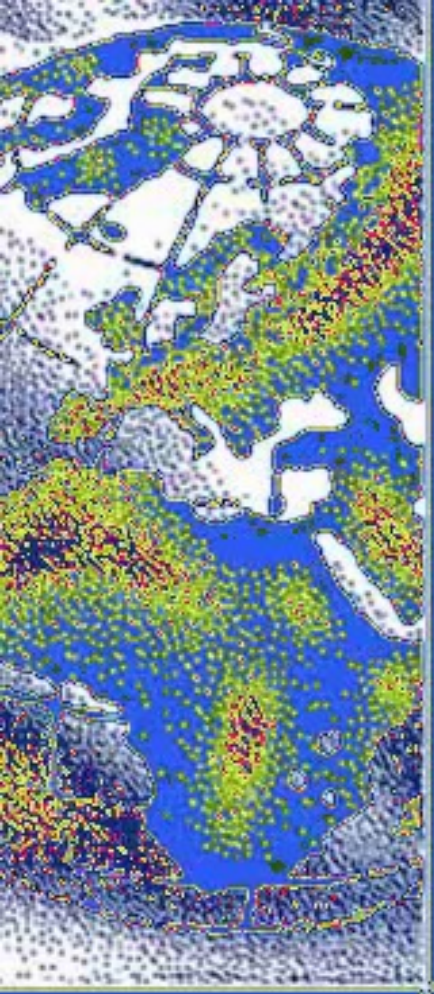

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Andreas Kirschkamp

A Contingency-Based View of Chief Executive Officers' Early Warning Behavior

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Herausgegeben von Professor Dr. Utz Schäffer
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Andreas Kirschkamp

A Contingency-Based View of Chief Executive Officers' Early Warning Behavior

An Empirical Analysis of German Medium-Sized Companies

With a foreword by Prof. Dr. Utz Schäffer

Deutscher Universitäts-Verlag

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Foreword

With early warning of CEOs in small and medium-sized companies, Andreas Kirschkamp has found a highly relevant and, up to this point, mainly unexplored research area as a field for his dissertation thesis. In a first step, he confirms the results of traditional contingency theory which show a strong link between environmental uncertainty and strategic sensemaking. In a second step and as the actual core of this study, he elaborates on the link between personality traits of CEOs and their strategic sensemaking. Thus, he sees his study in the tradition of an "extended contingency theory". The underlying framework originates from Lewin/Stephens 1994 who distinguish eight attitudes as determinants of organizational design. Kirschkamp empirically shows that six of these attitudes have significant explanatory influence on the design variables. However, egalitarianism and degree of moral reasoning do not have any explanatory power within this context.

Regarding the relationship between early warning behavior and success, Kirschkamp finds that successful CEOs differ in their use of sources from their less successful peers. They use internal, impersonal and external, personal sources more than managers of organizations with low success in early warning do. The managers with effective early warning behavior scan with a broader scope, delegate less, interpret with more and different partners, and more intensively. However, no difference can be observed as for the frequency of scanning, tool support and fixity of time for interpretation. In addition, the author investigates into how far early warning behavior is being adapted to the degree of strategic uncertainty. He finds that CEOs of organizations with success in early warning align scope of scanning, diversity of internal models and intensity of interpretation to the degree of perceived strategic uncertainty.

The dissertation thesis of Andreas Kirschkamp thus offers an array of interesting findings which will hopefully stimulate further research.

Utz Schäffer

Preface

CEOs all agree that the detection of chances and risks by means of early warning is an indispensable prerequisite of organizational success. This view of the practice was analyzed theoretically and the design of successful early warning was elaborated using a sample of 600 medium-sized companies in Germany. Additionally, the theoretical expansion of the contingency theory, the most influential organizational theory of the 20th century, was tested empirically for the first time with a large sample and an exhaustive model of the managerial personality. Indeed, the personality of CEO influences the design of the organization. These two major findings are the core of my research and of the resulting dissertation.

Such a work is of course the result of intense academic collaboration. First, I thank Prof. Dr. Utz Schäffer for his academic advice and continuous support. The discussions with him were characterized by his profound theoretical knowledge and highest methodological and theoretical standards. In addition, I enjoyed my professional time at the chair of Controlling at the European Business School. Especially the freedom of teaching junior and senior students was a remarkable experience. I also thank all my friends at the chair for their support during this period.

I also want to thank Prof. Heinz Klandt for his role as a co-advisor. Especially his methodological excellence further improved the quality of this dissertation. I am very grateful that already at the beginning of this work I could involve him in the academic discussion.

This work was supported and financed by McKinsey & Company. For this and the regular discussions I want to thank Dr. Herbert Pohl, partner of the finance practice in Munich. His excellent analytic mind and constructive ideas were challenging and contributed to the quality of my analysis.

Also, I want to thank my friends Matthias Hansch and Christian Leven for their help during this period. They not only acted as discussion partners but also motivators. Additionally, I want to thank Britta, my partner in life, for her understanding and

apologize for all the evening hours and weekends I could not spend with her. She really helped me so much to concentrate on this dissertation.

Finally, I thank my parents for their support and understanding. My father's contribution was very significant. I want to dedicate this work to my parents but also to my grandparents who in their way contributed to this academic work.

Andreas Kirschkamp

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List of Abbreviations

ANOVA	analysis of variance
CEO	chief executive officer
CI	competitive intelligence
CMD	cognitive moral development
Dr.	Doktor
e.g.	exempli gratia
et al.	et alii
etc.	et cetera
f.	following page
ff.	following pages
FN	footnote
Ibid.	ibidem
i.e.	id est
KonTraG	Gesetz zur Kontrolle und Transparenz im Unternehmensbereich
LISREL	linear structural relations
MCS	management control system
MIMIC	multiple indicator multiple cause
m.	million
PEU	perceived environmental uncertainty
PSU	perceived strategic uncertainty
PLS	partial least squares
Prof.	Professor
SD	standard deviation
VIF	variance inflation factor

A Introduction

1 Motivation and Objectives

"Organizations depend on the environment […] and often must cope with unstable, unpredictable external events."[1] They can anticipate these events that affect the organization by early warning,[2] a two-step process that comprises scanning the environment[3] and interpreting these data into information about opportunities and risks for the organization.[4]

"[I]dentifying the opportunities and risks"[5] in the organizational environment[6] gives organizations time and the possibility to survive[7] by changing strategy or structure in order to adapt quickly to new trends or by even influencing these trends.[8] Organizations that are aware of potential risks and chances can use this information and shape the environment or adapt to it.[9] So, they have the possibility to avoid a missing fit between the organizational environment and the strategy of the organization which results in declining performance.[10] In consequence, it is not surprising that organizations anticipating these potential risks and chances tend to be more successful than competitors which are not aware of them.[11] This process helps organizations to outperform peers and leads to a competitive advantage.[12] Therefore,

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1 Daft, Sormunen and Parks (1988), p. 123. See also Hambrick (1981), p. 299, Chakravarthy (1997), p. 69 and Zahra and Bogne (2000), p. 135ff. The dependency of organizations on the environment is also analyzed by Brown (1966), p. 322.

2 See B 2.4.

3 See Daft and Weick (1984), p. 290, May, Stewart and Sweo (2000), p. 403, Hambrick (1982), p. 159f., Culnan (1983), p. 194, Tushman (1977), p. 588 and Jemison (1984), p. 133.

4 See Daft and Weick (1984), p. 290.

5 Andrews (1980), p. 48.

6 For the strategic importance of anticipating trends see Aguilar (1967), p. 1, Steiner (1969), p. 15ff. and Hofer and Schendel (1978), p. 47, who calls it environmental analysis.

7 See Hambrick (1982), p. 159, Lawrence (1981), p. 321ff., Channon (1979), p. 123 and Huber (1984), p. 929.

8 See Hedberg, Nystrom and Starbuck (1976), p. 47f. and Bluedorn, Johnson, Cartwright and Barringer (1994), p. 201f.

9 See Huygens, Baden-Fuller, van den Bosch and Volberda (2001), p. 971ff.

10 See Lawrence and Lorsch (1967), p. 84ff.

11 See Miller and Friesen (1977), Subramanian, Fernandes and Harper (1993), Subramanian, Kumar and Yauger (1994) and Thornhill and Amit (2003).

12 See Cockburn, Henderson and Stern (2000), p. 1123 and Kunze (2000), p. 169ff. He considers the anticipation of risks and chances as an important resource that leads to leadership in the market. See also Fritz (1990), p. 496, Kirzner (1978), p. 11 and Kröger (2001), p. 9ff. For time as a competitive advantage see Simon (1988) p. 79ff.

early warning is perceived as a resource defined as “stocks of available factors that are owned or controlled by the firm”[13] which can be deployed by the company. This is supported by the resource based view that assumes “that sustained superior performance arises from sustainable competitive advantages”[14] caused by firm-specific resources.[15]

The relevance and necessity of this anticipation can be illustrated with examples from companies that anticipated trends and therefore gained market dominance. AMAZON foresaw the relevance of the internet as a distribution channel[16] and DELL new methods of production and storage[17]. Both of them were then able to convert this foresight into a benefit for their customers. Examples of companies that were not able to foresee the future also prove the necessity of early warning. On the larger scale, there is a rising number of insolvencies in countries like Germany.[18] On the smaller scale, there are many examples of companies that failed to notice risks and new trends.[19]

The necessity of early warning systems is also reflected by German law. The KonTraG (Gesetz zur Kontrolle und Transparenz im Unternehmensbereich = Law for Control and Transparency in Business) requires an early warning system for stock corporations.[20] It demands these systems mainly because of two reasons: 1) the fast changing environment and 2) the backward orientation of accounting that therefore does not allow the deduction of reliable conclusions about the future. Although the regulatory demands are not completely concordant with those of the organizations,[21] this law has been a milestone in Germany for its importance on early warning in legislation.

