b>	<b>300</b>

<sup>63</sup> 2% of the respondents in the sample containing the business-educated managers have not answered this question.

<sup>64</sup> Only business-educated managers.

<sup>65</sup> Only engineering-educated managers. I had no data on the educational specialization of *sivilokonoms*.

<sup>66</sup> 4% of the respondents have not answered this question.

This overview indicates that the ones who responded to the questionnaire and the ones who did not were quite similar regarding demographic characteristics. There were, however, some differences that should be taken into account. First of all, there was a larger proportion of non-responses in the top management group compared to other management groups. Second, there was an over-representation of business-educated managers from BI in the response sample compared to the non-response sample. Otherwise the response sample and the non-response sample were almost totally comparable, thus indicating that an overall response rate of 46% was satisfactory for this study.

### **External validity**

External validity refers to the approximate validity with which conclusions can be drawn about the generalizability of the inferred relationships to and across populations of persons, settings and times (Cook and Campbell 1979).

The first question is related to the generalizability of the results to Norwegian business-educated and engineering-educated managers. A total of 300 *sivilingeniors* and 251 *sivilokonoms* answered the questionnaire out of population of 900 *sivilingeniors* and 1516 *sivilokonoms*.<sup>67</sup> Regarding the *sivilingeniors* most of the respondents were found in top management positions (70%). This was slightly different for the *sivilokonoms* (40%).<sup>68</sup> However, managerial level was used as a control variable in all data analyses and no particular effect of this variable was observed. This suggests that preference for problem strategies and the measurements of managerial behavior have not in any particular way been influenced by the managers' current managerial level. In addition, the gender dimension is quite skewed in the sample. Overall 92% are males and 8% are females. This suggests that the generalizability of the results from the study to women manager may be questionable. Besides the gender dimension, there is overall reason to believe that the results from the study is generalizable for all business (*sivilokonoms*) and engineering (*sivilingeniors*) managers in Norway, as none of the control variable except characteristics of the present employer showed any significant results.

The second question is related to the generalizability of the results to all managers. The design of the study was quite homogenous on educational background, but the respondents had various types of work experience. The direct relationship between educational background and management

---

<sup>67</sup> Members of NSF and NIF that are managers, educated from NHH/BI and NTNU and work in the private sector.

<sup>68</sup> See table 16 for further details.

competence is also quite weak suggesting a relatively small effect of educational background on management competence. In this sense the fact that this sample only contains two educational groups may not be a major problem regarding the overall conclusions drawn from the study. Previous studies (Amdam 1999; Skaalebraaten 1996) have also showed that most Norwegian managers are either *sivilkonoms* or *sivilingeniors*, suggesting that a large proportion of Norwegian managers belong to the particular groups of managers investigated. This means that the findings of the study to some extent can be generalized to managers in Norway.

The cultural (national) dimension, on the other hand, should not be disregarded. As discussed previously, managerial behavior is constrained by cultural factors: the organizational culture, the industrial culture and the national culture (Bass 1990). Also, the results from the study indicate that organizational culture has a strong influence on management competence. Based on the observation that managerial behavior is constrained by different elements of national culture, it would be highly questionable to generalize the findings of this study to another national culture without conducting new studies in another national settings to validate the findings.

The theoretical relationship between observable experience and management competence, which was tested in the study, is generalizable. High degree of variation was obtained in the independent variables by having many indicators of each of the variables: educational background (2), functional background (5) and tenure (3). In addition, management competence was measured by using previously developed instruments, which had proved to be both reliable and valid in previous studies. These two instruments measured two central aspects of management competence - cognitive style and managerial behavior. In addition, the amount of respondents that took part in this study was extensive (551 managers) thus filling a gap identified in previous research, e.g. by Waller et al. (1995), when examining the relations between demographic characteristics and cognitive bases and value.

## **7.6 Summary of the results**

The major research question addressed in the beginning of this thesis concerned the relations between educational background, work experience and management competence. Based on this overall research question two additional research questions were proposed. One concerning the joint effects of educational background and type of work experience on management competence, and the other concerning whether or not managers' demographic characteristics were good proxies for management competence. The hypotheses tested were organized in two major groups.

The first group addressed the relationship between the independent variables: educational background and work experience. The second group of hypotheses tested the proposed relations between demographic characteristics (educational background and work experience) and management competence (preference for problem solving strategies and managerial behavior).

The following model summarizes the results of the study:

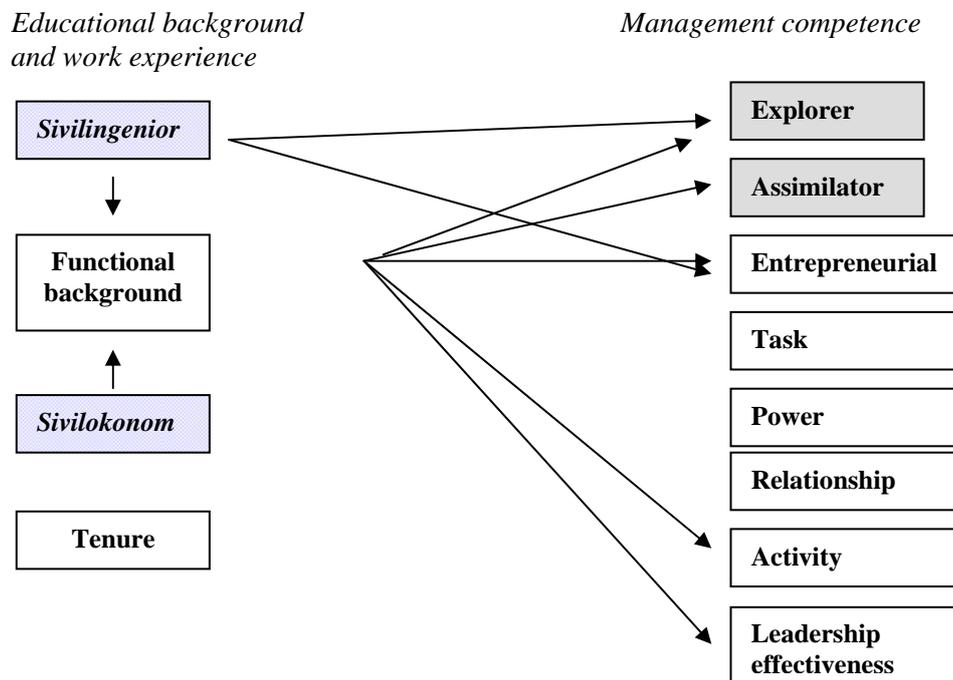


Figure 12: Summary of Findings: Educational background and work experience - Management competence

The results of the study suggest on the whole that there are relationships between educational background, work experience and management competence. In addition, there is also a clear relationship between individuals' type of educational background and type of work experience.

Several of the results from the data analysis highlight important issues for further discussion both in relation to previous research on the relationship between educational background, work experience and management competence, for future research and for managerial practice. The next chapter of the thesis discusses these topics.



## **8. Discussion and Implications**

This chapter discusses the results of the study. The discussion is focused around the following research questions proposed in chapter 5:

**What is the relationship between managers' educational background and work experience (independent variables) and their problem solving strategies and managerial behavior (dependent variables)?**

**What is the joint effect of educational background and work experience on management competence?**

**To what extent are demographic characteristics such as educational background and work experience good proxies for management competence?**

This study provides some answers to these research questions. However, shortcomings have been identified, which propose that more research on this topic is required. This chapter discusses the major findings of the study and presents some implications for future research and some practical guidelines for managers.

### **8.1 The relationship between demographic characteristics and management competence**

The results to be discussed in this section were obtained from the multiple regression analyses. Each regression analysis contained two models: model 1, which included the significant independent variables and the relevant dependent variables, and model 2, which included the significant independent variables, the control variables and the relevant dependent variables. Including all significant independent variables in one model, and all the significant independent variables and the control variables in the other model is considered a conservative method for analyzing the data (Hair et al. 1992). Also the interaction effects are taken care of in such analyses, indicating which of the variables are the best indicators of the proposed relationship if they have joint effects.

### **Educational background, work experience and preference for problem solving strategies**

The overall regression model revealed that the main observable experience predictors of preference for problem solving strategies are educational background and functional background. However, the effects of functional background and educational background on preference for problem solving strategies are overall quite small (explain below 10% of the total variance). These were the key findings:

- A significant relationship between structure seeking and functional background was found. Generally the following observable characteristics showed significant relationships with structure seeking: administrative work experience, work experience from large organizations and no work experience from innovative industries.
- A relationship between novelty seeking and educational background was also identified. Engineering-educated managers were more novelty seeking compared to their business-educated counterparts.
- Finally, a relationship between preference for structure and functional background was identified. Managers who did not have any previous work experience from innovative industries preferred more structure compared to those who had such experience.

This study revealed that a relation between demographic characteristics and preferences for problem solving strategies exists, but that the relation is quite weak. Preference for problem solving strategies is a cognitive style measurement (Finkelstein and Hambrick 1996; Kirton 1989; Kaufmann 1995), and individuals' cognitive styles are believed to be composites of insight and personality (e.g. Martinsen 1994; Messick 1976). The weak relation between demographic characteristics and preference for problem solving strategies may indicate that personality is an important ingredient of the cognitive style construct and that demographic characteristics only count for small variations in cognitive style. Previous studies have identified a relationship between insight and cognitive style (Martinsen 1994; Martinsen 1995a; Martinsen 1995b). However, the respondent's insight has been measured on a micro level, such as familiarity with a particular problem situation and by not using as broad demographic characteristics as this study uses. This suggests that the links between cognitive style and demographic characteristics are stronger when demographic characteristics are more detailed.

The relationship between vocational preferences and personality is another interesting aspect related to the findings and non-findings of the relation between demographic characteristics and preference for problem solving strategies. Holland (1985) argues that particular personalities are drawn to particular educational and vocational choices. This suggests that personality can be an independent variable affecting educational and vocational choices. Thus a reverse relationship compared to what has been identified in this study can exist, i.e. that personality influences educational and vocational choices and that these identified relationships are more connected to personality than to certain observable experience variables. In addition, a newly conducted study (Chan 1999) has identified that managers often have a personality type that is social and enterprising. Holland (1985) argued that engineers often have an investigative and realistic personality type, while graduates from business schools often have an enterprising and conventional personality type. This may suggest that the *sivilokonom*s who are managers are more social than conventional and that *sivilingenior*s who become managers are not typical representatives for the engineering profession.

Another factor to reflect on related to the relationship between personality and experience is the nature of the qualification systems for management in different countries. In Norway, the *sivilokonom* and the *sivilingenior* programs have traditionally been viewed as an elite education together with medicine, and clever students have traditionally been recommended to complete educational programs that provide future status in society. In this sense, managers with business and engineering education in Norway may have had other aspirations compared to for instance managers with business and engineering education in the U.S.. Cross-cultural studies examining the similarities and differences in aspirations of different types of graduates seem promising for future research.

### **Educational background, work experience and managerial behavior**

The overall regression models revealed that there are relations between functional background and managerial behavior. However, the strength of the relations was quite weak (the independent variables explained less than 10% of the variation in the dependent variables). The study did not identify any significant relations between educational background and managerial behavior, nor between tenure characteristics and managerial behavior. These were the key findings:

- A significant relation between functional background and entrepreneurial orientation was identified. Managers with diverse functional experience and work background from manufacturing were overall more entrepreneurially oriented compared to managers with

more homogeneous types of work experience and primarily administrative experience. Managers with experience from innovative industries were also more entrepreneurially oriented compared to other types of managers.

- A relation between functional background and activity orientation was identified. Functional background prior to management positions from throughput functions and prime work experience from large organizations had positive effects on activity orientation.
- Finally, a relationship between functional background and perceived leadership effectiveness was also identified. Managers who had their prime work experience from large organizations (above 400 employees) did on the average viewed themselves as more effective leaders compared to managers who had their prime experience from smaller organizations.

Regarding entrepreneurial orientation, the strongest indicator of entrepreneurial orientation was work experience from innovative industries (see table 32). Although educational background (*sivilingenior*) and functional background prior to management position (production/operations) showed significant group mean differences in the ANOVA analyses, their effects were no longer significant in the multiple regression analysis. This indicates that the joint effect of educational background and work experience to be discussed in the next section was identified in these analyses, i.e. that there is a relationship between type of educational background, functional background and industry experience. This study showed that experience from innovative industries and overall work experience (manufacturing and mixed experience) are stronger indicators of entrepreneurial orientation than educational background and functional background prior to the first management position.

Functional background was the only demographic characteristic that showed any significant relationship to activity orientation. Experience from large organizations and functional background prior to the first management position from throughput functions had positive relationships to activity orientation. The multiple regression analysis also revealed that joint effects of educational background and work experience related to activity orientation. There is clearly a relation between type of overall work experience and type of functional background prior to the first management position. However, the results from the regression analysis suggested that functional background prior to the first management position was a better predictor of activity orientation than overall type of work experience.

The self-perception of leadership effectiveness is to some extent influenced by experience from large organizations. However, this effect is also quite weak (see table 40). This finding suggests that managers who primarily have their work experience from large organizations, view themselves as more effective leaders compared to managers with their prime experience from small and medium sized organizations.

For three of the six managerial behavior variables investigated, no significant relations between demographic characteristics and managerial behavior were identified. These variables were task orientation, relationship orientation, and power orientation, and overall, there were no significant relations between educational background, tenure and managerial behavior. These non-findings are interesting for three major reasons. First of all, the non-findings indicate that demographic characteristics are not necessarily good indicators of important types of managerial behavior dimensions. This will be further elaborated under the section discussing the use of demographic characteristics as proxies of management competence. In addition, these non-findings also indicate that Norwegian managers who are *siviløkonomers* and *sivilingenjører* are overall quite homogeneous regarding their managerial behavior, at least regarding their meta-competence. Thirdly, these non-findings indicate that educational background and tenure characteristics do not explain any variation in managerial behavior. These observations will be further discussed in the next section of this chapter.

The two previous sections of this chapter have discussed the relations between demographic characteristics (educational background and work experience) and management competence (preference for problem solving strategies and managerial behavior). All the observed significant relations were quite weak. However, the explanatory power of the regression models increased significantly when characteristics of the present employer were included. This topic will be discussed in the next section.

### **Organizational moderators on management competence**

Characteristics of present employer were used as control variables in the study. Five different characteristics were included - degree of employee orientation, degree of emphasis on innovation and creativity, degree of power games and conflicts, degree of emphasis on goals and results, and finally degree of emphasis on individual leaders. As showed in table 13, each of these variables related positively to both the preferences for problem solving strategies' variables and the managerial behavior variables. It is important to be aware that these are perceived measures, and that managers

who prefer to explore or are entrepreneurial may also view their organizations and employees as more innovative than what actually is true.

Overall, both regarding preferences for problem solving strategies and managerial behavior, a major increase in the  $R^2$  by including the control variables was obtained. This study identified a relationship between preference for problem solving strategy and organizational characteristics. Generally, managers who worked in organizations which emphasized innovation and creativity, were more inclined to prefer an explorer problem solving strategy, while managers working in organizations emphasizing goals and results were inclined to prefer an assimilator problem solving strategy. To my knowledge, the link between cognitive style and organizational moderators has not yet been showed empirically. The direction of this relationship is not clear. Another plausible explanation is the one of reversed relationships, i.e. that individuals who have preferences for an explorer problem solving strategy prefer to work in organizations emphasizing innovation and creativity. This explanation suggests that these managers, even prior to their particular education and type of work experience, prefer an explorer problem solving strategy.

This study also identified a relationship between managerial behavior and organizational moderators. This has been highlighted in previous studies (see Bass 1990 for summary). The results from this study indicate that managerial behavior is closely connected to characteristics of the present employer. Managers working in organizations emphasizing innovation, creativity, goals and results were more entrepreneurially oriented compared to those who did not work in such organizations. Additionally, managers who worked in organizations emphasizing employees' needs, innovation, creativity, goals and results were more activity oriented and viewed themselves as more effective leaders compared to those who did not work in such organizations. Also for the non-significant relationships between demographic characteristics and managerial behavior (task orientation, power orientation and relationship orientation), the characteristics of the present employer showed significant relationships to the behavioral characteristics. Managers working in organizations which focused on goals and results, were more task oriented compared to other types of managers. Managers working in organizations characterized by conflict and power games and where the individual managers were held accountable instead of management teams were more power oriented. Finally, managers working in organizations characterized as emphasizing the employees' needs, focusing on innovation and creativity, and focusing on goals and results were more relationship oriented compared to managers who did not work in such organizations.

Regarding organizational moderators, this study adds information to the relationship between organizational characteristics and management competence. Conclusions from the study show that organizational characteristics connected to the present employer significantly increase the explanatory power of the relationship between management competence, educational background and work experience. This suggests that situational moderators should always be taken into account when using demographic characteristics as proxies for cognitive bases and values. The high increase in explanatory power (almost in all cases a doubling) suggests that the significant results obtained in previous studies on the relationship between managers' demographic characteristics and different types of strategic management could be better explained by organizational characteristics than by individual characteristics of the managers.

To summarize this section, the study identified relationships between several demographic characteristics especially related to functional background and management competence. However, the overall relationships were quite weak. The explanatory power increased significantly by including characteristics of the current employer in the regression model. This suggests that organizational moderators should be taken into account when studying the relation between managers' demographic characteristics and their management competence.

Several of the significant independent variables identified from the MANOVA and ANOVA analyses were not significant in the multiple regression models where all significant independent variables were included as a group (model 1). This suggests that there are joint effects of the different characteristics of educational background and type of work experience. This will be discussed in the next section.

## **8.2 The joint effect of educational background and work experience**

The results from the analyses conducted in chapter 7 revealed that there is a clear relationship between educational background and type of functional background. This section discusses in particular the direct link between educational background and functional background, and the symbolic effect of educational background as a screening mechanism (Arrow 1973; Collins 1979; Meyer 1978) in the labor market.

### **Educational background - a determinant of type of work experience**

Even though the *sivilokonom*s and the *sivilingenior*s have different educational backgrounds and functional experience, their demographic characteristics are also in many instances quite alike. Both curricula have a strong quantitative approach and both educational programs focus on factors of major importance for modern enterprises - the *sivilokonom* program focuses on administration and control of economic resources, and the *sivilingenior* program focuses on technology and production. The fact that the two educational groups have on average short tenure, in particular functions prior to their first management position (on the average 4 years), diminishes the importance of the combined effect of educational background and type of functional experience proposed by Hitt and Tyler (1991) and Waller et al. (1995). They are not clearly committed to a particular paradigm before they enter their first management position (Hambrick and Fukutomi 1991). Even though functional background may not be that important for graduates who advance quickly to management positions, the types of management positions they have had, e.g. professional manager versus general manager, internal or external promotion, length of tenure, and type of organizational experience, are of great interest. This suggests that we should include managerial experience as a new dimension in addition to educational background, functional background and tenure when using demographic characteristics as proxies for cognitive bases and values (Finkelstein and Hambrick 1996). In the present framework of the upper echelon perspective, the time period between functional background and present managerial position is more or less treated as a "black box". This experience base can be of major importance for managers who have had extensive managerial experience prior to the present position. For people who have been managers most of their professional careers, the previous functional background is likely to be more or less irrelevant as an influential experience base.

Another interesting similarity between these two educational groups is that most of them have their previous work experience from large organizations (above 400 employees). This suggests that large companies tend to recruit these graduates and that these graduates also prefer to work in large companies. This can also be one reason why so many of these graduates are found in important management positions in Norway. Having experience from a large and advanced company may be important if those who screen the labor market believes that management competence developed in large organizations is more extensive compared to management competence developed in smaller organizations. A bias created by the sample may also be present related to this result. Some of the large organizations pay the membership fee to NSF and NIF for their employees, suggesting that there

may be an over-representation of managers from large organizations in their databases due to an underlying system of payment of membership fees. No information on this matter is available regarding the respondents in the study.

There are also several differences between these two educational groups regarding their functional background. Even though these two groups of managers quickly advance to management positions, they become managers in quite different industries and functions. *Sivilokonoms* typically work in administrative functions such as accounting, finance and consulting, and have most frequently worked in industries such as banking and finance, manufacturing and professional services. *Sivilingeniors*, on the other hand, mostly have their previous work experience from technical functions related to production and operations, and they have frequently been working in industries such as manufacturing, engineering consulting and chemical raw materials and products. So even though these two educational groups are frequently found in management positions they have had different routes to management. One career path is related to administrative functions (*sivilokonoms*) and the other to technical functions (*sivilingeniors*). This is an observation that should call for differences in management competence among those two groups of managers.

In the sample, *sivilokonoms* at the top management level showed a greater degree of mobility between industries, while the *sivilingeniors* more often were promoted internally to management positions. This may suggest that the competence of *sivilokonoms* is less specialized and industry-specific compared to *sivilingeniors*' competence and that these two educational groups have different paths to top management positions - internal for *sivilingeniors* and external for *sivilokonoms*. For middle managers this relationship was reversed, i.e. that *sivilingeniors* showed greater degree of mobility between industries compared to *sivilokonoms*. This can be explained by the nature of the sample. Many of the *sivilokonoms* on the middle manager level were business managers and finance managers who had relatively long tenures in the same position. This suggests that middle managers in the *sivilokonom* group are relatively stable both related to tenure in position and in industry, and this may explain the reversed relationship for middle managers. Overall, a larger proportion of the *sivilingeniors* had their previous work experience from industries defined as innovative, while the proportion among the two groups was almost identical related to experience from knowledge intensive industries (table 17). The fact that *sivilingeniors* to a larger extent have their previous work experience from innovative industries suggests that their competence is viewed as useful in such

industries and/or that their preferences and personal interests may influence them to apply for positions in such industries.

The results from both the exploratory study and the survey showed that there are clear relations between the type of educational background and functional experience of *sivilokonom*s and *sivilingenior*s. *Sivilokonom*s qualify to management positions through administrative functions such as accounting, consulting and finance. These managers seem to have less industry-specific competence since they have had a higher degree of industry mobility compared to *sivilingenior*s. *Sivilingenior*s, on the other hand, qualify to management positions through production and operations functions. Their competence seems to be more industry-specific because they are more frequently internally promoted and experience less industry changes. This suggests that the combined effect of educational background and work experience should always be considered when studying the relationship between educational background, work experience and management competence, and also be included in studies using demographic characteristics as proxies for managerial cognitive bases and values.

### **Educational background - a social selection mechanism in the labor market**

Educational background does not only have a strong influence on type of work experience. It also serves as a screening mechanism in the labor markets (Arrow 1973; Collins 1979; Meyer 1978). The *sivilokonom* and *sivilingenior* titles place the graduates in a fortunate position regarding these graduates' opportunities of becoming managers. Particularly the results from the exploratory study suggest that these two educational programs have an elite status in the Norwegian educational system, at least regarding how the labor market views the managerial potential of these candidates. This is in accordance with the screening theorists (Arrow 1973; Collins 1979) who believe that education screens people as much as it teaches them skills or develops their values.

Educational choices can also be seen as opportunities for social mobility. Clever students from below average income families have opportunities for social mobility by being accepted at prestigious educational programs. In order to be accepted as a student at NHH/BI and NTNU, all students regardless of social background need good grades from high school. As long as these two types of education are considered appropriate educational backgrounds for management positions they will attract clever students who have aspirations of becoming managers. In this sense, it may be the students' aspirations and the elite status of the schools as much as the content of the educational program that explain why so many managers in Norway are

*sivilokonoms* and *sivilingeniors*. A previous study (Eriksen 1982) showed that students applying for business education and engineering education have other preferences compared to for instance people applying for teacher training or medical training.

To summarize this section, this study revealed strong connections between type of educational background and type of work experience. However, the managers did not have long tenure in particular functional areas before they became managers. Aspirations of the students and the social status of the educational programs could be as important as the content of the educational programs in explaining why so many managers in Norway are *sivilokonoms* and *sivilingeniors*.

### **8.3 Demographic characteristics as proxies for management competence**

The relatively small effects of the independent variables on the dependent variables suggest that using demographic characteristics as proxies for management competence (cognitive bases and values) may be inadequate. Markóczy (1997) who studied the relationship between beliefs and demographic characteristics also had doubts about using demographic characteristics as proxies for cognitive models. This section starts by discussing the use of managers' demographic characteristics as proxies for preference for problem solving strategies (cognitive style), and then continues by discussing the use of managers' demographic characteristics as proxies for managerial behavior.

#### **Problem solving strategies**

This study identifies relationships between functional background, educational background and preference for problem solving strategies. However, using demographic characteristics as the only proxies for cognitive style is not a highly recommendable route to follow since the explanatory power provided by the demographic characteristics is quite weak (below 10% of the variation in preference for problem solving strategies is explained by educational background or functional experience). Previous research suggests that personality may be of great importance for cognitive style (Kirton 1989; Martinsen 1994; Messick 1976) and thus managerial action in organizations (Mintzberg 1976; Nutt 1993). It is therefore advisable to rather measure cognitive style directly in studies where the managers' cognitive bases and values are used as independent variables to explain strategic action, decision making and the like (e.g. the

upper echelon perspective) instead of using demographic characteristics as proxies for cognitive style. There are several instruments available (e.g. Cacioppo and Petty 1982; Costa and McCrae 1992; Kaufmann and Martinsen 1991; Kirton 1987) that measure cognitive style and therefore it is possible to use such measurements instead of weak proxies provided by demographic characteristics.

Another important drawback in using demographic characteristics as proxies for cognitive style is the "chicken and egg problem". If cognitive style is primarily a personality factor<sup>69</sup>, cognitive style may also influence educational and vocational choices and therefore a tautology would be present in the measurements. For instance, a person with preference for an explorer problem solving strategy would choose an educational background that fits his/her interests and a career that also matches his/her cognitive style. However, social factors (Salancik and Pfeffer 1978) may interfere with the preferences in the sense that social context puts constraints upon individual actions and choices. This observation suggests that demographic characteristics such as educational background and functional background cannot be ruled out as having any influence on preferences for problem solving strategies. A combined effect of personality and demographic characteristics (insight) is the most likely for preference for problem solving strategies.

### **Managerial behavior**

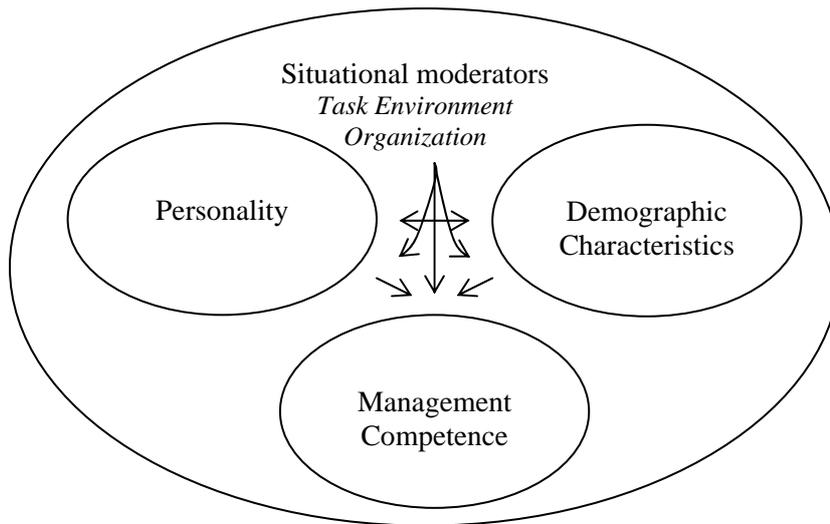
The results from the analyses of the relationship between educational background, work experience and managerial behavior show that demographic characteristics are not particularly good proxies for managerial behavior. Relationships are identified, but relatively little of the variation in managerial behavior is explained by the demographic characteristics. This indicates that there must be other factors that explain managerial behavior in organizations than demographic characteristics of the individual manager. One explaining factor highlighted by several researchers (see Bass 1990, chapter 26) and also in this study, is organizational moderators, i.e. characteristics of the present employer. In addition, characteristics connected to the task environment are also likely to influence managerial behavior (Bass 1990; Finkelstein and Hambrick 1996).

To summarize this discussion, the social information processing perspective proposed by Salancik and Pfeffer (1978) provides additional information that explains why demographic characteristics are not necessarily good proxies

---

<sup>69</sup> "Consistent individual differences in preferred ways of organizing and processing information and experience" (Messick 1976:3).

of management competence. Based on their insightful observations and the results provided by this study, the following variables affecting management competence can be proposed:



*Figure 13: Factors influencing management competence*

This model indicates important factors influencing the type of management competence applied by managers in organizations. Individual characteristics such as personality (aptitudes) and demographic characteristics influence the use of managerial competence. The demographic characteristics can to some extent be viewed as proxies for different types of knowledge and skills. In addition, situational moderators such as characteristics of the task environment and the organization will constrain and influence the use of management competence. This model suggests that demographic characteristics are related to management competence. However, I suggest that additional information on the antecedents of management competence can be gained by taking into consideration situational moderators and personality.

## 8.4 Implications for further research

This section presents some implications and opportunities for future research based on the findings discussed in section 8.1, 8.2 and 8.3. The presentation of the implications and the suggestions for future research is organized according to figure 13. The first set of opportunities for future research focuses on the relationships between individual characteristics (personality, demographic characteristics and management competence), and the second group of future research opportunities focuses in particular on the role of situational moderators on the use of management competence. At the end of this section, some general research ideas related to the research topic are also presented.

### **The relationship between personality, experience and management competence**

The results from this research project suggest that demographic characteristics only count for a small part of the variation in management competence. Personality may be another important factor that can explain variations in management competence. Also the observation that particular personality types are drawn towards management is a topic to further elaborate on (Chan 1999). Could it be that the *sivilokonoms* and the *sivilingeniors* who become managers have a common personality type and that this personality type is distinctively different for the personality of *sivilokonoms* and *sivilingeniors* who are not managers? Can this be a factor which explains the relatively equal management competence found in these two educational groups? These questions suggest that more research is needed on personality as an antecedent of management competence.

More research is also needed on the role of personality for educational and vocational choices. This type of research could provide information on the relationship between personality and experience and how the two factors together influence management competence. This study suggests that there is a joint effect of personality and type of experience (educational background and type of work experience) on management competence. The combined effect of these two variables on management competence would contribute with more in-depth information on which factors that really influence management competence. Such knowledge would be useful with regard to development of management programs and in management recruiting.

A more thorough investigation of demographic characteristics is needed due to the mix of confirmed (this study and several of the studies presented in chapter 4) and disconfirmed (several of the studies presented in chapter 4) results regarding demographic characteristics' influence on management

competence. Research on the relation between personality and insight on cognitive style shows that the more detailed the demographic characteristics, the more likely they are to show significant effects on cognitive style. In particular, more detailed information about managers' career tracks would be useful. Learning theory has showed us that all the information an individual is exposed to does not create learning and thus competence. This suggests that some of the managers' experience are more likely to influence the managers' competence than others are. Investigations on relationships between situations and/or incidents that have had great influence on the managers and their management competence seem promising for future research.

Finally, an overall understanding of which factors that influence preference for problem solving strategies and managerial behavior besides demographic characteristics, would be useful both for research on managers and research on cognitive style.

### **The role of situational moderators on management competence**

The results of the study indicate that management competence needs to be studied in the context of the organization. The nature of the present organization clearly has an influence on the managers' competence. This suggests that different types of organizations mobilize different types of management competence. If the manager leads an organization that emphasizes innovation and creativity, the manager is more likely to prefer an explorer problem solving strategy and be more entrepreneurially oriented compared to managers working in other types of organizations. This finding needs more elaboration since organizational characteristics were only used as control variables in this study. An opportunity for future research is for instance to use Mintzberg's typology (1979) and investigate if different types of organizations mobilize different types of management competence.

Another opportunity for future research related to organizational moderators is identification of the direction of relationship between individual characteristics and characteristics of the present employer. Based on the results from the study, we do not know whether managers seek to work in organizations that match their competence or if characteristics of the present employer influence the managers' competence. This is an area where there is need for more knowledge.

The substantial increase in explanatory power provided by including characteristics of the present employer in model 2 suggests that contemporary experience may be most influential on management competence. However, this is only speculation and more research is needed

on the role of contemporary experience on management competence. If this proposed relationship is true, this will also influence the type of demographic characteristics to be used when applying such characteristics as proxies for management competence. This suggests that educational background and early work history may have relatively little influence on present management competence.

The role of task environment and the national culture as situational moderators were not measured in this study. However, the homogeneity between the managers in the study on power orientation, task orientation and relationship orientation can be indications of a national culture of management in Norway. The relatively equal weight of behavioral characteristics such as task orientation, relationship orientation and power orientation among over 500 Norwegian managers who have experience from various industries and different types of organizational and functional experience, suggest that these managers' behavior is influenced by other factors than individual characteristics and characteristics of the present employer. The nature of a Norwegian management culture is yet to be investigated, thus being an opportunity for future research.