In the context of research on early warning there is first of all an important stream of economic literature that focuses on the phenomenon of environmental scanning. At this moment research has focused on the relationship between environmental

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13 Amit and Schoemaker (1993), p. 35.
14 Powell (2001), p. 875.
15 See Barney (2001), p. 644.
16 See De Figueiredo (2000), p. 50.
17 See Henderson (2004) and Lee and Lee (2005).
18 See Bundesamt' (2005), p. 20f.
19 See for example Sull (1999), p. 47.
20 See Lück (1998), p.9ff., Kröger (2001), p. 12ff. and Hahn, Weber and Friedrich (2000). A specific law for limited liability companies does not exist as the legislator assumes the same responsibility for them depending on their size and structure. See Lück (1998), p. 1926.
21 See Wall (2002).

uncertainty and specific design variables of scanning behavior.[22] But important questions remain and further research has to be done.[23]

The process of early warning consists of two steps: scanning and interpretation.[24] Although the importance of the second step is stressed in literature,[25] empirical studies have not yet focused on this step. In the context of early warning there are only case studies that tried to explore the way managers interpret the organizational environment.[26] This gap should be closed with an empirical analysis of both steps to understand how top managers conduct early warning. Therefore, the early warning behavior of CEOs of medium-sized companies is analyzed. The subject of this analysis was chosen because of two reasons: first, the behavior of such CEOs is to a high degree influenced by their personality and not by factors such as corporate culture and second, for the companies managed by these CEOs early warning is already relevant.[27] This leads to the first research question:

1) *How do CEOs of medium-sized companies design their early warning behavior?*

Classical contingency variables such as environmental uncertainty influence the organizational structure in general[28] and early warning behavior in particular.[29] So far research has focused on the relationship between environmental uncertainty and specific design variables of scanning behavior.[30] Additionally, YASAI-ARDEKANI and NYSTROM compared the influence of traditional contingency variables on scanning behavior of executives and found out that environmental uncertainty mostly influences scanning.[31]

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22 See Aguilar (1967), Daft, Sormunen and Parks (1988), Sawyerr (1993), Elenkov (1997), May, Stewart and Sweo (2000), McGee and Sawyerr (2003) and Garg, Walters and Priem (2003).

23 See Müller (1987), p. 152 and Krystek and Müller-Stewens (1993), p. VI.

24 See Daft and Weick (1984), p. 286.

25 See Nottenburg and Fedor (1983), p. 315ff., Isabella (1990), p. 8f. and Crossan, Lane and White (1999), p. 528f.

26 See for example Banerjee (2001). On the organizational level research has already been conducted. See for example Schneider (1997), Durand (2003)g and B 2.4.

27 See also F 1.1.

28 See for example Burns and Stalker (1961) and Woodward (1975).

29 See Lewin and Stephens (1994), p. 187f. and Yasai-Ardekani and Nystrom (1996), p. 188.

30 See Aguilar (1967), Daft, Sormunen and Parks (1988), Sawyerr (1993), Elenkov (1997), May, Stewart and Sweo (2000), McGee and Sawyerr (2003) and Garg, Walters and Priem (2003).

31 See Yasai-Ardekani and Nystrom (1996).

Additionally, organizational structure and early warning behavior are influenced by the CEO and his attitudes.[32] Although researchers like MAGNUSSON[33] and KENRICK and DANTCHIK[34] have postulated that behavior can only be predicted by considering both – situational factors and the personality of the individual – few studies have examined the scanning behavior in relation to the characteristics of an individual and to situational factors. HAMBRICK and MASON analyzed the individual scanning behavior in the context of the manager's level of hierarchy and professional function,[35] FISHER the relationship between the individual locus of control and scanning behavior.[36] In a general context the relationship between the interpreter's personality and its interpretation was analyzed by SCRIBNER and HANDLER.[37]

Until now no model capturing the managerial personality has been applied in order to analyze which relevant attitudes influence scanning behavior as additional contingency variable. Also, the second step of early warning, interpretation, has not been considered at all. Considering these two deficits the second research question arises:

2) *Do contingency variables influence the early warning behavior of CEOs of medium-sized companies?*

The aim of early warning is the detection of future trends. Only if relevant trends are anticipated early enough early warning will be successful. In order to understand the conditions of its success, the relationship of scanning and interpretation with this success needs to be analyzed. Until now, only YASAI-ARDEKANI and NYSTROM have analyzed the relationship between scanning and scanning effectiveness.[38] Based on these thoughts the third research question is derived:

3) *What is the relationship between the early warning behavior of CEOs of medium-sized companies and the success of early warning of medium-sized companies?*

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32 See Child (1972), p. 13, Miller and Dröge (1986), p. 539 and Lewin and Stephens (1994), p. 185.
33 See Magnusson (1981).
34 See Kenrick and Dantchik (1983).
35 See Hambrick (1981) and Hambrick (1982).
36 See Fisher (1996).
37 See Scribner and Handler (1987).
38 See Yasai-Ardekani and Nystrom (1996).

Finally, the analysis whether this success of early warning is relevant to the overall economic success is needed. For this, studies of MILLER and FRIESEN,[39] SUBRAMANIAN et al.[40] and SUBRAMANIAN et al.[41] have to be valuated. This leads to the following analysis:

4) *What is the relationship between the success of early warning of medium-sized companies and their overall economic success?*

Based on these four research questions, the frame of reference of this research outlay is deduced.

Figure 1: Frame of Reference of Research Outlay

After the motivation and the objectives of this work have been presented, its proceeding is described in the following section.

2 Proceeding and Method

According to the research questions the focus of the analysis is early warning behavior of CEOs of medium-sized companies. Therefore, part B analyzes the German and English literature related to this topic to find a model which allows the understanding of this process. Part C explains the classical contingency theory and its extension proposed by LEWIN and STEPHENS[42] and shows that is a theory explaining influences on early warning behavior. Based on this theoretical background the design variables of early warning, the measures of success and the contingency variables are presented. Then, the research model is shown. In part D the hypotheses are deduced: first, the hypotheses about the relationship between environmental uncertainty and early warning behavior, then those about the relationship between the CEO's attitudes and his early warning behavior and finally the hypothesis about the relationship between the success of early warning and economic success. The proposed research model is operationalized in part E. In part F the methodological basis of the study is

39 See Miller and Friesen (1977).
40 See Subramanian, Fernandes and Harper (1993).
41 See Subramanian, Kumar and Yauger (1994).
42 See Lewin and Stephens (1994).

chosen and fit criteria are applied to the selected constructs. Part G contains the results of the empirical findings. After a general description of the status quo of early warning behavior and a description of this behavior according to success of early warning and size, the hypotheses of part D are valuated. The final part H summarizes the findings and judges them in the context of scientific progress. This work concludes with a comment on needed further research and on its implication for practical use in organizations.

B Understanding of Early Warning in Literature and Definition of Important Terms

According to the research questions presented above, the analysis focuses on how the individual manager anticipates future risks and chances for the organization. The manager uses the process of early warning. Therefore, the early warning behavior of the individual manager is analyzed. Within this process data and information have to be distinguished. Managers are confronted with general data about the organizational environment. Then, this "[d]ata is given meaning"[43] and transformed by interpretation to information relevant for the organization. In order to answer the research questions about the early warning behavior of the individual, first, German literature about early warning is presented and analyzed whether it is suitable for this purpose.

1 German Literature

1.1 Frühwarnung, Früherkennung and Frühaufklärung

In the context of early warning German literature[44] first differentiates between the anticipation of risks and chances[45] for the own organization and for other organizations.[46] Following the research questions, this analysis focuses on the anticipation of future chances and risks by the CEO for his organisation.

The terms 'Frühwarnung', 'Früherkennung' and 'Frühaufklärung' predominantly occur within German literature about the analysis of the organizational environment.[47] These different notions and their instruments are presented in figure 2.

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43 Daft and Weick (1984), p. 286.

44 German literature is used here as a synonym for literature written in German. For example literature by Swiss researchers of the University of St. Gallen on the method of networked thinking is included. See Steinle, Eggers and Ahlers (1995).

45 The additional focus on chances depends on the generation of early warning or of the time horizon as seen later in this paragraph.

46 See Krystek and Müller-Stewens (1990), p. 338.

47 These terms are for example used by Hahn and Krystek (1979), Klausmann (1983) and Liebl (1996).

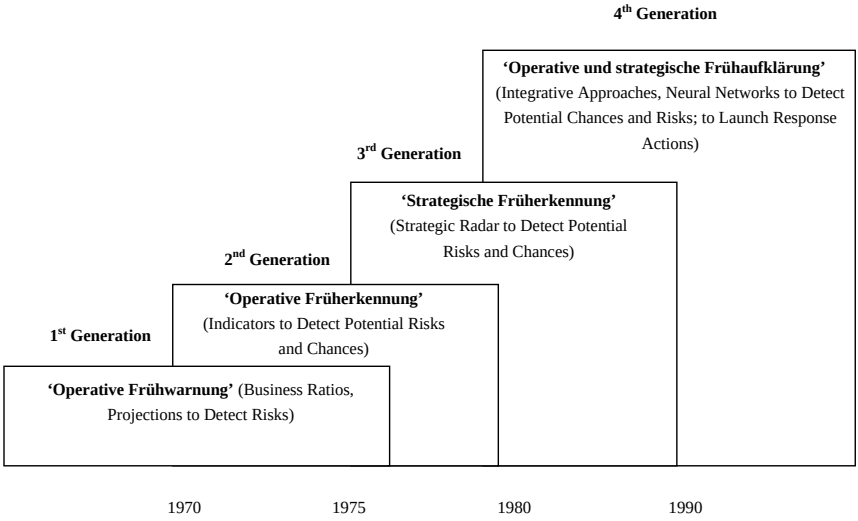

Figure 2: German Terms in the Context of Environmental Analysis[48]

Figure 2 shows a possible differentiation of early warning methods dependent on their time of occurrence.[49] Every class of early warning is typical of a specific time and has its own instruments and objectives.[50] The first generation called 'Operative Frühwarnung' was developed in 1973 and makes projections on the basis of past data. This is done in the context of operational organizational planning. Its main objective is detecting risks. The second generation started in 1977. It is called 'Operative Früherkennung' and tries to detect potential risks and chances by means of indicators. The third generation, 'Operative Früherkennung', began at the end of the 1970ies and instruments such as the strategic radar are mainly used to detect potential risks and chances. The last generation is called 'Frühaufklärung' and is characterized by networked thinking. It helps to detect risks and chances and additionally is the basis of response actions.[51] In this context, an exemplary definition of early warning is provided: "Eine Früherkennung umfaßt alle systematisch erfolgenden Handlungen der Wahrnehmung, Sammlung, Auswertung und Weiterleitung von Informationen über

48 See Zimmermann (1992), p. 79.
49 See Liebl (1991), p. 4.
50 See Klausmann (1983), p. 41ff., Liebl (1991), p. 7 and Eisenschink (1996), p. 22ff. for the problem of differentiating these notions.
51 See Zimmermann (1992), p. 79. In this context Gomez does not speak about a fourth generation but about early warning taking a holistic view. See Gomez (1983), p. 22.

latent bereits vorhandene Chancen und Risiken in einem so frühen Stadium, daß noch ausreichend Zeit für eine Durchführung geeigneter Strategien und Maßnahmen zur Nutzung signalisierter Chancen und zur Abwehr angezeigter Risiken verbleibt.“[52]

1.2 The Concept of Early Warning by KRYSTEK and MÜLLER-STEWENS

KRYSTEK and MÜLLER-STEWENS consider that differentiating early warning by generations implicates focusing more on technical means than on objectives of early warning. Therefore, they distinguish between short term and long term objectives which are pursued by operational and strategic early warning.[53] Operational systems refer to short term measures of success and mainly aim at detecting risks, whereas strategic systems refer to long term potentials of profit and try to detect risks and chances.[54] It has been shown that early warning systems of the first and second generation have short term measures of success and try to detect risks, whereas early warning systems of the third and fourth generation aim at long term profit potentials and try to detect long term risks. Therefore, the systems of operational and strategic early warning comprise the four historical generations and this analysis will confine these two systems.[55]

1.2.1 Operational Early Warning

First, general aims, characteristics and the process of operational early warning are described. Then, three of the most frequently used instruments are presented: business ratios, projections and indicators.