The finding discussed above is contradictory to Ringer's (1992) knowledge field perspective, which suggests that individuals with different types of educational backgrounds belong to different fields of knowledge. According to Ringer's point of view, *sivilokonomers* and *sivilingenjører* should belong to different fields of knowledge and thus have different types of management competence. These two educational groups' relatively short work experience in subordinate positions prior to their first management position suggests that they rather belong to the field of management than to the field of engineering or the field of business economics and administration. This observation provides opportunities for future research on fields of knowledge. A knowledge field is not necessarily only connected to educational background. New fields can emerge based on the mobility of different professional groups in the labor market, e.g. from belonging to the profession of engineering to the "profession" of management.

Also, national particularities may be present regarding types of knowledge fields and which groups belong to each field. Germany can be used as an example of managers belonging to the field of engineering even though they are managers. This is related to the recruitment process of managers. German businesses traditionally recruit individuals to management positions after they have been employed in the organization for a long time (Amdam 1996; Byrkjeflot 1997; Engwall and Zamagni 1998; Locke 1989). This suggests that the influence of the managers' functional background may be

of greater importance for German managers than for Norwegian managers who are *sivilokonomers* and *sivilingenjører*, which again might suggest that the characteristics of the different fields of knowledge might be national particularities. Comparisons of different national systems of management recruitment and their relationship to management competence is an area that few researchers have investigated, thus being an opportunity for future research.

Characteristics of the present employer's task environment were not taken into account in the analyses. However, the explanatory power characteristics of the present employer had on explaining type of management competence suggests that characteristics of the task environment may be as important. Thus, an opportunity for future research lies in examining the relationship between the characteristics of the task environment (i.e. industry structure, capital intensity, market growth) and management competence.

### **General issues**

Overall the groups of managers compared in this study have many similar characteristics. Thus an opportunity for future research would be to examine the same relationships for other groups of managers.

Also the fact that few women participated in the study (under 10%) made it impossible to highlight any gender differences with regard to management competence. Both practitioners and researchers suggest that women have different management competence compared to males. However, empirical investigations on this proposition are quite sparse.

This study measures primarily the relations between demographic characteristics and managerial meta-competence. Although previous research on management competence (Boyatzis 1982; Collin 1989; Nordhaug 1993) suggests that meta-competence is essential in management positions, the role of task-specific and industry-specific competence cannot be ruled out as being important for managers as well. This suggests that more research on the types of competence useful in management positions and for different groups of managers is needed.

## **8.5 Methodological implications**

This section summarizes some of the important methodological implications of this study. The background information of these implications is in particular presented in sub-chapter 7.6: The validity of the findings. This section contains a discussion of the implications for research design, sample

type and size, measurement, and data analysis for studies investigating the relations between demographic characteristics and management competence.

Regarding research design a longitudinal design is a more appropriate design than a cross sectional one when studying to what extent demographic characteristics influence management competence. There is an overall problem in this study to determine which of the demographic characteristics cause certain effects on management competence. Using a longitudinal design would to some extent have solved this problem.

The variation of the managers in the sample is of major importance in order to have good effect size on the independent variables. In this study one can suspect that the two groups of managers studied are too similar and thus the small explanatory power contributed by the demographic characteristics on management competence is small due to the sample characteristics. Either way, however, it is important to have large samples in order to investigate the relations between demographic characteristics and management competence since the expected effect size is quite small. The results from previous studies under the upper echelon perspective have highlighted this matter.

This study has used already developed instruments to measure management competence. There are both strengths and weaknesses connected to the application of pre-developed instruments in this research project. Of strengths lie the fact that too many research projects use a lot of time developing their own instruments rather than validating and improving already existing ones. In this project investigations of useful instruments for measuring management competence were conducted and, as table 5 shows, there are many existing instruments available to measure different elements of management competence. One weakness, which is of particular importance, is connected to the fact that it is not obvious that the competence elements measured in this research project are the most important competence elements of management competence. Although previous studies argue that meta-competence is particularly important for managers, this has so far basically been a theoretically based point of view. There may be other types of meta-competence that are more central competence elements of management competence, and there may also be particular types of industry-specific and task-specific competence that are of great importance for managers.

Regarding data analysis, this study used MANOVA and ANOVA analyses to identify group means differences, and regression analyses to determine the strength of the observed relationships. With longitudinal data on career

history for instance, event history analysis is an interesting data analysis method to apply on these sets of data. In fact, since I had the career history of the managers, this would perhaps have been another useful method for data analysis of the work experience variable rather than developing the types of measures I did on type of work experience. Event history analysis could have contributed with more detailed information on promotion characteristics of the different managers, what type of functional experience was correlated with fast advancement to management position, more detailed information on the tenure characteristics in different phases of the manager's career, etc. In order to achieve more detailed demographic characteristics of type of work experience, event history analysis is a recommendable method to apply in further studies.

Another observation regarding data analysis that this study revealed is the importance of power analysis when the study is performed on a large sample. The nature of significance testing is quite sensitive to large samples and therefore even minor variations turn out to be highly significant. By conducting post-hoc power analysis it is possible to rule out significant findings that are only results of the sample size. This is a highly recommendable procedure to pursue for this type of study in the future.

## **8.6 Implications for practice**

There are basically three major practical implications that can be drawn from the findings of the study. First, the results from this study shed light on management recruitment. Second, the relationship between personal preferences and vocational and educational choices is highlighted. Third, the findings of the study indicate something about management and the management culture in Norway.

Traditionally educational background and work experience are often used as proxies for managers' abilities in management recruitment. Even though companies that recruit managers often use personality tests and interviews in the final selection process of managers, the first screening process is often based on CV content. Since educational background and work experience seem to explain very little of variation in management competence, this practice is questionable, because the screening of potential candidates to management positions is based on failing grounds. People that might be very competent for the position are not selected because they have the wrong experience. The results from this study showed that less than 10% of the variation of management competence is explained by educational background and work experience. In that sense, this should certainly be an element management recruiters should look more into. However, this is a

variation between *sivilokonoms* and *sivilingeniors* who have succeeded in becoming managers. Hence, in a total population, the screening may not be so bad.

The results from this study indicate that people on average have some kinds of preferences that follow them throughout their career. Engineers seem to be more novelty seeking, prefer to work in innovative industries and in production and operations. This is a further indication of Holland's (1985) theory of vocational choices which argues that different types of personalities have different preferences regarding preferred education and type of work experience. This suggests that looking at persistent preferences regarding educational and vocational choices might give us indications of the managers' competence, and thereby being of practical use for management recruiters.

The next practical implication involves the homogenous nature of management competence observed among *sivilokonoms* and *sivilingeniors*. Many Norwegian managers are either *sivilokonom* or *sivilingenior* (Amdam 1999; Skaalebraaten 1996). This study shows that they have different types of functional experience, but the fact that they quite quickly advance to general management positions may decrease the influence of their functional background in their experience base. Many of those who advanced quickly to management positions probably had preferences for management positions quite early in their career. It is striking how similar these two educational groups are regarding their management competence. Only small differences are observed between the two when examining the mean scores of the measurements of the dependent variables. Since we know that these managers have great variation in experience bases, this is more striking and suggests very homogeneous management competence among Norwegian managers.

Based on the homogeneous management competence observed among Norwegian managers' who are *sivilokonoms* and *sivilingeniors* this may have several practical implications for Norwegian business life. Since many Norwegian managers have these two particular educational backgrounds, it is likely that in many Norwegian companies the top management team consists only of *sivilokonoms* and/or *sivilingeniors*. An interesting point of view is that there is a perceived difference among Norwegian managers regarding the management competence of *sivilokonoms* and *sivilingeniors* (see exploratory study, chapter 3). However, the survey study revealed very small differences suggesting that many Norwegian top management teams are quite homogenous regarding their management competence. This has several practical implications. First of all homogeneity within management

groups influences the teams' absorptive capacity (Cohen and Levinthal 1990). Their abilities to sense opportunities and take advantage of the opportunities that arise in the environment are likely to be influenced by the degree of competence homogeneity within the management team (Teece, Pisano, and Shuen 1997). The likelihood of homogeneity among Norwegian managers may be one explanatory factor why Norwegian businesses are even less innovative than the average of the OECD (Maus 2000). To many Norwegian managers it may come as a surprise that mixing experience and business graduates is insufficient for generating heterogeneity, as conventional wisdom claims that these two groups are very different.

The following quote<sup>70</sup> expresses the relationship between absorptive capacity, dynamic capabilities and innovation fairly well: "...new voices must be brought into the strategy process. Companies miss the future not because they're fat and lazy - they mostly aren't any more - but because they're blind. They have too little genetic diversity. .... the lack of genetic diversity is most acute at the top. The pyramid in an organisation is typically a hierarchy of experience". Based on the findings in this study one can conclude that more heterogeneous management competence could be beneficial for change and innovation in Norwegian businesses. The homogenous management competence suggests that Norwegian business community lacks genetic diversity.

---

<sup>70</sup> Management Interview with Gary Hamel in Financial Times, Monday April 28 1997.



## References

- Abelson, R.P. 1981. The Psychological Status of the Script Concept. *American Psychologist* 36:715-729.
- Alvarez, J.-L., ed. 1998. *The Diffusion and Consumption of Business Knowledge*. Hampshire and London: Macmillian Press LTD.
- Amdam, R.P. 1993. *For egen regning: BI og den økonomiske-administrative utdanningen 1943-1993*. Oslo: Universitetsforlaget.
- Amdam, R.P., ed. 1996. *Management, Education and Competitiveness*. London: Routledge.
- Amdam, R.P. 1999. *Utdanning, økonomi og ledelse: Framveksten av den økonomisk-administrative utdanningen ca 1936-1986*. Oslo: Unipub.
- Arrow, K. 1973. Higher Education as a Filter. *Journal of Public Economy* 2 (3):193-216.
- Bantel, K.A., and S.E. Jackson. 1989. Top Management and Innovations in Banking: Does the composition of the top team make a difference. *Strategic Management Journal* 10:107-124.
- Barbosa, R.R. 1985. Innovation in a Mature Industry. Unpublished doctoral dissertation, Columbia University, New York.
- Barnard, C.I. 1938/1968. *The Functions of the Executive*. Cambridge, MA.: Harvard University Press.
- Bass, B.M. 1985. *Leadership and Performance Beyond Expectations*. New York: The Free Press.
- Bass, B.M. 1990. *Bass & Stogdill's Handbook of Leadership*. 3rd ed. New York: The Free Press.
- Bass, B.M., and B.J. Avolio. 1989. *Manual of the Multifactor Leadership Questionnaire*. Palo Alto, CA: Consulting Psychologists Press.
- Becker, M. 1970. Sociometric Location and Innovativeness. *American Sociological Review* 35:267-304.
- Beltramini, R.F., R.A. Peterson, and G. Kozmetsky. 1984. Concerns of College Students Regarding Business Ethics. *Journal of Business Ethics* 3:195-200.
- Berger, P., and T. Luckmann. 1966. *The Social Construction of Reality*. London: Penguin Books.
- Biglan, A. 1973. The Characteristics of Subject Matter in Different Academic Areas. *Journal of Applied Psychology* 57 (3):195-203.
- Birkelund, G.E., P. Gooderham, O. Nordhaug, and K. Ringdal. 2000. Sosial bakgrunn, kjønn, studiested, og jobbverdier hos siviløkonomstudenter. Paper presented at FIBE, Bergen.
- Blau, P.M., and W.R. Scott. 1962. *Formal Organizations: A comparative approach*. San Francisco: Chandler.

- Boeker, W. 1997. Strategic Change: The influence of managerial characteristics and organizational growth. *Academy of Management Journal* 40 (1):152-170.
- Bourdieu, P. 1996. *The State Nobility : Elite schools in the field of power*. Cambridge: Polity Press.
- Bourdieu, P., and J.-C. Passeron. 1977. *Reproduction in Education, Society and Culture*. London: Sage.
- Boyatzis, R.E. 1982. *The Competent Manager: A model for effective performance*. New York: Wiley.
- Bray, J.H., and S.E. Maxwell. 1985. *Multivariate Analysis of Variance, Quantitative applications in the social sciences series #54*. Thousand Oaks, CA: Sage Publications.
- Brockmann, E.N., and P.G. Simmonds. 1997. Strategic Decision Making: The influence of CEO experience and use of tacit knowledge. *Journal of Managerial Issues* 9 (4):454-467.
- Bryman, A. 1992. *Charisma and Leadership in Organizations*. London: Sage Publications.
- Burns, J.M. 1978. *Leadership*. New York: Harper Torchbooks.
- Bycio, P., R. Hackett, and J.S. Allen. 1995. Further Assessment of Bass's (1985) Conceptualization of Transactional and Transformational Leadership. *Journal of Applied Psychology* 80:468-478.
- Byrkjeflot, H., ed. 1997. *Fra styring til ledelse*. Bergen: Fagbokforlaget.
- Byrkjeflot, H. 1999a. Ledelsesutfordringer ved tusenårsskiftet. *Magma* 2 (5):35-46.
- Byrkjeflot, H. 1999b. The Structure of Management Education in Europe. CEMP-report no. 8. Sandvika: Norwegian School of Management.
- Cacioppo, J.T., and R.E. Petty. 1982. The Need for Cognition. *Journal of Personality and Social Psychology* 42:116-131.
- Calder, B.J., L.W. Phillips, and A.M. Tybout. 1981. Designing Research for Application. *Journal of Consumer Research* 8 (September):197-207.
- Cannell, F., L. Oksenberg, and J. Converse. 1977. Striving for Response Accuracy: Experiments in new interviewing techniques. *Journal of Marketing Research* 14 (August):306-315.
- Carless, S. 1998. Assessing the Discriminant Validity of Transformational Leader Behavior as Measured by the MLQ. *Journal of Occupational and Organizational Psychology* 71 (4):353-359.
- Carlyn, M. 1977. An Assessment of the Myers-Briggs Type Indicator. *Journal of Personality Assessment* 41:461-473.
- Carmines, E.G., and R.A. Zeller. 1979. *Reliability and Validity Assessment. Quantitative applications in social sciences*. London: Sage Publications.

- Chan, K. 1999. Toward a Theory of Individual Differences and Leadership: Understanding the motivation to lead. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.
- Chandler, A.D. 1962. *Strategy and Structure. Chapters in the History of the American Industrial Enterprise*. Cambridge, Mass.: The MIT Press.
- Child, J. 1997. Strategic Choice in the Analysis of Action, Structure, Organizations and Environment: Retrospect and prospect. *Organization studies* 18 (1):43-76.
- Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. New Jersey: Lawrence Erlbaum Ass.
- Cohen, W.M., and D.A. Levinthal. 1990. Absorptive Capacity: A new perspective on learning and innovation. *Administrative Science Quarterly* 35 (1):128-152.
- Colbjørnsen, T., I. Drake, and W. Haukedal. 1999. AFFs lederundersøkelse. Bergen: AFF.
- Collin, A. 1989. Managers' Competence: Rhetoric, reality and research. *Personnel Review* 18 (6):20-25.
- Collins, R. 1979. *The Credential Society. An Historical Sociology of Education and Stratification*. New York: Academic Press.
- Cook, T.D., and D.T. Campbell. 1979. *Quasi-Experimentation. Design & Analysis Issues for Field Settings*. Boston: Houghton Mifflin Company.
- Costa, P.T., and R.R. McCrae. 1992. Normal Personality Assessment in Clinical Practice: The NEO Personality Inventory. *Psychological Assessment* 4 (1):5-13.
- Cronbach, L.J. 1951. Coefficient Alpha and the Internal Structure of Tests. *Psychometica* 16 (3):297-334.
- Dawson, L.M. 1997. Ethical Differences between Men and Women in the Sales Profession. *Journal of Business Ethics* 16 (11):1143-1152.
- Dearborn, D.C., and H.A. Simon. 1958. Selective Perception: A note on the departmental affiliations of executives. *Sociometry* 21:144-150.
- Den Hartog, D.N., J.J. Van Muijen, and P.L. Koopman. 1997. Transactional versus Transformational Leadership: An analysis of the MLQ. *Journal of Occupational and Organizational Psychology* 70 (1):19-35.
- Dewey, J. 1958. *Experience and Nature*. New York: Dover Publications.
- DiMaggio, P.J., and W.W. Powell. 1983. The Iron Cage Revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* 48:147-160.
- DiMaggio, P.J., and W.W. Powell. 1991. Introduction. In *The New Institutionalism in Organizational Analysis*, edited by W. Powell and P. DiMaggio. Chicago: The University of Chicago Press.

- Durkheim, E. 1949. *The Division of Labor in Society*. Glencoe, IL: The Free Press.
- Edvardsen, R. 1991. Valg av utdanning og yrke: Betydningen av kjønn, sosial og geografisk bakgrunn ved utdannings- og yrkesvalg. Oslo: NAVF.
- Engwall, L. 1992. *Mercury meets Minerva: Business Studies and Higher Education The Swedish Case*. Oxford: Pergamon Press.
- Engwall, L. 2000. Foreign Role Models and Standardization in Nordic Business Education. *Scandinavian Journal of Management* 16 (1):1-24.
- Engwall, L., and V. Zamagni, eds. 1998. *Management Education in Historical Perspective*. Manchester: Manchester University Press.
- Eriksen, K. 1982. Motivasjon, studium, yrke. Oslo: NAVFs utredningsinstitutt.
- Fiedler, F.E. 1967. *A Theory of Leadership Effectiveness*. New York: McGraw-Hill.
- Finkelstein, S., and D.C. Hambrick. 1996. *Strategic Leadership: Top executives and their effects on organizations*. St. Paul: West Publishing Company.
- Fleishman, E.A., and J. Simmons. 1970. Relationship between the Leadership Patterns and Effectiveness Ratings among Israeli Foremen. *Personnel Psychology* 23:169-172.
- Fligstein, N. 1987. The Intraorganizational Power Struggle: The rise of finance presidents in large corporations, 1919-1979. *American Sociological Review* 52:44-58.
- Fligstein, N. 1990. *The Transformation of Corporate Control*. Cambridge: Harvard University Press.
- Frankfort-Nachmias, C., and D. Nachmias. 1996. *Research Methods in the Social Sciences*. 5th ed. London: Arnold.
- Gammelsæter, H. 1991. Organisasjonsendring gjennom generasjoner av ledere. Molde: Møreforskning.
- Gardner, W.L., and M.J. Matinko. 1996. Using the Myers-Briggs Type Indicator to Study Managers: A literature review and research agenda. *Journal of Management* 22 (1):45-83.
- Geertz, C. 1973. *The Interpretation of Cultures*. New York: Basic Books.
- Geletkanycz, M.A., and D.C. Hambrick. 1997. The External Ties of Top Executives: Implications for strategic choice and performance. *Administrative Science Quarterly* 42 (4):654-681.
- Ghuri, P., K. Grønhaug, and I. Kristianslund. 1995. *Research Methods in Business Studies*. Hertfordshire: Prentice Hall.
- Ginsberg, A., and N. Venkatraman. 1992. Investing in New Information Technology: The role of competitive posture and issue diagnosis. *Strategic Management Journal* 13:37-53.

- Gourvish, T.R., and N. Tiratsoo, eds. 1998. *Missionaries and Managers: United States technical assistance and European management education, 1945-1980*. New York: Manchester University Press.
- Grant, J. 1988. Women as Managers: What they can offer to organizations. *Organizational Dynamics* 16 (1):56-63.
- Grimm, C.M., and K.G. Smith. 1991. Management and Organizational Change: A note on the railroad industry. *Strategic Management Journal* 12:557-562.
- Gupta, A.K., and V. Govindarajan. 1984. Business Unit Strategy, Managerial Characteristics, and Business Unit Effectiveness at Strategy Implementation. *Academy of Management Journal* 27:25-41.
- Gupta, A.K. 1988. Contingency Perspectives on Strategic Leadership: Current knowledge and future research directions. In *The Executive Effect: Concepts and methods for studying top managers*, edited by D. C. Hambrick. Greenwich, Connecticut: JAI Press Inc.
- Hair, J.F., R.E. Anderson, R.L. Tatham, and W.C. Black. 1992. *Multivariate Data Analysis*. New York: Macmillian Publishing Company.
- Hambrick, D.C., S. Black, and J.W. Fredrickson. 1992. Executive Leadership of the High-Technology Firm: What is special about it? In *Advances in Global High-Technology Management*, edited by L. Gomez-Mejia and M. Lawless. Greenwich, Conn.: JAI Press.
- Hambrick, D.C., and G. Brandon. 1988. Executive Values. In *The Executive Effect: Concepts and Methods for Studying Top Managers*, edited by D. C. Hambrick. Greenwich, Conn.: JAI Press.
- Hambrick, D.C., and S. Finkelstein. 1987. Managerial Discretion: A bridge between polar views of organizational outcomes. *Research in Organizational Behavior* 9:369-406.
- Hambrick, D.C., and G.D. Fukutomi. 1991. The Seasons of a CEO's Tenure. *Academy of Management Review* 16:719-742.
- Hambrick, D.C., M.A. Geletkanycz, and J.W. Fredrickson. 1993. Top Executive Commitment to the Status-Quo: Some tests of its determinants. *Strategic Management Journal* 14 (6):401-418.
- Hambrick, D.C., and P.A. Mason. 1984. Upper Echelons: The organization as a reflection of its top managers. *Academy of Management Review* 9 (2):193-206.
- Hanisch, T.J., and E. Lange. 1985. *Vitenskap for industrien*. Oslo: Universitetsforlaget.
- Harrell, A.M., and M.J. Stahl. 1981. A Behavioral Decision Theory Approach for Measuring McClelland's Trichotomy of Needs. *Journal of Applied Psychology* 66:242-244.

- Hedlund, G., and I. Nonaka. 1993. Models of Knowledge Management in the West and Japan. In *Implementing Strategic Processes*, edited by Lorange, Roos & Van de Ven. Oxford: Blackwell Business.
- Heilmeier, G.H. 1993. Room for Whom at the Top? Promoting Technical Literacy in the Executive Suite. *Research Technology Management*:27-32.
- Hersey, P., and K.H. Blanchard. 1993. *Management of Organizational Behavior: Utilizing human resources*. 6th ed ed. Englewood Cliffs, N.J.: Prentice Hall.
- Hitt, M.A., and B.B. Tyler. 1991. Strategic Decision Models: Integrating different perspectives. *Strategic Management Journal* 12:327-351.
- Hofstede, G. 1981. Culture and Organizations. *International Studies of Management and Organization* 10:15-41.
- Hofstede, G. 1991. *Cultures and Organizations: Software of the mind*. London: McGraw-Hill.
- Holland, J.L. 1985. *Making Vocational Choices: A theory of vocational personalities and work environments*. 2nd ed. New Jersey: Englewood Cliffs.
- Hrebiniak, L.G., and W.F. Joyce. 1985. Organizational Adaptation: Strategic choice and environmental determinism. *Administrative Science Quarterly* 30:336-349.
- Iversen, G.R., and H. Norpoth. 1987. *Analysis of Variance*. 2nd ed, *Quantitative applications in the social sciences # 1*. Newbury Park, CA: Sage Publications.
- Jensen, O.H., and A. Strømme Svendsen. 1986. *Norges Handelshøyskole Femti år*. Bergen: Norges Handelshøyskole.
- Jung, C.G. von. 1921. *Psychologische Typen*. Zyrich: Rascher & Cie.
- Kagan, J., B.L. Rosman, D. Day, J. Albert, and W. Phillips. 1964. Information Processing in the Child: Significance of analytic and reflective attitudes. *Psychological Monographs* 78:Whole No. 578.
- Kanter, R.M. 1977. *Men and Women of the Corporation*. New York: Basic Books.
- Karmel, B. 1978. Leadership: A challenge to traditional research methods and assumptions. *Academy of Management Review* 3:475-482.
- Kaufmann, G. 1979. The Explorer and the Assimilator: A cognitive style distinction and its potential implications for innovative problem solving. *Scandinavian Journal of Educational Research* 23:101-108.
- Kaufmann, G. 1995. The Theory of Cognitive Strategy Preferences in Problem Solving. In *A Festschrift in Honour of Kjell Raaheim*, edited by G. Kaufmann, T. Helstrup and K. Teigen. Bergen: Fagbokforlaget.
- Kaufmann, G., and Ø. Martinsen. 1991. *AE Index*. Bergen: University of Bergen.

- Kimberly, J.R., and M.J. Evanisko. 1981. Organizational Innovation: The influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. *Academy of Management Journal* 24:689-713.
- Kipping, M., and O. Bjarnar, eds. 1998. *The Americanisation of European Business. The Marshall plan and the transfer of US management models*. London: Routledge.
- Kirton, M.J. 1987. *Kirton Adaption - Innovation Inventory Manual*. 2nd ed. Hatfield, England: Occupational Research Centre.
- Kirton, M.J., ed. 1989. *Adaptors and Innovators. Styles of Creativity and Problem Solving*. London: Routledge.
- Kolb, D.A. 1976. *The Learning Style Inventory: Technical Manual*. Boston: McBerb and Company.
- Kolb, D.A. 1984. *Experiential Learning*. Englewood Cliffs: Prentice Hall.
- Kotter, J.P. 1982. *The General Managers*. New York: The Free Press.
- Kvålshaugen, R. 1994. Management Competence in Professional Business Service Firms. Master Thesis, Norwegian School of Management - BI, Sandvika.
- Lane, M.S., and D. Schaupp. 1989. Ethics in Education: A comparative study. *Journal of Business Ethics* 8:943-949.
- Lewin, K. 1951. *Field Theory in Social Sciences*. New York: Harper & Row.
- Lidtun, V. 1995. Formingen av den norske siviløkonomprofesjonen etter 1945 : Ledelsesteori som profesjonsstrategi. Master thesis, Administrasjon og organisasjonsvitenskap, University of Bergen, Bergen.
- Lieberson, S., and J.F. O'Conner. 1972. Leadership and Organizational Performance: A study of large corporations. *American Sociological Review* 37:117-130.
- Lines, R. 1992. Environmental Orientations of Managers in two Norwegian Industries: The construct and its antecedents. Unpublished doctoral dissertation, Norwegian School of Economics and Business Administration, Bergen.
- Locke, R.R. 1989. *Management and Higher Education since 1940*. Cambridge: Cambridge University Press.
- Locke, R.R. 1996. *The Collapse of the American Management Mystique*. New York: Oxford University Press.
- Loden, M. 1986. *Feminine leadership, or How to Succeed in Business without Being One of the Boys*. New York: Time Books.
- Lowe, K.B., and K. Galen Kroeck. 1996. Effectiveness Correlates of Transformational and Transactional Leadership: A meta-analytic review of MLQ literature. *Leadership Quarterly* 7 (3):385-425.

- Løwendahl, B.R. 1992. Global Strategies for Professional Business Service Firms. Unpublished doctoral dissertation, Wharton School, University of Pennsylvania.
- Løwendahl, B.R. 2000a. Learning Effects - The Case of the Lillehammer Olympic Winter Games 1994. In *Evaluation of Events: Scandinavian Experiences*, edited by L. L. Mossberg. New York: Cognizant Communication Corporation.
- Løwendahl, B.R. 2000b. *Strategic Management of Professional Service Firms*. 2nd ed. Copenhagen: Copenhagen Business School Press.
- March, J.G. 1994. *A Primer on Decision Making: How decisions happens*. New York: Free Press.
- March, J.G. 1991. Exploration and Exploitation in Organizational Learning. *Organization Science* 2 (1):71-87.
- March, J.G., and H.A. Simon. 1958. *Organizations*. New York: Wiley.
- Mardal, J.K. 1998. Siviløkonomer: Karriere og nytte av studiet. Sandvika: Handelshøyskolen BI.
- Markóczy, L. 1997. Measuring Beliefs: Accept no substitutes. *Academy of Management Journal* 40 (5):1228-1242.
- Marnburg, E. 1997. Etikk i næringslivet. En teoretisk og empirisk studie av individets, organisasjonens og utdanningens betydning for atferd i etiske konfliktsituasjoner. Unpublished doctoral dissertation, Norwegian University of Science and Technology, Trondheim.
- Martinsen, Ø. 1989. Variabler knyttet til problemløsning og kreativitet. Master thesis, Educational science, University of Oslo, Oslo.
- Martinsen, Ø. 1993. The Assimilator-Explorer Cognitive Styles and Their Relationship to Selected Aspects of Personality and Ability. Bergen: University of Bergen, Psychometric Unit.
- Martinsen, Ø. 1994. Insight with Style. Unpublished doctoral dissertation, Faculty of Psychology, University of Bergen, Bergen.
- Martinsen, Ø. 1995a. Cognitive Styles and Experience in Solving Insight Problems - Replication and Extension. *Creativity Research Journal* 8 (3):291-298.
- Martinsen, Ø. 1995b. Insight with Style: Cognitive style and its functions in solving insight problems. In *A Festschrift in Honour of Kjell Raaheim*, edited by G. Kaufmann, T. Helstrup and K. Teigen. Bergen: Fagbokforlaget.
- Martinsen, Ø. 1999. Lederatferd. Bergen: AFF.
- Maus, K.W. (ed). 2000. Det norske forsknings-og innovasjonssystemet - statistikk og indikatorer - 1999. Oslo: Norwegian Research Council.
- McCabe, D.L., J.M. Dukerich, and J. Dutton. 1991. Context, Values and Moral Dilemmas: Comparing the choices of business and law school students. *Journal of Business Ethics* 10:951-960.

- McCabe, D.L., J.M. Dukerich, and J.E. Dutton. 1994. The Effects Of Professional-Education On Values and the Resolution Of Ethical Dilemmas - Business School vs Law-School Students. *Journal Of Business Ethics* 13 (9):693.
- Messick, S. 1976. Personality Consistencies in Cognition and Creativity. In *Individuality in Learning*, edited by S.A. Messick. San Francisco, Cal.: Jossey-Bass.
- Meyer, J.W., and B. Rowan. 1977. Institutional Organizations: Formal structure as myth and ceremony. *American Journal of Sociology* 83:340-363.
- Meyer, J.W. 1978. The Effects of Education as an Institution. *American Journal of Sociology* 83 (1):55-77.
- Miles, R.E., and C.C. Snow. 1978. *Organizational Strategy, Structure, and Process*. New York: McGraw-Hill.
- Miller, D. 1991. Stale in the Saddle: CEO tenure and the match between organization and environment. *Management Science* 37:34-52.
- Mintzberg, H. 1973. *The Nature of Managerial Work*. New York: HarperCollins Publishers.
- Mintzberg, H. 1976. Planning on the Left Side and Managing on the Right. *Harvard Business Review* 54 (4):49-58.
- Mintzberg, H. 1979. *The Structuring of Organizations*. Englewood Cliffs: Prentice-Hall.
- Mohr, L.B. 1990. *Understanding Significance Testing, Quantitative applications in the social sciences series #73*. Newbury Park, CA: Sage Publications.
- Morgan, G. 1988. *Riding the Waves of Change. Developing Managerial Competencies for a Turbulent World*. San Francisco: Jossey-Bass.
- Murphy, K.R., and B. Myers. 1998. *Statistical Power Analysis*. Mahwah, New Jersey: Lawrence Erlbaum Ass.
- Myers, I.B., and M.H. McCaulley. 1985. *Manual: A guide to the development and use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.
- Nelson, R.R., and S.G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, MA: Belknap.
- Newbold, P. 1988. *Statistics for Business and Economics*. 2nd ed. Englewood Cliffs, NJ: Prentice Hall.
- NIFU. 1997. Kandidatundersøkelsen 1996. Oslo: NIFU skriftserie.
- Nisbett, M.A. 1986. The Leader - Boss or Coach? *Canadian Banker* 93 (1):54-57.
- Nordhaug, O. 1993. *Human Capital in Organizations. Competence, Training, and Learning*. Oslo: Scandinavian University Press.
- North, D.C. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge, UK: Cambridge University Press.