Operational early warning tries to prevent crises. Detecting chances is not its objective.[56] Therefore, operational early warning uses insights of crisis management in order to understand reasons for crises.[57] Most of the time the department of

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52 Weigand and Buchner (2000), p. 9. This definition shows the close relationship of the four notions. The definition of ‘Früherkennung’ also fulfils the criteria of ‘Frühaufklärung’.

53 See Krystek and Müller-Stewens (1993), p. 10. They also use the terms of operational and strategic early warning systems. See Krystek and Müller-Stewens (1993), p. 11.

54 See Krystek and Müller-Stewens (1993), p. 10. Considering these points of reference both systems are further differentiated by input, throughput, output and outcome measures. See Krystek/Müller-Stewens (1993), p. 12.

55 See Krystek/Müller-Stewens (1993), p. 22f.

56 In this context Klausmann postulates that operational early warning should aim at expanding its focus by detecting chances for the organization. See Klausmann (1983), p. 39f.

57 For an overview about causes of crises see Hauschildt (1998), p. 5ff.

'Controlling' is responsible for operational early warning that is characterized by its subsidiary principle. Specific subsystems are analyzed in order to detect possible risks in different fields. These are classified into external and internal fields. External fields comprise market, general economic conditions and technology; internal fields for example research and development, personnel and cost of production. The data about these fields is well structured, in most of the cases quantifiable.[58] The data are mostly derived from existing information systems within the organization. For these data levels or ranges of aspiration are determined. These are then compared to actual values. The outputs of operational early warning are deviances of actual values compared to expected or aspired values. A significant deviance leads to a specific reaction such as a message to the next level of hierarchy or to a central place.[59] Now, business ratios, projections and indicators are described as the most important means of operational early warning.

Business ratios condense a complex, quantifiable situation[60] and are an important means to support operative early warning.[61] Their objectives are operationalization, animation and encouragement, allegation, regulation and control.[62] Business ratios help executives to get informed about the situation of their business. They simplify complex circumstances and enable communication between departments and different levels of hierarchy. Business ratios are relative or absolute values and are compared to others. Often these other values are planned ones.[63] Other values as basis for comparison may be derived from past periods, other departments within the organization or from other organizations.[64] Often, business ratios are integrated into frameworks.[65] These frameworks generally have a pyramidal structure. This means that a menacing development can be detected even at a low, non-aggregated level before influencing the aggregated business ratios at the top of the system.[66]

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58 An example of such well quantifiable data is the amount of orders that helps to predict future revenues.

59 For a description of the process of operational early warning see Krystek and Müller-Stewens (1993), p. 11ff.

60 For an introduction to business ratios see Küting and Weber (1999), p. 23ff and Weber (2004), p. 239ff.

61 See Krystek and Müller-Stewens (1990), p. 338 and Hahn (1983), p. 7.

62 See Weber (1995), p. 204.

63 See Kühn (1980), p. 497 and Gomez (1983), p. 14.

64 See Krystek (1990), p. 69.

65 See Küting and Weber (1999), p. 27ff. Examples of ratio systems are the system by DuPont, the ZVEI ratio system or the return on investment/cash-flow ratio system. For an overview see Reichmann (1990), p. 18ff.

66 See Krystek (1990), p. 70.

Disadvantages of business ratios are the danger of only analyzing specified sectors or objects, of taking a short term perspective[67] and finally of focusing only on risks and not on potential chances.[68]

An additional means of operational early warning are **projections** or extrapolations. Basis for these projections are business ratios or ratio systems about a specified business circumstance. Current values are extrapolated and then compared with planned future values.[69] The comparison of extrapolated values with planned, future ones is a feed-forward instrument because top management can anticipate future trends and react to it. So the gap between planning and reasonable future development will be closed. The dangers of business ratios all apply to projections as well. An additional danger is the reliability of projections because some developments are difficult to extrapolate.

Business ratios and projections deal with quantifiable facts. **Indicators**, however, help to understand facts that are not directly observable phenomena.[70] This means that qualitative data or soft facts are the focus of indicator analysis.[71] Indicators are used as a means of detecting latent changes inside or outside the organization.[72] For this purpose, those indicators are identified and observed that predict future development.[73] Examples of such indicators are interest rates or the order volume of specific clients.[74] Indicators are often a composite of various ratios.[75] The surveillance of indicators

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67 See Liebl (1991), 4f. and Gomez (1983), p. 15f.

68 See Krystek and Müller-Stewens (1993), p. 59. For a general critique of business ratios see Küting and Weber (1999), p. 48ff.

69 See Krystek (1990), p. 70. Schäffer considers the comparison of extrapolated values with planned ones also as a comparison of planed values with real ones. See Schäffer (2001), p. 13. See also Weber (2004), p. 225ff.

70 See Krystek and Müller-Stewens (1993), p. 76.

71 See Krystek and Müller-Stewens (1990), p. 340 and Ansoff, Kirsch and Roventa (1983), p. 244. They use qualitative data and soft facts synonymously.

72 See Gomez (1983), p. 16.

73 See Krystek (1990), p. 69, Zimmermann (1992), p. 74 and Krystek and Müller-Stewens (1993), p. 79. For a general introduction see also Hahn and Krystek (1979), p. 76ff. and Rieser (1978), p. 51ff. For an early warning system based on indicators see Hahn (1983), p. 9.

74 See Hahn and Klausmann (1979), p. 67.

75 See Krystek and Müller-Stewens (1993), p. 60. In this context it is possible to differentiate between fully identical indicators, partially different indicators and non-partially identical indicators.

should not only be conducted to detect potential risks but also chances.[76] Mainly, it is criticized that indicators are not specific enough[77] to base strategic measures on them.[78]

1.2.2 Strategic Early Warning

The relationship between organization and environment can be described as coevolutionary.[79] On the one hand, an organization is influenced by its environment; on the other hand, it can actively affect developments of its environment. In both cases, it is important for the organization to anticipate future trends which is the aim of strategic early warning. Only after this anticipation it can adapt itself to such trends or change its environment. In this context, discontinuities are most important and therefore, it is the first aim of strategic early warning to detect ANSOFF's weak signals[80] to inform the management and to initiate change.[81] There exist two ways to detect these signals. To scan means to analyze the environment systematically, whereas monitoring is the analysis of the environment limited to single phenomena.[82] These two notions are specific to German literature while the differentiation is not common in English literature.[83] Two examples of institutionalized scanning are the scanning radar, developed and used by the BATTELLE-INSTITUT,[84] and scenario analysis. Based on different assumptions about future development the latter produces alternative scenarios.[85] Due to the high degree of uncertainty and to underlying assumptions that are difficult to quantify and to calculate, this method is characterized by a high degree of intuition. The resulting scenarios are then related to the strength-and-weaknesses profile of the organization.[86]

Further developments in German literature about strategic early warning have to be mentioned. The German 'Diffusionstheorie' was mainly influenced by the concept of

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76 See Liebl (1991), p. 5.
77 See Kühn (1980), p. 498.
78 See Gomez (1983), p. 16.
79 See Krystek and Müller-Stewens (1993), p. 160.
80 See Ansoff (1975), p. 23. His concept will be explained in B 2.2.
81 See Liebl (1996), p .7 and Reinhardt (1984), p. 26ff.
82 See Welge and Al-Laham (2001), p. 301.
83 See Aguilar (1967), p. 19ff. for the typical terminology in English literature.
84 See Battelle-Institut (1978) and Battelle-Institut (1979).
85 See Krystek and Müller-Stewens (1993), p. 168ff., p. 216ff. and Müller-Stewens and Lechner (2001), p. 152ff and p. 168f.
86 This is the way strategic early warning is for example conducted at Daimler Benz Aerospace. See Tessun (1997). This procedure is in accordance with Ansoff's advices. See Ansoff (1975), p. 24f.

issue management.[87] Another important impulse for strategic early warning came from KIRSCH and TRUX at the end of the 1970ies.[88] Their approach was very dependent on ANSOFF's concepts[89] and characterized by a multidisciplinary procedure in order to detect weak signals[90] and by a focus on organizational knowledge.[91] The most recent development of strategic early warning is the concept of networked thinking ('Vernetztes Denken'). Weak signals are considered to be specific to the organization and detectable by the method of networked thinking.[92] A holistic view is used where all relevant factors and their interdependencies have to be identified and dealt with.[93] This method wants to focus on causes rather than on symptoms.[94]

KRYSTEK and MÜLLER-STEWENS view the resulting information of strategic early warning as necessary for strategic management.[95] "Strategisches Management hat die Formulierung und Weiterentwicklung einer tendenziell langfristigen konzeptionellen Gesamtsicht der Unternehmung zum Inhalt, die der Auffindung, dem Auf- und Ausbau sowie dem Erhalt von Erfolgspotentialen dienen."[96]

Figure 3 shows the differences between operational and strategic early warning systems. Depending on their reach the systems are classified as operational or strategic. Operational early warning deals with data of high concreteness whereas strategic early warning deals with data of low concreteness. Exemplary tools are assigned to the different classes of early warning.