- Nunnally, J.C., and I.H. Bernstein. 1994. *Psychometric Theory*. 3rd ed. New York: McGraw-Hill.
- Nutt, P. 1993. Flexible Decision Styles and the Choices of Top Executives. *Journal of Management Studies* 30 (5):695-721.
- Olson, C.L. 1976. On Choosing a Test Statistic in Multivariate Analysis of Variance. *Psychological Bulletin* 83:579-586.
- Olson, C.L. 1979. Practical Considerations Choosing a MANOVA Test Statistics: A rejoinder to Stevens. *Psychological Bulletin* 86:1350-1352.
- Opheim, V. 1999. Rekruttering til sivilingeniørstudiet. Endring eller stabilitet? Master thesis, Department of Sociology and Society Geography, University of Oslo, Oslo.
- Parsons, T. 1951. *The Social System*. New York: The Free Press.
- Penrose, E. 1959. *The Theory of the Growth of the Firm*. 3rd ed. Oxford: Oxford University Press.
- Peterson, R.A., and R.A. Kerin. 1981. The Quality of Self-Report Data: Review and synthesis. In *Review in Marketing*, edited by E. Enis and K. Roering. Chicago: American Marketing Assoc.
- Pfeffer, J. 1983. Organizational Demography. In *Research in Organizational Behavior*, edited by L. Cummings and B. Staw. Greenwich, CT: JAI Press.
- Piaget, J. 1969. *The Mechanisms of Perception*. London: Routledge & Kegan Paul.
- Podsakoff, P.M., and D.W. Organ. 1986. Self Reports in Organizational Research: Problems and prospectus. *Journal of Management* 12:531-544.
- Polanyi, M. 1969. *Knowing and Being*. London: Routledge and Kegan Paul.
- Powell, W.W., and P.J. DiMaggio. 1991. *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press.
- Rajagopalan, N., and D.K. Datta. 1996. CEO characteristics: Does industry matter? *Academy of Management Journal* 39 (1):197-215.
- Reed, R., and M. Reed. 1989. CEO Experience and Diversification Strategy Fit. *Journal of Management Studies* 26 (3):251-270.
- Rest, J.R., and S.J. Thoma. 1985. Relation of Moral Judgement Development to Formal Education. *Developmental Psychologist* 21:709-714.
- Ringer, F. 1992. *Fields of Knowledge*. Cambridge: Cambridge University Press.
- Rogers, E.M., and F.F. Shoemaker. 1971. *Communication of Innovations*. New York: Free Press.
- Rost, J.C. 1993. *Leadership for the Twenty-First Century*. Westport, Connecticut: Praeger.

- Rystad, J. 1995. Mellom fakta og fiksjon. Kvalifisering og tilpasning i sivilingeniørutdanningen. Dr. ing., Institutt for organisasjons-og arbeidslivserfaring, Norwegian University of Technology and Science, Trondheim.
- Røvik, K.A. 1998. *Moderne organisasjoner. Trender i organisasjonstenkingen ved tusenårsskiftet*. Bergen: Fagbokforlaget.
- Raaheim, K. 1974. *Problem Solving and Intelligence*. Oslo: Norwegian University Press.
- Salancik, G.R., and J. Pfeffer. 1978. A Social Information Processing Approach to Job Attitudes and Task Design. *Administrative Science Quarterly* 23:224-253.
- Schunk, D.H. 1991. *Learning Theories: An educational perspective*. New York: Macmillian Publishing Company.
- Schwenk, C. 1993. Management Tenure and Explanations for Success and Failure. *Omega-International Journal of Management Science* 21 (4):449-456.
- Scott, W.R. 1995. *Institutions and Organizations*. Thousand Oaks, California: Sage Publications Inc.
- Segal, U.A. 1992. Values, Personality and Career Choices. *The Journal of Applied Social Sciences* 16:143-159.
- Sejersted, F. 1997. Lederskap og demokratisk kapitalisme. In *Fra styring til ledelse*, edited by H. Byrkjeflot. Bergen: Fagbokforlaget.
- Selznick, P. 1957. *Leadership in Administration*. Berkeley: University of California Press.
- Skaalebraaten, J.O. 1996. Topplederundersøkelsen: Sivilingeniøren er tilbake i lederstillinger. Oslo: Norske Sivilingeniørers Forening.
- Song, Jae H. 1983. Diversifying Acquisitions and Financial Relationships: Testing 1974-1976 behaviour. *Strategic Management Journal* 4 (2):97.
- Spilling, O.R., ed. 1998. *SMB 98: Fakta om små og mellomstore bedrifter i Norge*. Bergen: Fagbokforlaget.
- Stacey, R.D. 1993. *Strategic Management and Organisational Dynamics*. London: Pitman Publishing.
- Steensma, H.K., and T.L. Liberti. 1999. The Influence of Occupational Experience on the Comprehensiveness of Strategic Decision Making. Paper presented at the Academy of Management, Chicago.
- Sternberg, R.J. 1988. The Three Facet Model of Creativity. In *The Nature of Creativity*, edited by R. Sternberg. Cambridge: Cambridge University Press.
- Sternberg, R.J., R.K. Wagner, W.M. Williams, and J.A. Horvath. 1995. Testing Common-Sense. *American Psychologist* 50 (11):912.

- Stevens, J.P. 1979. Comment to Olson: On choosing a test statistics in multivariate analysis of variance. *Psychological Bulletin* 86:355-360.
- Tabachnick, B.G., and L.S. Fidell. 1996. *Using Multivariate Statistics*. 3rd ed. New York: HarperCollins.
- Tata, J. 1998. The Influence of Gender on the Use and Effectiveness of Managerial Accounts. *Group and Organization Management* 23 (3):267-288.
- Teece, D.J., G. Pisano, and A. Shuen. 1997. Dynamic Capabilities and Strategic Management. *Strategic Management Journal* 18 (7):509-533.
- Thomas, A.B. 1988. Does Leadership Make a Difference to Organizational Performance? *Administrative Science Quarterly* 33:388-400.
- Thomas, A.S., R.J. Litschert, and K. Ramaswamy. 1991. The Performance Impact of Strategy-Manager Coalignment: An empirical examination. *Strategic Management Journal* 12:509-522.
- Thompson, J.D. 1967. *Organization in Action. Social Science Bases of Administrative Theory*. New York: Mc Graw-Hill Book Company.
- Tiratsoo, N. 1998. Management Education in Postwar Britain. In *Management Education in a Historical Perspective*, edited by L. Engwall and V. Zamagni. Manchester: Manchester University Press.
- Tyler, B.B., and H.K. Steensma. 1998. The Effects of Executives' Experiences and Perceptions on their Assessment of Potential Technological Alliances. *Strategic Management Journal* 19 (10):939-965.
- Vroom, V.H., and B. Pahl. 1971. Relationship between Age and Risk-Taking among Manager. *Journal of Applied Psychology* 55 (5):399-405.
- Walck, C.L. 1996. Management and Leadership. In *MBTI Applications*, edited by A. L. Hammer. Palo Alto, CA: Consulting Psychologists Press.
- Waller, M.J., G.P. Huber, and W.H. Glick. 1995. Functional Background as a Determinant of Executives' Selective Perception. *Academy of Management Journal* 38 (4):943-974.
- Wally, S., and J.R. Baum. 1994. Personal and Structural Determinants of the Pace of Strategic Decision Making. *Academy of Management Journal* 37:932-956.
- Weiner, N., and T.A. Mahoney. 1981. A Model of Corporate Performance as a Function of Environmental, Organizational, and Leadership Influences. *Academy of Management Journal* 24:453-470.
- Weisberg, R.W. 1980. *Memory, Thought and Behavior*. New York: Oxford University Press.
- Whitley, R. 1981. Women, Business Schools and the Social Reproduction of Business Elites: Britain and France. In *Access to Power. Cross-*

- National Studies of Women and Elites*. London: George Allen & Unwin.
- Whitley, R. 1984. The Fragmented State of Management Studies: Reasons and consequences. *Journal of Management Studies* 21 (3):331-348.
- Whitley, R., A. Thomas, and J. Marceau. 1981. *Masters of Business. The Making of a New Elite?* London and New York: Tavistock Publications.
- Wiersema, M.F., and K.A. Bantel. 1992. Top Management Team Demography and Corporate Strategic Change. *Academy of Management Journal* 35 (1):91-121.
- Waage, J.F. 1964. Virkninger av informasjon om kollokvievirksomhet blant 1. års studenter NTH og studentenes vurderinger av arbeidsformen. Trondheim: NTH.
- Yukl, G. 1994. *Leadership in Organizations*. 3rd ed. New Jersey: Prentice-Hall Inc.
- Zucker, L. 1977. The Role of Institutionalization in Cultural Persistence. *American Sociological Review* 42:726-743.
- Aamodt, P.O. 1982. Utdanning og sosial bakgrunn. Oslo: Statistisk Sentralbyrå.



## Appendix 1: Secondary Data Sources

The following secondary data sources are used in the exploratory study:

Content of the *sivilokonom* program and the *sivilingenior* program:

- Curricula NHH (*sivilokonom*): 1980, 1985, 1990 and 1995.
- Curricula NTNU (*sivilingenior*): 1980, 1985, 1990 and 1995.
- Curriculum BI (*sivilokonom*): 1997.

The history of the schools:

- Jensen, O.H. & A.S. Strømme 1986. *Norges Handelshøyskole. Femti år*. Bergen: Norges Handelshøyskole.
- Norske sivilokonomer gjennom 50 år. Norske sivilokonomers forening 1939-1989.
- Hanisch, T.J. & E. Lange 1985. *Vitenskap for industrien*. Oslo: Universitetsforlaget.
- Kjærvik, A. ed. 1997. *Teknologi for samfunnet. NTH i en brytningstid 1985-1995*. Trondheim: Norges teknisk-naturvitenskapelige universitet.
- Amdam, R.P. 1993. *For egen regning: BI og den økonomiske-administrative utdanningen 1943-1993*. Oslo: Universitetsforlaget.

The labor market for *sivilokonom*s and *sivilingenior*s:

- NHH labor market surveys of newly graduates from NHH (*sivilokonom*) 1985, 1990, 1995, 1996, 1997 and 1998.
- NIFs labor market surveys of newly graduates from NTHU (*sivilingenior*) 1988, 1990, 1995, 1996 and 1997.
- BIs labor market surveys of newly graduates from BI (*sivilokonom*) 1998, 1999.
- The European Graduate Survey 1998. Universium Institute, Sweden.
- The Norwegian Graduate Survey 1998. Universium Institute, Sweden.
- Birgitta Szanday. 1997. Kandidatundersøkelsen. NIFU - Norsk institutt for studier av forskning og utdanning.

Other useful material:

- Birkelund, G.E., P. Gooderham, O. Nordhaug & K. Ringdal. 2000. "Sosial bakgrunn, kjønn, studiested, og jobbverdier hos sivilokonomstudenter". Paper presented at FIBE XVII.
- Kjempekjenn, T., M. Venemyr, M. Lille-Mæhlum. 1996. Næringslivslederes utdanning og eierposisjon i Agder. Diplomoppgave ved Handelshøyskolen BI.

- Mardal, J.K. 1998. Siviløkonomer; karriere og nytte av studiet. Diplomoppgave ved Handelshøyskolen BI.
- Opheim, V. 1999. Rekruttering til sivilingeniørstudiet. Endring eller stabilitet? Hovedfagsoppgave, Cand.polit. Institutt for sosiologi og samfunnsgeografi, Universitetet i Oslo.
- Rystad, J. 1995. Mellom fakta og fiksjon. Kvalifisering og tilpasning i sivilingeniørutdanningen. Doktor ingeniøravhandling, Institutt for organisasjons-og arbeidslivserfaring, NTNU.
- Skaalebraaten, J.O. 1996. Topplederundersøkelsen. Sivilingeniører tilbake i lederstillinger. NIF.

## Appendix 2: Interview Guide

### *Information about the project*

What the research problem is: How might educational background influence the development of managerial competence?

### *Background*

The relationship to previous studies of managers and their management competence. Part of the Creation of European Management Practice (CEMP) project.

A clarification of the major roles of the participants in the exploratory study.

What I have planned to do: exploratory study with review of secondary data sources; investigate the social, political and economic roles of Norwegian School of Economics and Business Administration (NHH) and Norwegian University of Technology and Science (NTNU) in the Norwegian society; analyses of the content of the two educational programs; in-depth study of six managers; and a validating survey study including members of the *Norske Siviløkonomers Forening* (NSF) and the *Norske Sivilingeniørers Forening* (NIF) who are currently in management positions.

### *Research model*

Make it clear for the interviewees the type of information that I am looking for. Basically I want to investigate if any types of management ideas are created during education and if this had had any influence on the development of their management competence. Show the interviewees the conceptual model.

### *Background information*

Ask the interviewees if it is possible to have a copy of their CV.

Map: Age, educational background, post-qualifying education, postgraduate studies, membership in different type of organizations, leisure activities, type of work experience (career development). Ask the interviewees why they changed jobs.

### *Management knowledge*

What type management positions have you held?

Use Mintzbergs 10 roles as a starting point for the discussion (foil):

- How do you fill these different roles?
- Where do you get the knowledge that makes you capable of filling these roles?
- Are any of the roles irrelevant for you? Why?

What do you expect from a manager? What are the most important qualities of a manager?

What type(s) of event(s) have had a profound influence on you as manager? Have you any opinions why?

Have you changed your view on management and the manager's roles in the organization throughout your career? If so, what have been the causes for this/these change(s)?

#### *Management ideas created during education*

Begin with a clarification of the relationship between knowledge, skills and aptitudes (slide). What I especially want you to focus on is management ideas created during education, how these ideas have influenced your knowledge about management, and how they have influenced the development of your managerial skills and aptitudes.

What are the reasons for your educational choices? Would you have chosen the same education today? If not, what other alternatives would have been more appropriate for you?

What do you consider your most important sources for management knowledge - books, articles, etc about management, practical development of managerial skills (on-the-job), or aptitudes (personality) (in percentages)?

Was there something that you learned during education that influenced you in a fundamental way?

What type of knowledge achieved during education have you found particularly useful in management position?

What type of knowledge did the curriculum at your educational institution lack related to the managerial function? In what way and through which sources have you got access to this knowledge later on in your career?

Can you today recall any of the knowledge that you achieved during education? Do you use any of the knowledge achieved during education actively today?

Does educational background matter when you hire a manager? If yes, why? If no, why not?

#### *Values, beliefs, attitudes*

Examples of values:

- *Collectivism*: To value the wholeness of humankind and of social systems; regard and respect for all people.
- *Duty*: To value the integrity of reciprocal relationships; obligation and loyalty.
- *Rationality*: To value fact-based, emotion-free decisions and actions.
- *Novelty*: To value change, the new, the different.
- *Materialism*: To value wealth and tangible possessions.
- *Power*: To value control of situations and people.

What values and attitudes do you prioritize?

- For yourself?
- Among your followers?
- Among your competitors?

Do you think that your educational background has influenced any of your values and attitudes?

Has your educational background in one way or other influenced you as an individual?

#### *Personal networks*

Do you have any professional contact with:

- some of your fellow students, and/or
- people with the same educational background as yourself?

Do you have any informal, social contact with some of your fellow students?

What kind of networks do you have, and where have you got to know these individuals?



## Appendix 3: Questionnaire<sup>71</sup>

### ***Utdanning, Arbeidserfaring og Lederkompetanse***

#### ***Et forskningsprosjekt om hvordan lederes erfaringsbakgrunn samvarierer med deres lederkompetanse***

Gjennomført av

**Ragnhild Kvålshaugen, Handelshøyskolen BI  
i samarbeid med**

**Norske Sivilingeniørers Forening (NIF) og Norske  
Siviløkonomers Forening (NSF)**

#### **ORIENTERING OG INSTRUKSJONER**

- Denne undersøkelsen har som formål å belyse hvorvidt det finnes sammenhenger mellom lederes erfaringsbakgrunn og deres lederkompetanse. Studien, som omfatter siviløkonomer og sivilingeniører, vil undersøke om det er forskjeller mellom disse to gruppene når det gjelder ulike måter å opptre som ledere. Tidligere studier gir grunnlag for å anta at det eksisterer sammenhenger mellom lederes atferd og deres erfaringsbakgrunn. Denne studien har som mål å undersøke denne sammenhengen nærmere. Metodene som benyttes for å kartlegge lederkompetanse i denne undersøkelsen, er vel utprøvde og solid forankret innen internasjonal forskning.
- Undersøkelsen sendes til 1200 ledere som er medlemmer av NIF og NSF, som arbeider i privat sektor og som enten har utdanning som sivilingeniør fra Norges Tekniske Høgskole (NTH) / Norges Teknisk-

---

<sup>71</sup> The questionnaire has a slightly different layout as presented here compared to the original. The reason is the layout format of this dissertation. In addition, only one of the questionnaires is presented in its entire version. The part of the *siviløkonom* questionnaire presented here is the section that was different from the *sivilingeniør* questionnaire.

Naturvitenskaplig Universitet (NTNU), eller som siviløkonom fra Norges Handelshøyskole eller Handelshøyskolen BI.

- Alle spørreskjema håndteres konfidensielt. Dataregisteret basert på svarene som gis er underlagt konsesjonsplikt, og de innleverte dataene håndteres etter Lov om personregistre. I de endelige analysene vil svarene som er gitt analyseres under ett slik at det ikke er mulig å spore enkelt svar.
- Resultater fra undersøkelsen vil bli omtalt i Sivilingeniøren og Ajour.
- Vær vennlig og fyll ut spørreskjemaet i henhold til de instruksjoner som gis underveis. En hovedregel er at det som faller deg først inn ofte er det du bør svare.
- Det tar ca. 30 minutter å fylle ut spørreskjemaet.
- Når skjemaet er ferdig utfyllt, vær vennlig å returnere det i den vedlagte frankerte svarkonvolutt innen **15.06.99**. Om du har mistet konvolutt, vær vennlig å returnere skjemaet til:  
Ragnhild Kvalshaugen  
Handelshøyskolen BI  
Postboks 580  
1301 SANDVIKA
- Dersom du har spørsmål angående undersøkelsen, ta gjerne kontakt på telefon 67557284 eller e-post: ragnhild.kvalshaugen@bi.no.

**I Demografiske karakteristika**

a) **Hva er din alder?**

\_\_\_\_\_

b) **Kjønn**

Kvinne	<input type="checkbox"/>
Mann	<input type="checkbox"/>

c) **Hva er din sivilstatus?**

*(Kryss av for riktig sivilstatus.)*

Gift	<input type="checkbox"/>
Samboende	<input type="checkbox"/>
Enslig	<input type="checkbox"/>
Skilt	<input type="checkbox"/>
Annet	<input type="checkbox"/>

d) **Hvilke typer frivillige organisasjoner er du aktiv medlem av?**

*(Kryss av for riktig(e) organisasjon(er). Du kan sette flere kryss.)*

Amnesty International	<input type="checkbox"/>
Den norske Frimurerlosjen/Odd Fellow	<input type="checkbox"/>
Faglige interesseorganisasjoner	<input type="checkbox"/>
Idrettsforening/-lag	<input type="checkbox"/>
Lokal interessegruppe, miljøgruppe o.l.	<input type="checkbox"/>
Lions	<input type="checkbox"/>
Musikkforening, korps, sangkor, teatergruppe o.l.	<input type="checkbox"/>
Politisk parti	<input type="checkbox"/>
Rotary	<input type="checkbox"/>
Røde Kors, helselag, sanitetsforening o.l.	<input type="checkbox"/>
Velforening	<input type="checkbox"/>
Andre	<input type="checkbox"/>

**Andre organisasjoner du er medlem av:**

\_\_\_\_\_

\_\_\_\_\_

## 2 Utdanning

a) Hvilket år ble du uteksaminert fra NTH / NTNU som sivilingeniør?

\_\_\_\_\_

b) Hvilken spesialiseringsretning har du fra sivilingeniørstudiet?

(Kryss av for riktig spesialiseringsretning.)

Bygg- og miljøteknikk	
Datateknikk	
Elektronikk	
Energi og miljø	
Fysikk og matematikk	
Geofag og petroleumsteknologi	
Kjemi	
Marinteknikk	
Produktutvikling og produksjon	
Materialteknologi	
Teknisk design	
Teknisk kybernetikk	
Industriell økonomi og teknologiledelse	
Kommunikasjonsteknologi	
Nautikk studiet maritim kandidat	
Annet	

Ved annet, oppgi spesialisering:

\_\_\_\_\_

c) **Hvilken annen gradsutdanning har du foruten sivilingeniørstudiet?**

(Kryss av for riktig(e) alternativ(er). Du kan sette flere kryss.)

Ingen	
Siviløkonom	
Befalsutdanning/Krigsskole	
Master of Business Administration (MBA)	
Annen mastergrad	
Candidate juridicum (cand. jur.)	
Candidate politicum (cand.polit.)	
Høyere avdeling NHH	
Doktor ingeniør (dr.ing)	
Doctor Oeconoamiae (dr.oecon)	
Doctor Scientarum (dr.scient)	
Doctor philsoficum (dr.philos)	
Bedriftsøkonom	
Annen	

**Ved kryss for annen, oppgi type utdanning:**

\_\_\_\_\_

d) **Hvilke andre utdanningsalternativer vurderte du da du valgte sivilingeniørutdanningen?**

(Kryss av for riktig alternativ. Du kan sette flere kryss.)

Ingen andre	
Siviløkonom	
Juridisk embetseksamen	
Samfunnsvitenskapelig studier	
Filologi	
Naturvitenskapelige studier	
Medisinstudier	
Annet	
Studier i utlandet	

**Ved annet, hvilke annet/andre alternativ(er) hadde du?** \_\_\_\_\_

e) **Har du gjennomgått noen form for lederopplæring?**

*(Kryss av for riktig alternativ.)*

Ja	
Nei	
Vet ikke	

**Hvis ja, hva slags kurs har du vært deltaker i?**

*(Sett riktig antall kurs, for eksempel hvis du har deltatt på 3 korte bedriftsinterne kurs medfører det at tallet 3 skal stå i feltet bedriftsinterne, korte. Har du imidlertid gjennomført et eksternt kurs som har 4 samlinger over et år, setter du tallet 1 i feltet eksterne, lengre.)*

**Arrangør**

<b>Lengde på programmet</b>	<b>Bedriftsinterne</b>	<b>Eksterne</b>
Korte (2-3 dager)		
Middels (inntil 1 måned)		
Lengre (inntil 1 år)		

### 3 Arbeidserfaring

a) **Hva er din nåværende stilling?**

\_\_\_\_\_

b) **Hva er din nåværende arbeidsinntekt (uten bonusordninger og øvrige frynsegoder)?**

(Kryss av for riktig inntektsintervall.)

under kr 300.000	
kr 300.000 – 450.000	
kr 451.000 – 600.000	
kr 601.000 – 750.000	
kr 751.000 – 900.000	
kr 901.000 – 1.050.000	
kr 1.051.000 – 1.200.000	
over kr 1.200.000	

c) **Karrierevei**

**Instruksjon:**

*Her ber jeg deg beskrive din karrierevei.*

*Jeg ønsker at du skal oppgi stillingsstittel, antall år i den angitte stilling, bransje, størrelse på den bedriften du var/er ansatt i og hvorvidt den nye stillingen var et internt opprykk eller ei. Stillingstittel og antall år i denne stillingen oppgis direkte. For å lette utfyllingen har jeg laget noen predefinerte koder for bransje og størrelse på bedrift. Vær vennlig å bruk disse ved utfylling. Hvis den nye stillingen har vært et internt opprykk fra foregående stilling, vær vennlig å sette ett kryss i kolonnen "internt opprykk". Ved ny ekstern stilling lar du denne kolonnen stå åpen.*

*Hvis det ikke er tilstrekkelig med predefinerte rubrikker for utfylling (dvs. at du har hatt flere enn 8 stillinger), vær vennlig å notere ytterligere stillingsbeskrivelser i slutten av spørreskjemaet etter samme mønster som de predefinerte rubrikkene. Den siste stillingen du beskriver er din nåværende stilling.*

*Bytte av stilling skjer ved internt opprykk eller ny arbeidsgiver. Ved internt opprykk hos samme arbeidsgiver, ved bytte av arbeidsgiver på nytt stillingsnivå og ved bytte av arbeidsgiver på samme stillingsnivå skal du fylle ut en ny rubrikk i spørreskjemaet.*

**Bransjer**

Type bransje	Kode
Bank og finansvirksomhet	1
Bygge- og anleggsvirksomhet	2
Farmasøytiske produkter	3
Forskning og undervisning	4
Industri ellers	5
Informasjonsteknologi	6
Ikke-jernholdige metaller	7
Organisasjon- og ledelseskonsulent	8
Kjemiske råvarer og kjemisk/tekniske prod.	9
Kraft- og vannforsyning	10
Jern, stål og ferrolegeringer	11
Markedsføring og reklame	12
Media og forlag	13
Næringsmidler	14
Oljeutvinning og bergverksdrift	15

Type bransje	Kode
Rådgivende ingeniør	16
Transport, lagring og post	17
Varehandel, hotell- og restaurantvirksomhet	18
Annen forretningsmessig tjenesteyting	19
Offentlig sektor (stat og kommune)	20
Annen	21

**Størrelse på bedrift**

Størrelse	Kode
Liten (0-19 ansatte)	L
Mellomstor (20-99 ansatte)	M
Stor 1 (100-299 ansatte)	S1
Stor 2 (300-599 ansatte)	S2
Stor 3 (over 600 ansatte)	S3

1. stilling	Antall år ansatt	Bransje	Størrelse på bedrift

2. stilling	Antall år ansatt	Bransje	Størrelse på bedrift	Internt opprykk

3. stilling	Antall år ansatt	Bransje	Størrelse på bedrift	Internt opprykk

<b>4. stilling</b>	<b>Antall år ansatt</b>	<b>Bransje</b>	<b>Størrelse på bedrift</b>	<b>Internt opprykk</b>

<b>5. stilling</b>	<b>Antall år ansatt</b>	<b>Bransje</b>	<b>Størrelse på bedrift</b>	<b>Internt opprykk</b>

<b>6. stilling</b>	<b>Antall år ansatt</b>	<b>Bransje</b>	<b>Størrelse på bedrift</b>	<b>Internt opprykk</b>

<b>7. stilling</b>	<b>Antall år ansatt</b>	<b>Bransje</b>	<b>Størrelse på bedrift</b>	<b>Internt opprykk</b>

<b>8. stilling</b>	<b>Antall år ansatt</b>	<b>Bransje</b>	<b>Størrelse på bedrift</b>	<b>Internt opprykk</b>

- d) **Oppgi antall års arbeidserfaring i henholdsvis linje- og stabsfunksjoner før du fikk din første lederstilling.**  
*(Du kan sette ett kryss for linjefunksjon og ett kryss for stabsfunksjon.)*

<b>Antall år</b>	<b>Linje</b>	<b>Stab</b>
0-2 år		
2-4 år		
4-6 år		
6-8 år		
8-10 år		
10-12 år		
mer enn 12 år		

- e) **Hvor mange stillinger hadde du før du ble leder?**  
*(Oppgi antall stillinger.)*

\_\_\_\_\_

- f) **Hvor mange år var du i bedriften før du ble forfremmet til din første lederstilling?**  
*(Oppgi antall år.)*

\_\_\_\_\_

## 4 Lederkompetanse

### a) Problemløsningsstil

#### Instruksjon:

Når vi arbeider med å løse problemer, enten det er i arbeid, utdanning eller fritid, har vi alle ulike måter å gå frem på. Noen har en tendens til å holde seg til en bestemt måte når de løser problemer, mens andre foretrekker en annen fremgangsmåte. Andre igjen kombinerer eller varierer i større grad ulike måter å gå frem på. I tillegg foretrekker folk ofte ulike typer arbeid, oppgaver og situasjoner. Når du skal svare på spørsmålene under, prøv å tenke deg hvordan du **pleier** å gå frem når du løser problemer i arbeidssituasjonen. Vurder også hvilke situasjoner du **liker best**. Du skal altså vurdere om hver av setningene nedenfor **MEST TYPISK** eller **TIL VANLIG** beskriver den måte du går frem i problemløsning, eller hvilke typer situasjoner du vanligvis liker best. Sett en sirkel rundt det **ene** tallet som står i den kolonnen som passer **best** for deg. Du skal besvare alle spørsmålene.

	Stemmer svært dårlig	Stemmer dårlig	Nøytral	Stemmer godt	Stemmer svært godt
1. Jeg blir aldri sint når jeg står fast	1	2	3	4	5
2. Jeg foretrekker detaljarbeid som krever god orden	1	2	3	4	5
3. Jeg foretrekker situasjoner hvor en må holde seg til det som gjelder	1	2	3	4	5
4. Jeg liker best å arbeide uten å ha en på forhånd fastsatt plan	1	2	3	4	5
5. Jeg prøver meg ofte frem uten å planlegge systematisk	1	2	3	4	5
6. Jeg er alltid ærlig når jeg avgir svar	1	2	3	4	5
7. Jeg foretrekker å holde meg til det jeg kan godt	1	2	3	4	5
8. Jeg prøver oftest å finne nye løsningsmetoder når jeg løser problemer	1	2	3	4	5
9. Jeg foretrekker å arbeide uten å ha klare retningslinjer å holde meg til	1	2	3	4	5
10. Jeg liker godt situasjoner hvor det er nødvendig å bryte med aksepterte oppfatninger	1	2	3	4	5
11. Jeg foretrekker å unngå større forandringer	1	2	3	4	5
12. Jeg kommer best til min rett i situasjoner som er ordnede og oversiktlige	1	2	3	4	5

13. Jeg foretrekker situasjoner hvor en må arbeide etter bestemte regler	1	2	3	4	5
14. Jeg vil helst finne ut av ting på egen hånd når jeg skal lære noe nytt	1	2	3	4	5
15. Det har aldri hendt at jeg har gjort større tabber når jeg løser problemer	1	2	3	4	5
16. Jeg foretrekker å planlegge og strukturere det jeg skal gjøre	1	2	3	4	5
17. Jeg egner meg best til arbeid som krever systematikk og nøyaktighet	1	2	3	4	5
18. Jeg har oftest en lekende og nysgjerrig innstilling i arbeidet	1	2	3	4	5
19. Jeg foretrekker å improvisere i forhold til mine gjøremål	1	2	3	4	5
20. Jeg foretrekker arbeid med faste rutiner	1	2	3	4	5
21. Jeg sprudler av ideer når jeg løser problemer	1	2	3	4	5
22. Jeg liker best situasjoner hvor en må gå på tvers av etablerte normer	1	2	3	4	5
23. Jeg liker best å arbeide med ting jeg ikke kjenner så godt fra før	1	2	3	4	5
24. Jeg foretrekker å ha klare retningslinjer å holde meg til i arbeidet	1	2	3	4	5
25. Jeg vil helst ha systematisk veiledning når jeg skal lære noe nytt	1	2	3	4	5
26. Det har aldri hendt at jeg har jukset	1	2	3	4	5
27. Jeg er utpreget nøyaktig og oppgaveorientert i arbeidet	1	2	3	4	5
28. Jeg liker situasjoner hvor en aktivt må søke ny kunnskap	1	2	3	4	5
29. Jeg holder meg stort sett til aksepterte oppfatninger	1	2	3	4	5
30. Jeg kommer best til min rett i uoversiktlige situasjoner	1	2	3	4	5
31. Jeg foretrekker å holde meg til en fastsatt plan når jeg arbeider eller løser problemer	1	2	3	4	5
32. Jeg kan forandre mine oppfatninger/ideer selv om situasjonen ikke krever det	1	2	3	4	5
33. Jeg prøver oftest å bruke velprøvde løsningsmetoder når jeg løser problemer	1	2	3	4	5
34. Jeg liker best å utforske nytt terreng	1	2	3	4	5

**b) Lederatferd**

**Instruksjon:**

Spørsmålene under skal belyse hvordan du utøver din jobb som leder. Det er ingen "riktige eller gale" svar fordi vi regner med at ulike typer lederatferd er gunstig i ulike typer av organisasjoner og i ulike situasjoner. Prøv å svare på spørsmålene slik at svarene dine **også** gjenspeiler hvordan andre vil vurdere deg, og altså ikke nødvendigvis slik du helst **ønsker** å fremstå i jobben som leder.

Les hver påstand nøye og sett en sirkel rundt det ene tallet som er mest representativt for din lederatferd. Bruk skjønn når du vurderer hvor ofte du viser de aktuelle former for atferd i forhold til hvor ofte det er aktuelt eller mulig å vise denne form for atferd. Dersom du aldri viser den form for atferd som det er spørsmål om, setter du en sirkel rundt "Aldri" (1). Dersom du bestandig viser den type atferd som det er spørsmål om, setter du en sirkel rundt "Bestendig" (5). Dersom du viser den type atferd det spørsmål om henholdsvis sjelden, av og til, eller ofte, setter du en sirkel rundt enten "Sjelden"(2), "Av og til" (3), eller "Ofte"(4). Du setter **en sirkel for hver påstand**.