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87 See Krampe and Müller (1981).
88 See Kirsch and Trux (1979) and Kirsch and Trux (1986).
89 See Kirsch and Trux (1979), p. 53 and Ansoff (1975), p. 22f.
90 See Kirsch and Trux (1981), p. xix ff. and Hahn (1983), p. 13.
91 See Hahn (1983), p. 13.
92 See Zimmermann (1992), p. 78 and Gomez (1983), p. 19. For an explanation of the historical development of this approach see Eggenberger (1992), p. 43.
93 See Steinle, Eggers and Ahlers (1995), p. 16f.
94 See Probst and Gomez (1991), p. 8 for a procedural presentation of problem solving within the context of networked thinking. For a critique of this approach see Müller (1987), p. 139, Eschenbach and Kunesch (1996), p. 266, Krystek and Müller-Stewens (1993), p. 227 and Liebl (1997), p. 43.
95 See Krystek and Müller-Stewens (1993), p. 255.
96 Zettelmeyer (1984), p. 20. The notion 'strategic management' was decisively determined by Ansoff. See Ansoff (1972). For further information about the nature of strategic management see also Müller-Stewens and Lechner (2001), p. 17ff.

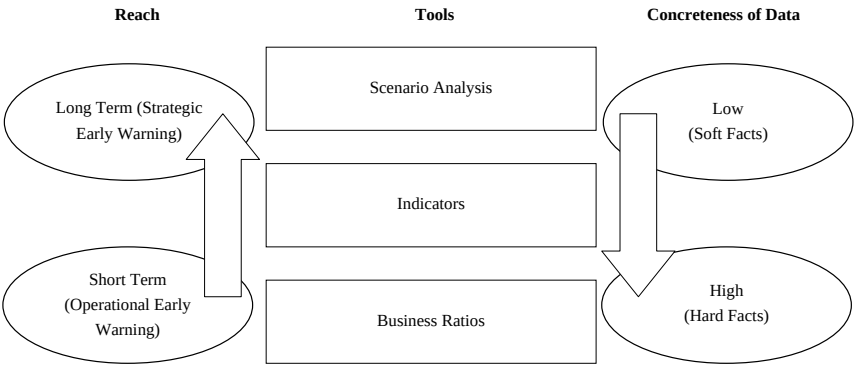

Figure 3: Summary of Operational and Strategic Early Warning[97]

The overview of German literature has been related to the topic of anticipation of future chances and risks and has shown that this literature focuses on instruments of early warning. These instruments have been classified and analyzed. Whereas an appropriate model in German literature to analyse the early warning behavior of the individual on which this analysis is focused could not be found, English literature is now presented and analyzed.

[97] Own compilation, based on Krystek and Müller-Stewens (1993), p. 10ff.

2 English Literature

2.1 AGUILAR's Concept of Environmental Analysis

AGUILAR stressed the importance of analyzing the organizational environment already in 1967.[98] He was the first to introduce the concept of scanning to business literature. "Scanning is the activity of acquiring information."[99] In the context of organizations, it deals with "scanning for information about events and relationships in a company's outside environment, the knowledge of which would assist top management in its task of charting the company's future course of action."[100] Scanning enables organizations to understand changes[101] and helps "identifying and understanding strategic threats and opportunities"[102] that have potentially larger impact for the company. AGUILAR identifies four ways of scanning: 1) undirected viewing, 2) conditioned viewing, 3) informal search and 4) formal search.[103] He understands these four modes of scanning as the basis of decision making within organizations. The tasks of acquiring information, e.g. of scanning, differ according to the nature of the decision. In this context AGUILAR distinguishes between two types of decisions: routine and innovative ones. Routine decisions are decisions with easily definable dimensions, whereas innovative decisions deal with unforeseeable ones. For routine decisions, one can generally specify the information needed and get all necessary information. "For these problems the full range of relevant information can often be identified, acquired, and understood. In contrast, for the innovative decision […] the task of scanning typically involves informational requirements that cannot be precisely defined, data that is not readily available, and subjects that are unfamiliar to the scanner."[104] This means that the three modes of scanning undirected and conditioned viewing as well as informal viewing are more appropriate to innovative decisions than formal search which is appropriate for routine decisions.[105]

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98 See Aguilar (1967).

99 Ibid., p. 1 (format of source not adopted). Aguilar does not differentiate between data and information because according to him scanning means receiving data about the environment and interpretation at the same time. Therefore, in his terminology the result of scanning is information.

100 Ibid., p. 1 (format of source not adopted). See also Culnan (1983), p. 194 and Hambrick (1982), p. 159.

101 See Kiesler and Sproull (1982), p. 555 and Lenz and Engledow (1986), p. 69.

102 El Sawy (1985), p. 53. See also Kiesler and Sproull (1982), p. 555.

103 See Aguilar (1967), p. 19ff.

104 Ibid., p. 4.

105 See Ibid., p. 19ff.

AGUILAR's fundamental work was further specified by ANSOFF. He aims to clarify the objects of environmental analysis and to develop a framework of reaction strategies for an organization.

2.2 ANSOFF's Concept of Weak Signals

ANSOFF developed the concept of weak signals in the 1970ies within the context of the oil crisis.[106] At this point organizations were confronted with unexpected environmental conditions that changed rapidly and could hardly be influenced. ANSOFF calls such unforeseen changes strategic surprises, "sudden, urgent, unfamiliar changes in the firm's perspective which threaten either a major profit reversal or loss of a major opportunity."[107] Organizations confronted with strategic surprises have not detected discontinuities of trends in advance. As depicted in figure 4 such discontinuities are abnormal developments of trends and represent profit or loss potential for organizations.

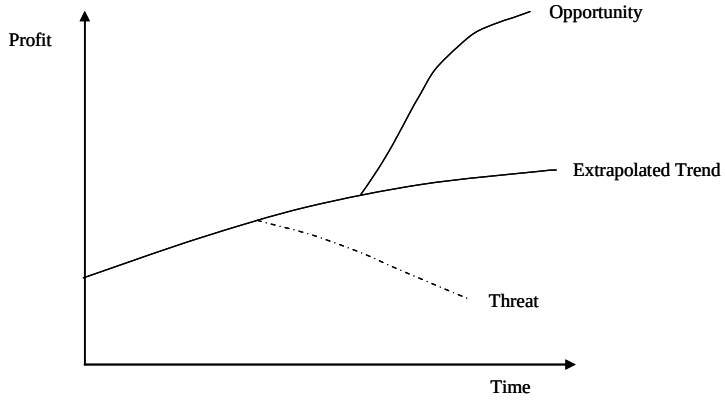

Figure 4: Developments of Trends to Discontinuities[108]

There are two possibilities to encounter strategic surprises. ANSOFF calls them "after the fact responsiveness"[109] and "before the fact preparedness"[110]. The former is a type

[106] See Hahn (1983), p. 3.
[107] Ansoff (1975), p. 22. See also Ansoff (1981), p. 234.
[108] See Ansoff (1975), p. 22.
[109] Ansoff (1976), p. 131.
[110] Ibid., p. 131.

of crisis management which is necessary after a strategic surprise has occurred. Therefore, is not relevant to early warning. The latter, before the fact preparedness, focuses on the time before strategic surprises might occur and tries to find possibilities to avoid them. There are two kinds of answers: the discontinuities are anticipated or the state of the firm is changed.[111] The following section will concentrate on these two issues.

Discontinuities can be foreseen by detecting weak signals. They are defined as "a development about which only partial information is available at the moment when the response must be launched, if it is to be completed before the development impacts on the firm."[112] At the very beginning the signal is only fragmented, at the end it is concrete. ANSOFF defines the different states of such a signal as states of ignorance.[113] According to these states of ignorance the information content of a signal can be deduced. This is presented in figure 5.

States of Ignorance / Response Strategy	(1) Sense of Threat/ Opportunity	(2) Source of Threat/ Opportunity	(3) Threat/Opportunity Concrete	(4) Response Concrete	(5) Outcome Concrete
Conviction that Discontinuities are Impending	Yes	Yes	Yes	Yes	Yes
Area of Organization is Identified which is the Source of Discontinuity	No	Yes	Yes	Yes	Yes
Characteristics of Threat, Nature of Impact, General Gravity of Impact, Timing of Impact	No	No	Yes	Yes	Yes
Response Identified: Timing, Action, Programs, Budgets	No	No	No	Yes	Yes
Profit Impact and Consequences of Responses are Computable	No	No	No	No	Yes

Figure 5: States of Ignorance and Information Content of Signals[114]

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111 In this context Ansoff also considers a "decisiveness gap". Ansoff (1981), p. 235. This problem occurs when organizations detect a discontinuity well in advance but are not able to react to it. It is the gap between information within the organization and prepared plans on the one hand and implementation of action on the other hand. See Ansoff (1981), p. 235.

112 Ansoff (1984), p. 483.

113 See Ansoff (1975), p. 24 and Ansoff (1976), p. 133.

114 See Ansoff (1975), p. 24 and Ansoff (1976), p.135.

Organizations have to react to weak signals in order to prevent strategic surprises. They do this by changing the state of the firm. ANSOFF proposes a range of possible response strategies according to the state of ignorance.

States of Ignorance / Response Strategy	(1) Sense of Threat/ Opportunity	(2) Source of Threat/ Opportunity	(3) Threat/ Opportunity Concrete	(4) Response Concrete	(5) Outcome Concrete
Environmental Awareness					
Self Awareness					
Internal Flexibility					
External Flexibility					
Internal Readiness					
Direct Action					

Figure 6: Ranges of Response Strategies to States of Ignorance[115]

As seen above, before-the-fact preparedness comprises two dimensions: anticipation of strategic surprises and changing the state of the firm. Based on this assumption, ANSOFF derives a model showing the interaction between threats as a result of a trend and possible reactions to it.

The states of threat range from sense of threat to outcome concrete.[116] After the explanation of time to complete response, time to unacceptable loss, state of firm and state of threat, the curves in figure 7 are considered. They illustrate two scenarios and show the advantage of detecting weak signals well in advance and of changing the state of the firm. 1) There is a threat, threat number 1, and a normal response to it. In states of the firm that are represented left from point A (unprepared, self aware, environmental aware, internally flexible or externally flexible) time to complete response t_r is longer than time to unacceptable loss t_l. Therefore, the organization will suffer from the negative effects of the threat. Only in the case that the state of the firm is right from point A (internally ready or action launched) t_r is smaller than time to unacceptable loss t_l. This means that the threatened loss can be prevented by changing the state of the firm. This example also shows that the earlier a signal is detected, the longer is the time until an inevitable loss will occur. If a crash reaction is possible, for any state of the firm, t_r is smaller than t_l. Under this condition neither the time of detecting the signal nor the state of the firm is important. 2) In the second scenario

115 See Ansoff (1975), p. 27, Ansoff (1976), p. 141 and Ansoff (1981), p. 250.
116 See also figure 5.

threat number 2 will be considered. No reaction at any state of the firm is possible to prevent possible losses resulting from this threat. This analysis shows ANSOFF's two key insights: the importance of detecting the signal early enough by scanning the environment of the organization[117] and of changing the state of the firm[118]. In the context of this work the first point is especially looked at.

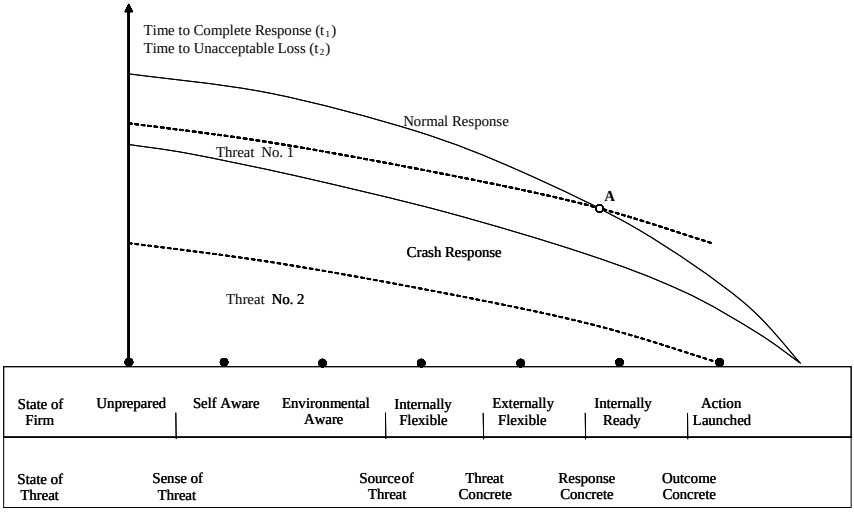

Figure 7: Optimal Responses to Environmental Threats[119]

Although ANSOFF's theory was widely accepted, it was criticized, too. The most important point is that his definition of weak signals is too vague and for this reason it is difficult to find criteria to detect them. Often, they are only identifiable ex-post and detected too late.[120]

These weaknesses are supposed to have been overcome by a more concrete description of weak signals. The following stream of literature deals with the description and detection of such signals.

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117 See Ansoff (1979), p. 47ff.
118 See Ansoff (1981), p. 250.
119 See Ansoff (1976), p. 142 and Ansoff (1981), p. 250.
120 See Simon (1986), p. 21ff., Konrad (1991), p. 56ff., Coenenberg and Baum (1987), p. 167, Weigand and Buchner (2000), p. 17f., Muchna (1988), p. 534ff. and Arnold (1981), p. 291.

2.3 Issue Detection

2.3.1 Historical Development

ANSOFF's concept of weak signals is the basis of issue management or organizational sensemaking.[121] It started within the field of public relations as "the process by which the corporation can identity, evaluate and respond to those social and political issues which may impact significantly upon it."[122] At this time issue management for example tried to detect problematic relationships between organizational actions and expectations of stakeholders.[123] Other issues examined during the late 1960ies and the early 1970ies were the demand for female employment and new environmental standards.[124] The importance of issue management rose till the middle of the 1980ies. This is also due to the fact that from this time on all issues relevant to organizations and no longer only public relations issues were considered. Consequently ANSOFF defines these issues as "a forthcoming development, either inside or outside the organization, which is likely to have an important impact on the ability of the enterprise to meet its objectives."[125]

2.3.2 Description of an Issue

The basic assumption of issue management is that issues are trends with a cyclical development.[126] Such a trend develops when people start knowing about it.[127] First, there are only few people who have knowledge about the issue. They may be called utopians. After some time this issue is also known by experts and consultants before it is finally adopted by politicians[128] and the public. The development of an issue is also reflected by its dissemination via the media. It may first appear within science fiction literature, then in specialized journals and after that in public ones. At the peak of attention, the issue can be treated in doctoral theses.[129] Such a development is

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121 Other terms in this field of literature are strategic issue management and strategic sensemaking. See Ericson (2001), p. 110f.
122 Johnson (1983), p. 22.
123 See Cheney and Vibbert (1987), p. 166ff.
124 See Wartick and Rude (1986), p. 125.
125 Ansoff (1980), p. 133. For a definition of issues see also Dutton, Fahey and Narayanam (1983), p. 308 and Liebl (1996), p. 8 and the there cited sources.
126 See Downs (1972), p. 38f.
127 See Dutton, Ashford, Lawrence and Miner-Rubino (2002) for an example of conditions favouring the expansion of an issue.
128 See Starling (1979), p. 141.
129 See Lancaster and Loescher (1994), p. 162.

comparable to the lifecycle of a product and is depicted in figure 8. In this figure a curve representing room for maneuver is added. It informs about the possibility for an organization to react to an issue. From the organizational point of view it is important to recognize a trend early enough, i.e. at the beginning of its life cycle. Only then, the room for maneuver is large enough to act.[130] If the trend progresses, it might be too late for any organizational reaction to this trend[131] or to influence and change it.[132]

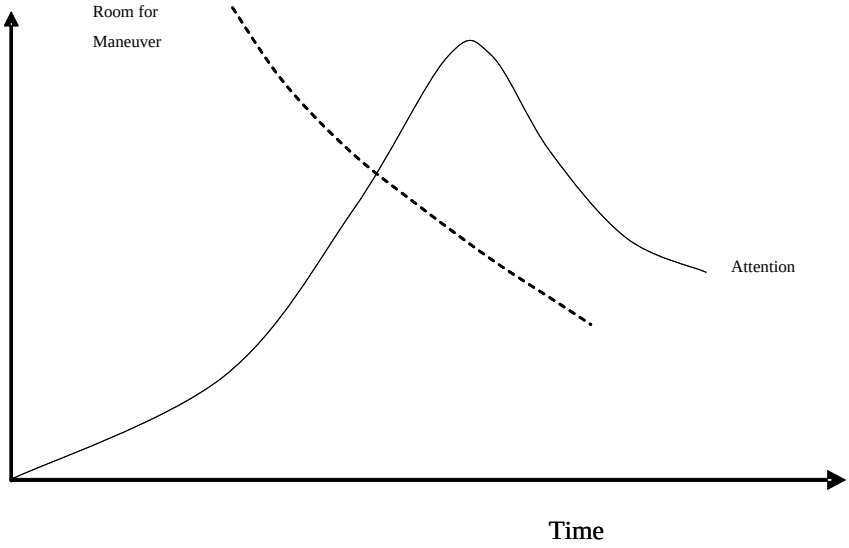

Figure 8: Lifecycle of an Issue[133]

The detection of such issues is the basis of strategic issue diagnosis and organizational sensemaking which will be presented in the following section.

130 See Picot (1977), p. 46ff.
131 See Coates, Coates, Jarratt and Heinz (1986), p. 21 and Starling (1979), p. 214f.
132 See Renfro and Morrison (1982), p. 55.
133 See Liebl (1996), p. 9.

2.3.3 Strategic Issue Diagnosis and Organizational Sensemaking

Strategic issue diagnosis focuses on the transformation of data into issues.[134] Apart from data obtained from scanning, three types of interpretive schemes serve as inputs for strategic issue diagnosis:[135] cognitive maps, political interests of the individual and issue characteristics. At the individual level the process itself is characterized by recursiveness and retroductivity. Recursiveness means that earlier interpretations are influenced by new data and judgments might be revised. “New interpretations in turn, alter perceptions of the issue, raising new questions, triggering the search for new data.”[136] Retroductivity is the coexistence and use of both logical modes, the inductive and deductive one. The final characteristic of the process is heterarchy and reflects the interplay of various organizational members of different hierarchies interpreting an issue. Outputs of strategic issue diagnosis are assumptions, cause-effect understandings and predictive judgments.[137]

In contrast to strategic issue diagnosis, organizational sensemaking examines also environmental scanning[138] and describes the process of interpretation within the organization to a greater extent. It “refers to those activities and processes by which data and stimuli are translated into focused issues (i.e. attention organizing acts) and the issues explored (i.e. acts of interpretation).”[139] At the beginning there is undirected scanning. For this process, AGUILAR’s definition of scanning as ”the activity of acquiring information”[140] is applicable. Then, the interpretation of issues follows. This process starts with the detection of issues on the basis of the data obtained from scanning. For example, this is done by issue tracking methods such as issue mapping; this was developed by WILSON. He assumes that issues can be identified by analyzing the interaction between trends in the macroenvironment and organizational sectors of the microenvironment such as customers, competitors, production.[141] The following step is to prioritize issues. First, the organization’s strengths and weaknesses are assessed. Based on this assessment the impact of the formerly identified issues can be estimated. Also, their urgency is valued. The resulting matrix, which shows impact

134 See Maitlis (2005), p. 21.
135 See Axelrod (1976), p. 23ff.
136 Dutton, Fahey and Narayanam (1983), p. 313.
137 Ibid., p. 315.
138 See Weick, Sutcliffe and Obstfeld (2005).
139 Dutton, Fahey and Narayanam (1983), p. 307f.
140 Aguilar (1967), p. 1 (format of source not adopted).
141 See Wilson (1983), p. 12.

and urgency of the issues, proposes the method of pursuing this issue.[142] An issue with a major impact and high urgency demands a quick reaction, whereas a trend with low impact and low urgency can be disregarded. Finally, the formulation of a response strategy is based on the results of this analysis. To this process ANSOFF's framework of response strategies can be applied.[143] However, sensemaking is understood only as the step precedent to decision, which itself is not regarded by this stream of literature.[144]

Sensemaking is considered to be a social process in which various organizational members participate.[145] Within this social process the role and influence of top managers as well as the role of middle managers is analyzed[146].[147] In addition, the process of organizational sensemaking is examined in the context of diverse organizational stakeholders.[148] Some researchers stress the cognitive processes[149] whereas another group of researchers focuses on organizational sensemaking in extreme conditions such as crises.[150]

The detection of issues is relevant for the anticipation of future chances and risks for an organization. The focus on issues is too restrictive because the anticipation of future trends also comprises the analysis of those trends that are not as disruptive as an issue. Therefore, the theory which deals with information processing of organizations in general is presented.