Aldri Sjelden Av og til Ofte Bestendig

1. Jeg setter enkeltsaker inn i en større sammenheng	1	2	3	4	5
2. Jeg sørger for at målene er klare for mine medarbeidere	1	2	3	4	5
3. Jeg sørger for at det ikke er tvil om at jeg er sjefen	1	2	3	4	5
4. Jeg lytter til medarbeiderne uten å avbryte	1	2	3	4	5
5. Jeg viser handlekraft i jobben som leder	1	2	3	4	5
6. Jeg oppnår målbare resultater i jobben som leder	1	2	3	4	5
7. Jeg ser saker i fugleperspektiv	1	2	3	4	5
8. Jeg viser at jeg er opptatt av mål og resultater	1	2	3	4	5
9. Jeg viser at jeg liker å bestemme over andre	1	2	3	4	5
10. I teamarbeid fremhever jeg den enkeltes kompetanse	1	2	3	4	5

11. Jeg klarer å gjennomføre mine oppgaver i tide	1	2	3	4	5
12. Mine overordnede vil hevde at jeg er en dyktig leder	1	2	3	4	5
13. Jeg formulerer helt nye målsettinger	1	2	3	4	5
14. Jeg uttrykker klare forventninger til andre	1	2	3	4	5
15. Jeg gir mine egne målsettinger forrang fremfor andres	1	2	3	4	5
16. Jeg viser at jeg bryr meg om mine medarbeidere som enkeltpersoner	1	2	3	4	5
17. Jeg står i mot press fra andre	1	2	3	4	5
18. Det er konflikter blant mine medarbeidere	1	2	3	4	5
19. Jeg formulerer helt nye strategier	1	2	3	4	5
20. Jeg gjør det klart hva som er mine medarbeideres oppgaver	1	2	3	4	5
21. Jeg innrømmer lett feil	1	2	3	4	5
22. Jeg bidrar til at mine medarbeidere kan utvikle seg i den retning de ønsker	1	2	3	4	5
23. Jeg tar upopulære avgjørelser når situasjonen krever det	1	2	3	4	5
24. Mine medarbeidere trives på jobben	1	2	3	4	5
25. Jeg formulerer nye fremtidsvisjoner	1	2	3	4	5
26. Jeg klargjør hvordan strategier kan følges i praktisk arbeid	1	2	3	4	5
27. Jeg viser tydelig at det er svært viktig for meg å vinne diskusjoner	1	2	3	4	5
28. Jeg hjelper medlemmene i en gruppe til å spille på hverandre	1	2	3	4	5
29. Jeg tar opp problemer med folk når det er nødvendig	1	2	3	4	5
30. Mine medarbeidere protesterer mot å jobbe overtid	1	2	3	4	5
31. Jeg viser vilje til å prøve utradisjonelle løsninger	1	2	3	4	5
32. Jeg klargjør hvordan mål kan nås	1	2	3	4	5
33. Jeg er opptatt av å få min vilje igjennom	1	2	3	4	5
34. Jeg utnytter mangfoldet i gruppen	1	2	3	4	5

35. Jeg viker ikke unna konflikter	1	2	3	4	5
36. Mine medarbeidere ser opp til meg	1	2	3	4	5
37. Jeg får i stand forandringer	1	2	3	4	5
38. Jeg sjekker aktivt at alle utfører de oppgaver de har fått	1	2	3	4	5
39. Jeg er opptatt av å fremstå som overbevisende	1	2	3	4	5
40. Jeg delegerer oppgaver til mine medarbeidere	1	2	3	4	5
41. Jeg bruker lang tid på å ta beslutninger	1	2	3	4	5
42. Jeg oppnår ikke resultater i jobben som leder	1	2	3	4	5
43. Jeg er orientert mot kunder og marked	1	2	3	4	5
44. Jeg kontrollerer at medarbeiderne overholder tidsfrister	1	2	3	4	5
45. Jeg viser at jeg er lederen	1	2	3	4	5
46. Jeg gir mine medarbeidere ansvar for viktige oppgaver	1	2	3	4	5
47. Jeg viser mot i beslutningssituasjoner	1	2	3	4	5
48. Det er høyt sykefravær blant mine medarbeidere	1	2	3	4	5
49. Jeg reagerer raskt på endringer i markedet	1	2	3	4	5
50. Jeg overvåker fremdriften i folks arbeid	1	2	3	4	5
51. Jeg går inn for å overbevis andre	1	2	3	4	5
52. Jeg gir ris og ros når det er fortjent	1	2	3	4	5
53. Jeg vegrer meg for å gripe inn når noe går galt	1	2	3	4	5
54. Jeg får ros for min dyktighet	1	2	3	4	5
55. Jeg setter i gang nye prosjekter	1	2	3	4	5
56. Jeg følger opp den enkeltes innsats	1	2	3	4	5
57. Jeg ser helst at andre føyer seg	1	2	3	4	5
58. Jeg belønner handlinger som bringer oss dit vi skal	1	2	3	4	5
59. Jeg unngår å gripe inn i problematiske saker	1	2	3	4	5
60. Jeg får belønninger (forfremmelse, lønnsøkning) for min dyktighet	1	2	3	4	5

**c) Om din nåværende arbeidsgiver**

	Passer ikke		Usikker		Passer godt
1. I min organisasjon vier vi svært stor oppmerksomhet til de ansattes behov	1	2	3	4	5
2. I min organisasjon vier vi svært stor oppmerksomhet til innovasjon og kreativitet	1	2	3	4	5
3. I min organisasjon er miljøet preget av maktkamper og konflikter	1	2	3	4	5
4. I min organisasjon vier vi svært stor oppmerksomhet til målstyring og resultatmåling	1	2	3	4	5
5. I min organisasjon er vi orientert mot å legge ansvar på enkeltledere fremfor team	1	2	3	4	5

*Tusen takk for hjelpen!*

*Vennligst returner skjemaet i den vedlagte frankerte svarkonvolutten.*

## Educational background section - the *siviløkonom* questionnaire

### 2 Utdanning

- a) Hvilket år ble du uteksaminert fra Norges Handelshøyskole (NHH) eller Handelshøyskolen BI som siviløkonom?

\_\_\_\_\_

- b) Hvor har du din siviløkonomutdanning fra?  
(Kryss av for riktig alternativ.)

Handelshøyskolen BI	<input type="checkbox"/>
Norges Handelshøyskole (NHH)	<input type="checkbox"/>

- c) Hvilken annen gradsutdanning har du foruten siviløkonomstudiet?  
(Kryss av for riktig(e) alternativ(er). Du kan sette flere kryss.)

Ingen	<input type="checkbox"/>
Sivilingeniør	<input type="checkbox"/>
Befalsutdanning/Krigsskole	<input type="checkbox"/>
Master of Business Administration (MBA)	<input type="checkbox"/>
Annen mastergrad	<input type="checkbox"/>
Candidate juridicum (cand. jur.)	<input type="checkbox"/>
Candidate politicum (cand.polit.)	<input type="checkbox"/>
Høyere avdeling NHH	<input type="checkbox"/>
Doktor ingeniør (dr.ing)	<input type="checkbox"/>
Doctor Oeconoamiae (dr.oecon)	<input type="checkbox"/>
Doctor Scientarum (dr.scient)	<input type="checkbox"/>
Doctor philosophicum (dr.philos)	<input type="checkbox"/>
Bedriftsøkonom	<input type="checkbox"/>
Annen	<input type="checkbox"/>

Ved kryss for annen, oppgi type gradsutdanning:

\_\_\_\_\_  
\_\_\_\_\_

d) **Hvilke andre utdanningsalternativer vurderte du da du valgte siviløkonomutdanningen?**

(Kryss av for riktig alternativ. Du kan sette flere kryss.)

Ingen andre	
Sivilingeniør	
Juridisk embetseksamen	
Samfunnsvitenskapelig studier	
Filologi	
Naturvitenskapelige studier	
Medisinstudier	
Annet	
Studier i utlandet	

Ved annet, hvilke annet/andre alternativ(er) hadde du:

---

e) **Har du gjennomgått noen form for lederopplæring?**

(Kryss av for riktig alternativ.)

Ja	
Nei	
Vet ikke	

**Hvis ja, hva slags type kurs har du vært deltaker i?**

(Sett riktig antall kurs, for eksempel hvis du har deltatt på 3 korte bedriftsinterne kurs medfører det at tallet 3 skal stå i feltet bedriftsinterne, korte. Har du imidlertid gjennomført et eksternt kurs som har 4 samlinger over et år, setter du tallet 1 i feltet eksterne, lengre.)

Lengde på programmet	Arrangør	
	Bedriftsinterne	Eksterne
Korte (2-3 dager)		
Middels (inntil 1 måned)		
Lengre (inntil 1 år)		



## Appendix 4: Computer Print Outs

Table I: Problem solving strategies, PCA with promax rotation

Items	Factors					
	1	2	3	4	5	6
17. I am best suited for work which requires precision and a systematic approach.	<b>.78</b>	.21	.40	.34	.38	.27
2. I prefer detailed work which requires neatness and precision.	<b>.74</b>	.21	.11	.37	.34	.14
27. I am exceptionally precise and task-oriented in my work.	<b>.66</b>	.08	.41	.24	.25	.22
20. I prefer work with set routines.	<b>.63</b>	.34	-.01	.58	.50	.21
18. I most often adopt a playful and curiosity driven approach to my work.	.29	<b>.75</b>	.14	.25	.36	.14
21. I bubble with ideas when I am solving problems.	.27	<b>.74</b>	.06	.39	.34	.04
8. When trying to solve a problem, I most often try to find new means of doing so.	.02	<b>.66</b>	.15	.36	.18	.19
34. I most like to investigate uncharted territory.	.34	<b>.62</b>	.14	.48	.56	.26
28. I like situations in which you have to seek new knowledge actively.	.07	.53	-.17	.21	.50	.19
16. I prefer to plan and structure what I am to do.	.32	.09	<b>.78</b>	.09	.17	.15
5. I often try things out without planning systematically.	.14	.18	<b>.74</b>	.32	.08	.12
31. I prefer to stick to a set plan when working or solving problems.	.40	.14	<b>.63</b>	.39	.36	.42
4. I like best to work without a prearranged plan.	.14	.10	<b>.61</b>	.50	.24	.15
19. I prefer to improvise in what I do.	.29	.53	.53	.40	.24	.28
10. I quite like situations in which it is necessary to break with conventional wisdom.	.25	.50	.14	<b>.74</b>	.44	.09
9. I prefer working without any clear guidelines.	.33	.23	.38	<b>.74</b>	.33	.26
24. I prefer to have clear guidelines to stick to in work.	.53	.22	.22	<b>.72</b>	.46	.45
22. I most like situations in which you have to violate established norms.	.26	.54	.20	<b>.69</b>	.31	.09
13. I prefer situations in which you have to work according to specific rules.	.64	.24	.19	.68	.59	.27
3. I prefer situations in which you have to stick to options that are tried and true.	.48	.14	.06	.50	.47	.18
7. I prefer to stick to what I know well.	.29	.11	.16	.25	<b>.72</b>	.21
12. I work best in situations which are clear and straightforward.	.61	.30	.09	.52	.66	.25
30. I work best in complex situations.	.36	.32	.06	.45	<b>.60</b>	.04
23. I most like to work with things I am not too familiar with.	.25	.34	.21	.41	<b>.59</b>	.11
11. I prefer to avoid major changes.	.25	.38	-.01	.33	<b>.57</b>	.14
29. I mostly stick to accepted ideas.	.43	.41	.05	.45	.48	.22
25. I prefer to have systematic instruction when learning something new.	.29	.14	.25	.38	.44	<b>.64</b>
14. I prefer to figure things out on my own when I am learning something new.	-.18	.27	.37	.24	-.07	<b>.53</b>
33. I most often try to use well-tried methods for solving problems.	.35	.32	.27	.41	.46	.50
32. I can change my opinions/ideas even if the situation does not require it.	-.07	.11	.24	.22	.10	-.48
<b>Eigenvalue</b>	<b>8.38</b>	<b>2.35</b>	<b>1.88</b>	<b>1.22</b>	<b>1.16</b>	<b>1.08</b>
<b>% of variance</b>	<b>27.9</b>	<b>7.8</b>	<b>6.3</b>	<b>4.1</b>	<b>3.9</b>	<b>3.6</b>
<b>Coefficient alpha</b>	<b>.76</b>	<b>.72</b>	<b>.73</b>	<b>.76</b>	<b>.63</b>	<b>.28</b>

Figure 1: Scree plot problem solving strategies

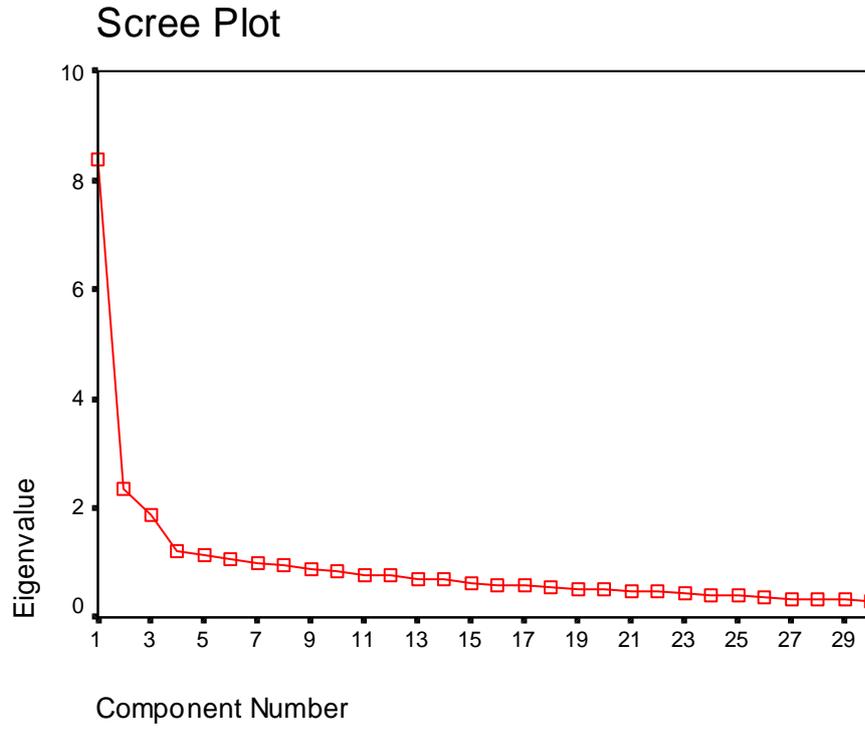


Table II: Problem solving strategies, PCA with promax rotation

<b>Components</b>				
<b>Items</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Structure seeking</b>				
13. I prefer situations in which you have to work according to specific rules.	<b>.79</b>	.37	.32	.36
12. I work best in situations which are clear and straightforward.	<b>.73</b>	.45	.23	.18
20. I prefer work with set routines.	<b>.71</b>	.42	.15	.30
24. I prefer to have clear guidelines to stick to in work.	<b>.70</b>	.35	.37	.38
17. I am best suited for work which requires precision and a systematic approach.	.68	.21	.54	.06
2. I prefer detailed work which requires neatness and precision.	<b>.65</b>	.20	.26	.13
3. I prefer situations in which you have to stick to options that are tried and true.	<b>.60</b>	.26	.16	.24
27. I am exceptionally precise and task-oriented in my work.	.54	.06	.52	.03
29. I mostly stick to accepted ideas.	.53	.48	.17	.23
30. I work best in complex situations.	.52	.45	.12	.27
33. I most often try to use well-tried methods for solving problems.	.48	.44	.40	.09
7. I prefer to stick to what I know well.	.48	.35	.22	-.07
25. I prefer to have systematic instruction when learning something new.	.45	.32	.39	-.03
<b>Novelty seeking</b>				
18. I most often adopt a playful and curiosity driven approach to my work.	.30	<b>.69</b>	.24	.18
34. I most like to investigate uncharted territory.	.50	<b>.69</b>	.25	.28
21. I bubble with ideas when I am solving problems.	.34	<b>.68</b>	.14	.38
28. I like situations in which you have to seek new knowledge actively.	.23	<b>.64</b>	-.08	.04
8. When trying to solve a problem, I most often try to find new means of doing so.	.14	<b>.61</b>	.20	.37
11. I prefer to avoid major changes.	.41	.51	.07	.13
23. I most like to work with things I am not too familiar with.	.44	.48	.25	.24
<b>Preference for structure</b>				
16. I prefer to plan and structure what I am to do.	.26	.05	<b>.77</b>	.05
5. I often try things out without planning systematically.	.20	.12	<b>.70</b>	.38
31. I prefer to stick to a set plan when working or solving problems.	.48	.21	<b>.69</b>	.15
19. I prefer to improvise in what I do.	.35	.47	<b>.60</b>	.34
4. I like best to work without a prearranged plan.	.32	.15	.59	.47
14. I prefer to figure things out on my own when I am learning something new.	-.04	.26	.41	.17
<b>Opposition for structure</b>				
10. I quite like situations in which it is necessary to break with conventional wisdom.	.50	.56	.20	<b>.66</b>
22. I most like situations in which you have to violate established norms.	.44	.53	.25	<b>.66</b>