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142 See Ansoff (1980), p. 140.
143 See B 2.2.
144 See Weick (1993), p. 636.
145 See Isabella (1990), Sackmann (1991), Sandelands and Stablein (1987), Weick and Roberts (1993) and Starbuck and Milliken (1988).
146 See Dutton and Jackson (1987), Smiricich and Stubbart (1985), Gioia and Chittipeddi (1991), Gioia and Thomas (1996) and Bartunek, Krim, Necochea and Humphries (1999).
147 See Westley (1990), Dutton and Ashford (1993) and Dutton, Ashford, O'Neill, Hayes and Wierba (1997).
148 See Maitlis (2005).
149 See Griffith (1999) and Thomas, Clark and Gioia (1993).
150 See Brown (2000), Brown and Jones (2000), Gephart (1992), Gephart (1993), Weick and Roberts (1993) and Weick (1993).

2.4 Organizational Information Processing

Literature about organizational information processing deals with the gathering of data and its interpretation within the organizational context.[151] The basic concept is that of DAFT and WEICK.[152]

They developed a model that explains how organizations interpret data and act accordingly. Later on, MILLIKEN[153] and THOMAS et al.[154] adapted it to the individual level. According to their model, the process of environmental interpretation can be grouped into three stages: scanning, interpreting and acting or learning.[155] Scanning is defined similar to AGUILAR's definition: "Scanning provides the external intelligence for the organization/environment that policy-makers use in planning, decision-making and strategy formulation."[156] The collection of mere data is followed by its interpretation. "Interpretation is the process of translating the viewed and searched events, of developing models for understanding, of bringing out of meaning."[157] Interpretation occurs before organizational action[158] which is comprised in two steps. The first is "the process by which knowledge about action outcome relationships between the organization and the environment is developed."[159] The second step is the response, the adaptive action. Such actions "involve some change; they can range from small-scale forms, such as changes in procedures, to larger-scale forms, such as product-service changes, revisions in overall strategy, and the redesign of organizational structures." [160] These adaptive actions define the degree of adaptability of an organization, i.e. the capability of learning to act according to environmental changes.[161] This act of learning also provides new information for scanning and interpretation.[162] Therefore, learning can be considered as a feedback loop

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151 See Sutcliffe (2001), p. 198. This work provides an overview of relevant literature in this area.
152 See Daft and Weick (1984).
153 See Milliken (1990).
154 See Thomas, Clark and Gioia (1993).
155 See Daft and Weick (1984), p. 286. See also Thomas, Clark and Gioia (1993), p. 240 and Gioia and Chittipeddi (1991), p. 444.
156 Daft, Sormunen and Parks (1988), p. 124. See also Rhyne (1985), p. 319f., Hofer and Schendel (1978), p. 16ff. and Meyer (1981), p. 520.
157 Liu (1998), p. 298. See also Daft and Weick (1984), p. 286 and Taylor and Fiske (1978), p. 250ff.
158 See Daft and Weick (1984), p. 286 and Argyris and Schon (1978), p. 17ff.
159 Daft and Weick (1984), p. 286.
160 See Thomas, Clark and Gioia (1993), p. 242. See also Ginsberg (1986), p. 560ff.
161 Terrebery (1968), p. 590.
162 Daft and Weick (1984), p. 286.

to the prior two steps.[163] DAFT's and WEICK's model of organizations as a system of interpretation is visualized below.

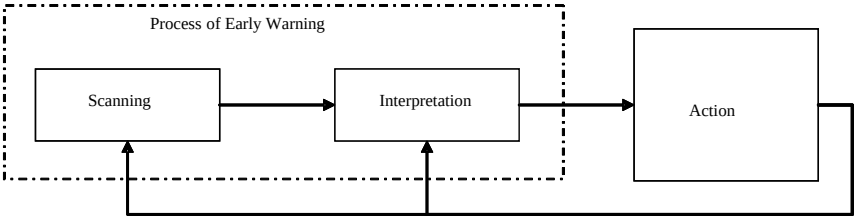

Figure 9: DAFT and WEICK's Model of Organizations as Interpretation Systems[164]

In order to answer this study's research questions DAFT's and WEICK's model of organizations as systems of interpretation is chosen because "that model specifically focuses on describing the processes by which managers perceive, interpret, and attempt to respond to changes in an organization's external environment."[165] This framework is supported by literature and combines predictions about perceiving data, interpretation and strategic reaction. This combination and the consideration of interpretation as a crucial step are unique in literature.[166] It is the basis in relevant literature that is concerned with organizational learning.[167] In order to answer the research questions the focus will be on the first two steps of the presented model, defined as the process of early warning.[168] The reason is that organizational action is not part of the research area resulting from the deduced research questions.

The concept of information processing was further developed in theories about organizational learning.[169] These theories try to link individual, group and organizational level. All of them start with the individual and information processing behavior comprising scanning and interpretation.[170] Although new trends are first perceived and interpreted by the individual,[171] the distributive process within the

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163 Liu's strategic scanning-relating learning cycle is similar to this model. The only difference is the disjuncture of scanning into sensing and perception. See Liu (1998), p. 301.
164 See Daft and Weick (1984), p. 286.
165 Milliken (1990), p. 43.
166 See Daft and Weick (1984), p. 293.
167 See for example Kim (2001), p. 20 and Huber (1991), p. 102.
168 These two steps can also be considered as learning about the environment. See Hedberg (1981), p. 5.
169 See Crossan, Lane and White (1999), p. 522 and Kim (2001), p. 38ff.
170 See Isabella (1990), p. 8f.
171 See Kim (1993), p. 37f. and Simon (1991), p. 129ff.

organization then has to be considered[172] because most of the time a group of people decides about organizational reactions to environmental change. Then, within the organization this knowledge has to be stored.[173] An exemplary model of organizational learning is the 4I model, developed by CROSSAN et al.[174] First, they identify two processes on the individual level: intuition and interpretation.[175] These two steps are similar to the two steps scanning and interpretation of DAFT and WEICK. Next, CROSSAN et al. extend DAFT and WEICK's model to consider a group and an organizational level: After the individual interpretation, coherence within the group has to be evolved by a process defined as integrating.[176] It is determined by communication among members of the organization[177] and leads to common understanding.[178] The final step is institutionalization and takes place on the organizational level. It is the learning which does not exist in dependence to any organizational members and "is embedded in the systems, structures, strategy, routines, prescribed practices of the organization."[179]

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172 See Huber (1991), p. 100ff., Farace and MacDonald (1974), p. 2ff. and Daft and Weick (1984), p. 285.
173 See Huber (1991).
174 See Crossan, Lane and White (1999). For an empirical validation of the model see Crossan and Berdrow (2003).
175 See Crossan, Lane and White (1999), p. 525.
176 See Ibid., p. 528.
177 See Simon (1991), p. 126 and Kim (1993), p. 43ff.
178 See Weick and Roberts (1993), p. 358f.
179 Crossan, Lane and White (1999), p. 529.

C Contingency Theory as an Approach to Explain Early Warning Behavior

Now the underlying theory of this work will be introduced. According to the research questions not only the early warning behavior of CEOs of medium-sized companies has to be assessed in general but also factors that influence this behavior have to be analyzed. Therefore, in the following the contingency theory which aims to explain organizational structure and design by considering contextual variables will be presented. First, the classical approach will be explained, followed by its extension. Then, the criticism of the contingency theory is presented and discussed. After that, it will be discussed whether this theory is appropriate to answer the research questions. In part four, the research model and its variables will be deduced by combining the classical approach of the contingency theory and its extension with the model of DAFT and WEICK. Finally, in part five the state of empirical research will be presented.

1 Basis of the Classical Contingency Theory

1.1 Development of the Classical Contingency Theory

The contingency theory was a critical reaction to the organizational theories of WEBER[180] and TAYLOR.[181] Two major shortcomings of their theories were criticized. First, WEBER's concept of bureaucracy was not concordant with empirical finding[182] and second, classical recommendations of the organizational theory did not consider situational differences and therefore, were not flexible and adaptable enough.[183] WOODWARD was one of the first who no longer looked for the one best way concept that does not consider situational differences. She considered external factors such as

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180 See Weber (2006).

181 See Taylor (1998).

182 "[I]t must be admitted that [Weber's] conceptualization in terms of ideal types ... presents many difficulties to the research worker. ... [T]he main problem for the researcher has been how to use Weberian concepts in analysis with data on real functioning organization." Pugh, Hickson, Hinings, MacDonald, Turner and Lupton (1963), p. 293f.

183 See Staehle (1973), p. 30. For further also theoretically based critics of Weber's theory see Bennis (1971), p. 436f.

technology before recommending an organizational structure.[184] The next researchers did not only examine the technical environment of the organization but also asked how organizational structure was depending on all relevant aspects of the organizational environment.[185] Having clarified the general direction of research, mainly two groups of scientists, one from the University of Chicago,[186] and the other from Aston University in Birmingham,[187] were responsible for further development of the contingency theory.

1.2 Aims and Main Assertions of the Classical Contingency Theory

The contingency theory aims to answer three questions:[188] 1) How can the organizational structure be measured empirically? 2) How do contingency variables influence the organizational structure? 3) What is the effect of different combinations of situation and structure on organizational efficiency?[189] "The major difference of this newer approach from earlier organizational theories lies in its acknowledgment that the process of designing organization involves the selection of a configuration that will best suit that particular situation which prevails."[190] Therefore, the fundamental thesis of the contingency approach is that organizations have to adapt to their environment in order to have high organizational performance.[191] The contingency theory wants to show this organizational structure's functional dependency on contingency variables and to prove it empirically.[192] The underlying assumption of this dependency is that

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184 "It appeared that different technologies imposed different kinds of demands on ... organizations, and that these demands had to be met through an appropriate form of organization." Woodward (1975), p. 16. See also Woodward (1980) p. 247f.

185 Burns and Stalker for example analyzed the influence of dynamics of the environment on the organizational structure. See Burns and Stalker (1961), p. 19ff.