<b>Components</b>				
<b>Items</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
9. I prefer working without any clear guidelines.	.54	.30	.44	.59
32. I can change my opinions/ideas even if the situation does not require it.	.03	.07	.10	.49
<b>Eigenvalues</b>	<b>5.59</b>	<b>1.80</b>	<b>1.54</b>	<b>0.96</b>
<b>% of variance</b>	<b>32.9</b>	<b>10.6</b>	<b>9.1</b>	<b>5.6</b>
<b>Coefficient alpha</b>	<b>.82</b>	<b>.74</b>	<b>.72</b>	<b>.73</b>

Table III: Chosen items problem solving strategies, PCA with promax rotation

<b>Components</b>				
<b>Items</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Structure seeking</b>				
13. I prefer situations in which you have to work according to specific rules.	<b>.78</b>	-.02	.09	.03
20. I prefer work with set routines.	<b>.73</b>	.17	-.12	.01
12. I work best in situations which are clear and straightforward.	<b>.68</b>	.15	.02	-.05
2. I prefer detailed work which requires neatness and precision.	<b>.67</b>	-.09	.02	.02
3. I prefer situations in which you have to stick to options that are tried and true.	<b>.66</b>	-.12	-.06	.13
24. I prefer to have clear guidelines to stick to in work.	<b>.66</b>	-.03	.12	.10
<b>Novelty seeking</b>				
28. I like situations in which you have to seek new knowledge actively.	.11	<b>.84</b>	-.23	-.25
18. I most often adopt a playful and curiosity driven approach to my work.	-.05	<b>.82</b>	.15	-.08
21. I bubble with ideas when I am solving problems.	-.02	<b>.54</b>	-.02	.33
8. When trying to solve a problem, I most often try to find new means of doing so.	-.27	<b>.52</b>	.06	.36
34. I most like to investigate uncharted territory.	.22	<b>.51</b>	.02	.14
<b>Preference for structure</b>				
16. I prefer to plan and structure what I am to do.	.00	-.02	<b>.89</b>	-.22
5. I often try things out without planning systematically.	-.11	-.11	<b>.75</b>	.16
31. I prefer to stick to a set plan when working or solving problems.	.29	-.03	<b>.65</b>	-.09
19. I prefer to improvise in what I do.	-.04	.28	<b>.55</b>	.14
<b>Opposition for structure</b>				
22. I most like situations in which you have to violate established norms.	.08	-.09	-.02	<b>.89</b>
10. I quite like situations in which it is necessary to break with conventional wisdom.	.18	.01	-.09	<b>.75</b>

Figure II: Scree plot, managerial behavior (no factor constraints)

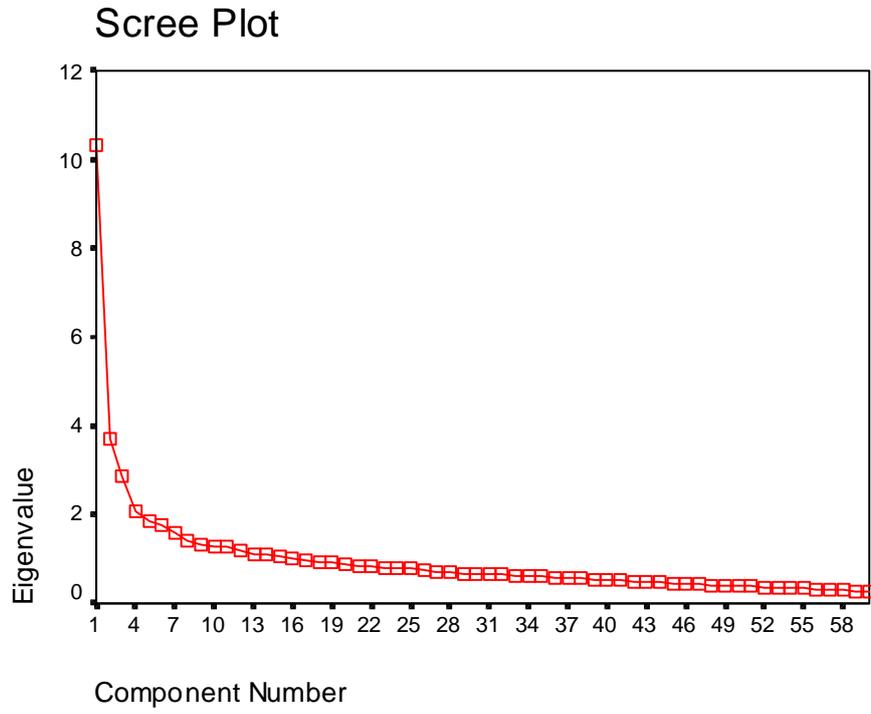


Table IV: Managerial behavior, PCA with varimax rotation

Components						
Items	1	2	3	4	5	6
<b>Entrepreneurial orientation</b>						
25. I formulate new visions.	<b>.73</b>	.08	.14	.07	.08	-.01
19. I formulate entire new strategies.	<b>.69</b>	.07	.06	.05	.12	-.03
13. I formulate entirely new objectives.	<b>.64</b>	.15	.07	.00	.05	.03
31. I show will to try untraditional solutions to problems.	<b>.63</b>	.27	-.02	-.09	.10	-.11
49. I react quickly to changes in the market place.	<b>.56</b>	.05	-.08	.25	.16	.17
55. I initiate new projects.	<b>.55</b>	.08	.17	.11	.14	.08
37. I create changes.	<b>.55</b>	.14	.16	.17	.14	.03
7. I see issues from a holistic perspective.	<b>.53</b>	.08	.03	.12	-.03	.02
43. I am oriented towards customers and markets.	.40	.06	-.07	.28	.18	.22
1. I see individual tasks in a larger context.	.38	.04	-.15	.15	.14	.08
26. I clarify how strategies can be implemented.	.36	.30	.04	.19	.17	.31
35. I do not avoid conflicts.	.23	.03	.00	.05	.14	-.06
<b>Relationship orientation</b>						
16. I show that I care about my subordinates as individuals.	.00	<b>.61</b>	-.05	.15	-.01	.04
10. In teamwork I emphasize each individuals' competence.	.16	<b>.55</b>	.02	.07	.14	-.01
28. I help the members of a team to cooperate.	.23	<b>.54</b>	-.06	.00	.15	.17
22. I allow my subordinates to develop in their own desirable direction.	.22	<b>.52</b>	.05	.17	.01	.00
34. I take advantage of group heterogeneity.	.28	<b>.52</b>	-.07	.08	.16	.07
52. I give praise as deserved.	.16	<b>.50</b>	.04	.10	.13	.19
21. I easily admit mistakes.	.03	-.41	.08	-.05	-.03	-.06
46. I give my subordinates responsibilities for important tasks.	.26	<b>.40</b>	.10	.26	.20	.04
40. I delegate tasks to my subordinates.	.22	.30	.04	.22	.22	.12
<b>Power orientation</b>						
9. It is obvious that I like to control others.	-.02	.02	<b>.71</b>	.10	.03	-.04
33. I am strong-willed.	.06	-.07	<b>.66</b>	.02	.12	.03
45. I show that I am the manager.	-.08	.11	<b>.65</b>	.15	.04	.19
27. I show that it is important for me to win discussions.	.15	-.19	<b>.62</b>	-.04	.01	.01
57. I want others to give in.	-.10	-.06	<b>.61</b>	-.09	-.20	.06
3. I make sure that no one doubts that I am in charge.	-.12	.21	.54	.18	.08	.14
51. My aim is to convince others.	.26	.04	<b>.47</b>	-.04	-.02	.18
39. I like to be perceived as being convincing.	.19	.05	<b>.46</b>	-.01	.04	.21
15. I give my goals priority before those of others.	.06	-.14	.39	-.05	.21	.01
4. I listen to my followers without interrupting them.	-.11	.34	-.38	.20	.07	.15

<b>Components</b>						
<b>Items</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Leadership effectiveness</b>						
12. My superiors claim that I am a gifted leader.	.20	.14	.16	<b>.63</b>	.10	.11
6. I achieve measurable results in my management role.	.28	.02	.11	<b>.54</b>	.26	.14
54. I get praise for my abilities.	.24	.12	.10	<b>.53</b>	-.20	.17
24. My followers enjoy themselves at work.	.10	.29	.02	<b>.52</b>	.09	-.12
11. I manage to complete my tasks on time.	-.01	-.05	.03	.51	.26	.25
36. My subordinates look up to me.	.22	.27	.17	<b>.48</b>	-.07	.01
42. I do not accomplish results as a manager.	.21	-.11	-.13	.42	.21	.09
30. My subordinates refuse working overtime.	-.14	.12	-.05	.40	.22	-.17
60. I get rewards (promotion, better salaries) for my abilities as a manager.	.31	.06	.07	.40	-.06	.20
48. There is high absence due to sickness among my subordinates.	.01	.18	-.05	.36	.08	-.10
2. I ensure that the goals are clarified for my subordinates.	.11	.27	.00	.30	.28	.29
18. There are conflicts among my subordinates.	-.04	.17	-.15	.25	.02	-.10
58. I reward actions that bring us to the goal.	.08	.19	-.05	.24	-.10	.03
<b>Action orientation</b>						
59. I avoid problematic cases.	.09	.19	.02	-.01	<b>.68</b>	.06
53. I decline taking action when something is wrong.	.11	.04	-.08	.03	<b>.65</b>	.00
29. I confront people with problems whenever it is necessary.	.17	.39	.02	.05	<b>.56</b>	.26
23. I make unpopular decisions when the situation requires it.	.24	.19	.17	.11	<b>.52</b>	.04
14. I express clear expectations towards others.	.20	.33	.16	.12	.43	.31
41. I spend extensive time on making decisions.	.19	-.12	-.05	.26	.41	-.02
17. I resist pressure from others.	.22	.12	.17	.13	.39	.16
5. I show drive in my work as a manager.	.29	.15	.27	.32	.35	.07
47. I show courage in decision-making situations.	.27	.26	.25	.23	.34	.09
<b>Task orientation</b>						
38. I control actively that everybody accomplishes his or her tasks.	-.05	.14	.16	-.05	.03	<b>.74</b>
50. I control the progress in people's work.	.06	-.02	.13	.02	-.04	<b>.69</b>
44. I control that my subordinates keep the schedule.	-.01	-.02	.10	-.04	.09	<b>.67</b>
56. I follow up each individual's achievements.	.01	.25	.02	.07	.03	<b>.64</b>
20. I make it clear what tasks my subordinates are going to do.	-.05	.31	.12	.12	.32	.40
32. I clarify how the objectives can be reached.	.28	.26	.04	.21	.18	.38
8. I ensure that the goals are clarified for my subordinates.	.18	.08	.10	.22	.27	.35
<b>Eigenvalues</b>	<b>6.84</b>	<b>3.25</b>	<b>2.36</b>	<b>1.60</b>	<b>1.38</b>	<b>1.72</b>
<b>% of variance</b>	<b>18.5</b>	<b>8.8</b>	<b>6.7</b>	<b>4.6</b>	<b>3.9</b>	<b>4.9</b>
<b>Coefficient alpha</b>	<b>.82</b>	<b>.74</b>	<b>.75</b>	<b>.71</b>	<b>.72</b>	<b>.75</b>

Table V: Chosen items managerial behavior, PCA with varimax rotation

Components						
Items	1	2	3	4	5	6
<b>Entrepreneurial orientation</b>						
25. I formulate new visions.	.77	.05	.09	.00	.14	.07
19. I formulate entire new strategies.	.76	.06	.04	-.01	.07	.09
13. I formulate entirely new objectives.	.70	.10	.02	.04	.08	.02
31. I show will to try untraditional solutions to problems.	.62	.37	-.01	-.08	-.11	.06
55. I initiate new projects.	.58	.10	.16	.12	.13	.13
37. I create changes.	.54	.17	.12	.01	.23	.13
49. I react quickly to changes in the market place.	.53	.15	-.12	.15	.22	.15
7. I see issues from a holistic perspective.	.48	.11	.06	-.04	.16	.03
<b>Relationship orientation</b>						
34. I take advantage of group heterogeneity.	.21	.65	-.07	.05	.09	.08
10. In teamwork I emphasize each individuals' competence.	.11	.62	.04	-.03	.05	.10
28. I help the members of a team to cooperate.	.18	.61	-.07	.16	.03	.08
16. I show that I care about my subordinates as individuals.	-.05	.60	-.09	.05	.19	.05
22. I allow my subordinates to develop in their own desirable direction.	.13	.58	.03	-.01	.19	-.01
52. I give praise as deserved.	.11	.53	.05	.14	.09	.21
46. I give my subordinates responsibilities for important tasks.	.21	.46	.09	.00	.23	.19
<b>Power orientation</b>						
33. I am strong-willed.	.05	-.05	.69	.00	.08	.13
9. It is obvious that I like to control others.	.00	-.01	.67	-.08	.17	.02
27. I show that it is important for me to win discussions.	.12	-.13	.67	-.02	-.02	.02
57. I want others to give in.	-.11	-.03	.65	.06	-.05	-.24
45. I show that I am the manager.	-.06	.03	.58	.22	.21	.05
51. My aim is to convince others.	.22	.10	.56	.16	-.05	-.02
39. I like to be perceived as being convincing.	.15	.06	.51	.21	-.02	.07
<b>Task orientation</b>						
38. I control actively that everybody accomplishes his or her tasks.	-.04	.10	.13	.78	.06	.07
44. I control that my subordinates keep the schedule.	.06	-.04	.08	.74	-.04	.09
50. I control the progress in people's work.	.07	.01	.14	.73	.08	-.05
56. I follow up each individual's achievements.	-.01	.24	.02	.65	.10	.06
<b>Leadership effectiveness</b>						
12. My superiors claim that I am a gifted leader.	.13	.11	.10	.05	.73	.15
54. I get praise for my abilities.	.16	.10	.05	.11	.64	-.10
36. My subordinates look up to me.	.18	.23	.10	.05	.57	-.01
6. I achieve measurable results in my management role.	.23	.06	.10	.08	.55	.25
24. My subordinates enjoy themselves at work.	.10	.27	-.07	-.06	.55	.05

<b>Components</b>						
<b>Items</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Action orientation</b>						
53. I decline taking action when something is wrong.	.10	.04	-.07	-.02	.04	<b>.76</b>
59. I avoid problematic cases.	.10	.18	.00	.09	.00	<b>.75</b>
29. I confront people with problems whenever it is necessary.	.13	.42	.06	.21	.05	<b>.60</b>
23. I make unpopular decisions when the situation requires it.	.22	.16	.14	.02	.20	<b>.57</b>

Table VI: Correlation matrix comparison of correlation among original variables and the factors developed from PCA

	<b>Entre</b>	<b>Relation</b>	<b>Power</b>	<b>Effect</b>	<b>Action</b>	<b>Task</b>
<b>Entre factor 1</b>	1.000 .976					
<b>Relation factor 2</b>	.430 .469	1.000 .913				
<b>Power factor 3</b>	.128 .129	-.044 -.021	1.000 .961			
<b>Effect factor 4</b>	.451 .464	.444 .437	.100 .187	1.000 .882		
<b>Action factor 5</b>	.496 .379	.424 .412	.158 .061	.480 .320	1.000 .841	
<b>Task factor 6</b>	.377 .129	.459 .185	.243 .238	.346 .154	.475 .200	1.000 .803

Table VII: Bivariate correlation, 4 factors problem solving strategy

	<b>Structure seeking</b>	<b>Novelty seeking</b>	<b>Preference for structure</b>	<b>Opposition for structure</b>
<b>Structure seeking</b>	1.000			
<b>Novelty seeking</b>	.459**	1.000		
<b>Preference for structure</b>	.402**	.312**	1.000	
<b>Opposition for structure</b>	.507**	.517**	.335**	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

*Table VIII: Bivariate correlation, 6 factors managerial behavior*

	<b>Entre</b>	<b>Task</b>	<b>Power</b>	<b>Relation</b>	<b>Action</b>	<b>Effectiv</b>
<b>Entre</b>	1.000					
<b>Task</b>	.114**	1.000				
<b>Power</b>	.154**	.238**	1.000			
<b>Relation</b>	.444**	.212**	.035	1.000		
<b>Action</b>	.360**	.153**	.061	.446**	1.000	
<b>Effectiv</b>	.437**	.166**	.188**	.477**	.299**	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).