186 Blau, Schoenherr and Meyer were responsible for basic and methodological research.

187 Pugh, Hickson, Payne und Hinings concentrated on the simultaneous analysis of various contextual variables.

188 See Kieser and Kubicek (1992), p. 61f.

189 The answer to the first question is the prerequisite to be able to answer the last two questions.

190 Child (1973), p. 237.

191 Parallels between the contingency approach and the biological evolutionary theory exist. "The idea is an elaboration of the biologist's functionalist view of the adaptation of living forms to their environment. For example, elephants have trunks to enable them to feed from their great height, and apes have prehensile fingers and toes to enable them to swing from trees. Contingency theory indicates the kinds of structure that may be appropriate responses to each of several different organizational contexts or situations." Khandwalla (1977), p. 237.

192 See Breilmann (1990), p. 2.

only successful organizations survive and therefore only the organizational structure of successful organizations is observable.[193]

The classical definition of organizational structure comprises "five primary dimensions"[194]: 1) specialization, 2) standardization, 3) formalization, 4) centralization and 5) configuration of the organizational culture.[195] According to the contingency theory these aspects characterize every organization and are determined by the organizational environment. Environmental uncertainty is the contingency variable of this environment that has to be considered the most.[196] Researchers have also considered organizational size[197] and production technology[198] as contingency variables.[199]

At this point the difference between the two approaches within the contingency theory – Cartesian and configuration approach[200] – have to be illustrated. Followers of the Cartesian approach "argue that fit between context und structure is a continuum that allows frequent, small movements by organizations from one state of fit to another."[201] Therefore, high performing organizations adapt their structure gradually to context. Three important findings of the Cartesian approach about the fit between context and organizational structure are now presented. 1) BURNS and STALKER observed twenty British and Scottish firms and identified two different types of organizations: mechanistic and organic ones. The mechanistic organization was characterized by a high degree of hierarchy and formalization; the organic one by a low level. Their finding was that, depending on the environment, each of these types can be successful. Mechanistic organizations tend to be successful within a stable environment, characterized by a low degree of complexity and dynamic, organic ones within an unstable environment.[202] 2) The degree of bureaucracy of successful organizations is

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193 See Gerdin and Greve (2004), p. 307 and Donaldson (1996), p. 57ff.
194 Pugh, Hickson, Hinings and Turner (1968), p. 65.
195 See Ibid., p. 72ff.
196 See Child (1975) and Burns and Stalker (1961).
197 See Pugh, Hickson, Hinings and Turner (1969), Hickson, Pugh and Pheysey (1969), Blau (1970), Child and Mansfield (1972) and Child (1975).
198 See Hickson, Pugh and Pheysey (1969), Child and Mansfield (1972) and Woodward (1975).
199 For an overview of possible contingency variables see Kieser and Kubicek (1992), p. 224 and Kieser (1999), p. 175.
200 See Gerdin and Greve (2004), p. 304ff.
201 Ibid., p. 304.
202 See Burns and Stalker (1961). See also Lawrence and Lorsch (1967), Bourgeois, McAllister and Mitchel (1978) and Argote (1982).

aligned with organizational size.[203] 3) WOODWARD finds that the degree of task routine has a positive influence on the degree of bureaucracy and hierarchy. Custom-design technologies and batch-technologies are found in organizations with low hierarchies and little staff, whereas mass production is found in organizations with high hierarchies.[204]

In contrast to the Cartesian contingency approach the configuration approach argues that there exists only a limited number of possible combinations of the above mentioned five structural variables.[205] "The mathematician tells us that p elements, each of which can take on n forms, lead to p^n possible combinations. […] But the world does not work like that. There is order in the world, but it is a far more profound one than that – a sense of union or harmony that grows out of the natural clustering of elements, whether they be stars, ants, or the characteristics of organizations."[206] [207] Therefore, MINTZBERG differentiates between five structural types with specific coordination mechanisms and forms of centralization.[208] So, a successful organization chooses the form out of these five structural types that best fits to its environment. MINTZBERG's theoretical assumption of organizational basic forms was later confirmed by the empirical works of MILLER and FRIESEN.[209] Another example of the configuration approach is the strategy typology of MILES and SNOW. They argue that "[o]rganizational survival may be said to rest on the quality of the 'fit' which management achieves among such major variables as the organization's product-market domain, its technology for serving that domain, and the organizational

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203 See Rushing (1966) and Pugh, Hickson, Hinings and Turner (1969).

204 See Woodward (1975). Other contingency variables were considered as well. For example Chandler analyzed the history of the 70 largest organisations of the United States. See Chandler (1966). He found out that the decentralized multidivisional structure was depending on the growth strategy of the organisation. A decentralized multidivisional structure was wide-spread for organizations in pursuit of a diversification strategy. The opposite was true for organizations pursuing a growth strategy within one single industry. This was later validated by Fouraker and Stopford. See Fouraker and Stopford (1968).

205 See Mintzberg (1979), p. 299.

206 Ibid., p. 300.

207 The assumption of a limited number of structural types is in line with the Darwinistic view. "[S]pecies at any one period are not indefinitely variable, and are not linked together by a multitude of intermediate gradations, partly because the process of natural selection will always be very slow and will act, at any one time, only on a very few forms; and partly because the very process of natural selection almost implies the continual supplanting and extinction of preceding and intermediate gradations." Darwin (1968), p. 231.

208 See Mintzberg (1979), p. 305ff.

209 See Miller and Friesen (1984), p. 31ff.

structures and processes developed to coordinate and control the technology."[210] Based on this idea, they found four organizational archetypes: defenders, prospectors, analyzers and reactors.

The difference between the two approaches of the contingency theory is also illustrated below.

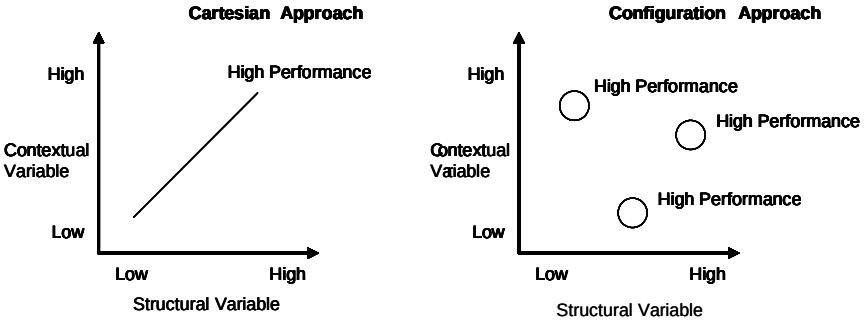

Figure 10: Difference between the Cartesian and Configuration Contingency Approach[211]

Finally, the role of organizational members according to the classical contingency theory is analyzed. According to it, the organizational structure is determined by exogenous factors and not by characteristics and behavior of its organizational members.[212] The individual only influences organizational success. The individual itself is directly influenced by the organizational structure and the environment.[213] For example, the degree of bureaucracy influences the employees' flexibility and the individual's innovativeness.[214] This reasoning is presented in figure 11.

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210 Miles and Snow (1978), p. 35.
211 See Gerdin and Greve (2004), p. 306.
212 See Lawrence and Lorsch (1967), p. 186.
213 "The organizational setting limits and influences people's behavior[.]" Payne and Pugh (1976), p. 1126. See also Breilmann (1990), p. 16 and Lawrence and Lorsch (1967), p. 17.
214 For an overview of effect of the organizational structure on the individual see Kieser and Kubicek (1992), p. 422f.

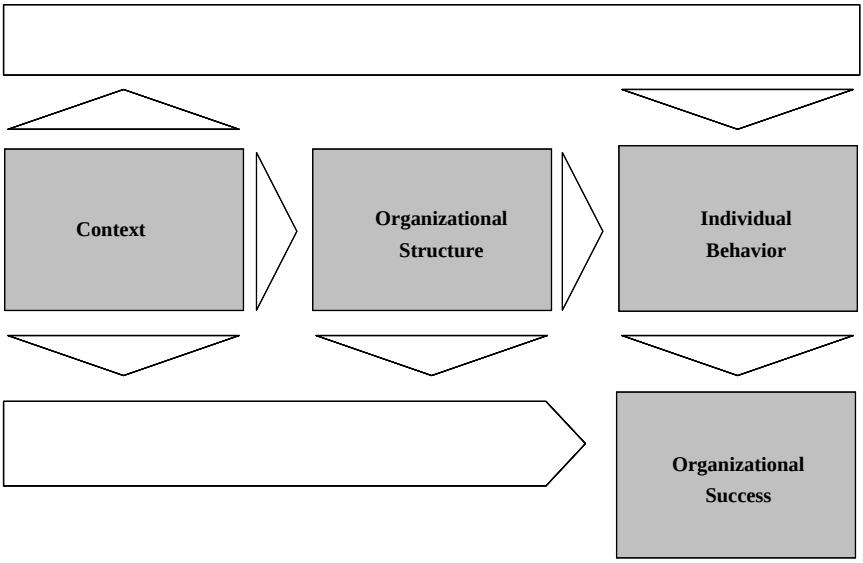

Figure 11: Assumed Causal Relationships by the Contingency Theory[215]

2 Extension of the Classical Contingency Theory

The main assumption of the classical contingency theory that the organization is only determined by its environment was criticized by researchers such as SILVERMAN,[216] CHILD and MANSFIELD.[217] The decision about the development of organizational structures is often not the result of rational choice because at the time of the decision about the organizational structure not all possible variants and their effects are known. Additionally, not only organizational goals are considered and other goals such as the will to retain power also influence the development of the organizational structure. Therefore, researchers of the extended contingency theory concluded that organizational structures are created by human beings and directly influenced by them.[218] They argue that "the structure of an organization is not an immutable given, but rather a set of complex variables about which managers can exercise considerable

[215] Adapted from ibid, p. 61.
[216] See Silverman (1968), p. 223.
[217] See Child and Mansfield (1972).
[218] See Ibid., Hrebiniak and Joyce (1985) and Hrebiniak and Einhorn (1990).

choice.“[219] This means that the almost mechanistic determination of the organization by situational variables is no longer assumed.

Following this reasoning, CHILD developed the concept of strategic choice. He assumes the existence of a “dominant coalition“[220], e.g. a group of managers such as the board. The power structure within the organization determines which members of the organization belong to this coalition. Top managers will mostly be part of it. Within this group every member knows about suitable organizational structures[221] yet at the same time has their personal goals.[222] The values and goals of the dominant coalition are called management philosophy or organizational philosophy and they determine organizational structure.[223] MONTANARI showed this relationship empirically between managerial philosophy and organizational structure.[224]

CHILD’s theory marked the beginning to consider the influence of the individual manager on organizational design[225]. Further researchers assumed that “decision making, leadership, strategy formation, structuring, and organizational change are influenced in subtle and complex ways by invisible, long-standing psychological forces.”[226] Especially in the context of young firms, the influence of the entrepreneur’s personality could be shown empirically.[227] However, concerning large organizations the question whether or how top managers influence the organizational design was rarely put.[228] In this context MEYER and STARBUCK were able to show such an influence at the example of the NATIONAL CASH REGISTER COMPANY. They analyzed the development of this organization for a period of 33 years and were able to demonstrate how individuals imprint their personality on organizations.[229] STOPFORD and BADEN-FULLER examined six turn-around companies and reached

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219 Lorsch, in Child (1984), p. 7.
220 Child (1972), p. 13.
221 See Miles (1975), p. 31ff., DiMaggio and Powell (1983) and Meyer and Rowan (1977).
222 These individual goals do not necessarily have to differ from the goals of the organization.
223 See Breilmann (1990), p. 105ff., Hambrick and Brandon (1988), p. 3f. and Baligh, Burton and Obel (1990), p. 35ff.
224 See Montanari (1979).
225 See Breilmann (1990), p. 175ff. for an overview of the most important empirical studies about the influence of the individual on the organizational structure.
226 Kets de Vries and Miller (1984), p. 1 (format of source not adopted). See also Romanelli and Tushman (1988), p. 129ff.
227 See Lang von Wins (2004), p. 29ff., Brandstätter (1997), p. 168ff., Eisenhardt and Schoonhoven (1990), p. 520f. and Rauch and Frese (2000), p. 130ff.
228 See Bobbitt and Ford (1980), p. 13ff.
229 See Meyer and Starbuck (1992), p. 102ff.

similar results.[230] Empirical evidence about the influence of individual managers was also provided by examples of new CEOs and their influence on the organizational structure.[231] These new CEOs for example introduced divisional structure.[232] Their influence was studied in organizations such as GENERAL MOTORS[233] and GENERAL ELECTRIC[234].

Further on the influence of specific attitudes of managers on organizational design was studied.[235] "Attitudes are defined as enduring psychological properties of the individual: i.e., characteristics that are relatively stable across time and situation. Personality is comprised of clusters of attitudes."[236] They influence intentions and behavior itself.[237] This notion attitude comprises individual differences such as traits, beliefs and values.[238] For example, MILLER stresses the importance of managerial attitudes and considers them as an important contingency which together with the traditional contingency variables determine the organizational structure.[239]

MILLER and DRÖGE were among the first researchers with an empirical study to show "that CEO personality might be influencing structure."[240] They focused on a single CEO's attitude. "[C]hief-executive-officer need for achievement influences the intended rationality of the strategy-making process, which in turn influences structural formalization and integration."[241] Their hypothesis was that chief executives with high need for achievement want to control the organization and therefore tend to prefer a high degree of centralization, formalization and horizontal coordination. They were able to show this relationship empirically.[242]

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230 See Stopford and Baden-Fuller (1990).
231 See Dale (1962) and Clee and Sachtjen (1964).
232 See Channon (1973), p. 76 and Mayer (1974), p. 187.
233 See Sloan (1963).
234 See Greenwood (1974).
235 In addition, researcher also analyzed the influence of CEOs' beliefs and values on organizational design. See Hambrick and Brandon (1988), Meyer and Starbuck (1992) and Baligh, Burton and Obel (1990).
236 Lewin and Stephens (1994), p. 189. See also Rokeach (1968), p. 82ff.
237 See Bass, Barnett and Brown (1989), p. 184 and Fishbein and Ajzen (1975), p. 5 and 21ff.
238 See Robinson, Shaver and Wrightsman (1991) in Lewin and Stephens (1994), p. 189.
239 See Miller, Kets de Vries and Toulouse (1982), Miller and Dröge (1986), Miller and Toulouse (1986) and Miller, Dröge and Toulouse (1988).
240 Miller and Dröge (1986), p. 539.
241 Miller, Dröge and Toulouse (1988), p. 544.
242 See Miller and Dröge (1986). For a detailed explanation of this attitude see D 2.3.

A second attitude examined in the context of organizational design is locus of control. MILLER et al. found out that individuals with an internal locus of control pursue different strategies from those of individuals with an external locus of control.[243] In addition to that, BURNS and STALKER showed that the design of organizations managed by individuals with an internal locus of control are more organic than organizations managed by individuals with an external locus of control.[244]

Although single personality characteristics such as need for achievement or locus of control have been analyzed until the research of LEWIN and STEPHENS "no integrative framework has been advanced linking a variety of CEO attitudes to their choices of organization designs"[245]. The organization design comprises the structure of an organization and is defined "as encompassing the organization's formal architecture (e.g. configuration, centralization, standardization, specialization), culture, decision-making norms, ethics, structure of employment relationship (e.g. work rules, grievance procedures, compensation system, norms regarding participation) and strategy."[246] LEWIN and STEPHENS extend the classical contingency theory and "believe that one crucial contingency – the attitudes of the general manager and in particular the chief executive officer – is a major source of variations in organization design."[247] Their model, an integrative framework, comprises eight attitudes of a CEO that exercise influence on organizational design: locus of control, tolerance for ambiguity, need for achievement, risk propensity, egalitarianism, moral reasoning, Machiavellianism and trust in people. These eight attitudes are the result of a method, comprising two steps. "First, using a deductive approach, we included all those attitudes shown by previous researchers to have an effect on organization-design preferences. Next we consulted a comprehensive source of attitude inventories … and included every attitude for which we could pose a plausible inductive analogue in organization-design preferences."[248] The attitudes analyzed by this theory are characterized by four features: 1) In order to assess these attitudes, there exist measures of established reliability and validity, 2)

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243 See Miller, Kets de Vries and Toulouse (1982), p. 244ff. For a detailed explanation of this attitude see D 2.1.

244 See Burns and Stalker (1961), p. 34f.

245 Lewin and Stephens (1994), p. 185.

246 Daft and Lewin (1990), p. 3. Other researchers employ the term organizational design as a synonym to organizational structure. See Galbraith (1977), p. 5ff.

247 Lewin and Stephens (1994), p. 183f. Nevertheless, they still consider the environment to be a fundamental contingency factor influencing organizational design.

248 Ibid., p. 190.

these attitudes might influence organizational design, 3) the attitudes are common among CEOs and 4) the value of these attitudes differ among CEOs.[249]

So far the study has shown that the original hypothesis of the contingency theory – the view of the organization as a product of its environment – was extended. Groups of individuals or single individuals also have an important influence on organizational design. In this context, it was LEWIN and STEPHENS who first developed a concept of relevant managerial attitudes influencing organizational design.

3 Critical Assessment of the Contingency Theory

The contingency theory is not without critics.[250] Analog to the last two parts, first, critical points about the classical approach and then specific potential weaknesses of its extension are presented and discussed.

The classical contingency theory analyzes the effects of situational variables on the organizational structure and tries to determine the degree of efficiency of combination between the environment and organizational structure.[251] Three of its main assumptions are under dispute: 1) The classical contingency theory claims that the structure of an organization is the result of its situational variables. The first reason not to assume such a strict determination of structural variables of the organization by situational ones is the fact that the latter are not simply given but can be altered. So the management itself can influence these situational variables, for example by creating new markets.[252] In addition to external variables the organizational structure can also be influenced by internal variables. HIRSCH-KREINSEN and SPRINGER for example show that organizations which introduce computerized numerical control machines successfully do so by applying different operational procedures which depend on existing organizational structures. In contrast to this, the classical contingency theory assumes that the introduction of such a new technology induces only one best organizational structure. But the example shows that contingency variables such as technology do not necessarily influence organizational structure. Internal variables such as operational procedures might be the major source of influence. This first criticism of the classical contingency theory can be refuted

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249 Ibid., p. 190.
250 For a detailed overview see Krohmer (1999), p. 44f.
251 See Schreyögg (1978), p. 6.
252 See Child and Mansfield (1972), p. 369.

because, although management can change situational variables and the organizational structure might also be influenced by internal variables, the causal relationship between situational variables and organizational structure still remains predominant. 2) The classical contingency theory assumes that there exist only organizational structures that most suitably fit the environment. Organizations with other structures would no longer exist and be eliminated. As the example of the introduction of computerized numerical control machines has shown, various organizational structures fit situational variables such as new technology. And even if a non-optimal fit between a contingency variable and an organizational structure exists, this will not imply that this organization will be automatically eliminated by the market. For example, an organization lacking a distribution structure optimally adapted to its environment might compensate this weakness with high-quality products.[253] This last critique point is only correct in parts: the choice of a non-optimal combination between an organization's structural element and the environment does not automatically imply the elimination of an organization. The reason is that an organization's success does not only depend on one structural aspect and its alignment to the environment. 3) Finally, the contingency theory assumes a measurable organizational structure. Scientists as the adherents of constructivism oppose this view and understand the organizational structure not as a set of rules but as the result of interpersonal communication and decisions.[254] According to them, actions within an organization are not the result of formal organizational structures but of interactive processes which lead to commonly shared views about activities and organizational goals.[255] Therefore, the organizational structure is the result of actions and hence, hardly measurable.[256] In the context of this work the individual action of early warning is the object for analysis and not an impersonal structure that refers to this point of critique.

Apart from this fundamental criticism of the main assumptions of the classical contingency theory further points of criticism are discussed.

The classical contingency theory is mainly based on empirical studies and thereby follows the trend of organizational sciences during the 1960ies and 1970ies. These studies were possible by increasing computer capacity and more efficient statistical

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253 See also Pennings (1992), p. 274.
254 See Brown (1978), p. 378.
255 See Smiricich (1983).
256 See Silverman (1968).

programs.[257] In this context, the exploratory method of the contingency theory is criticized. Only after a statistically significant correlation between environment and organizational structure was found, a theoretical reason was sought.[258] Therefore, conceptual aspects are not the main interest.[259] In this study, this point of criticism is not valid because the chosen procedure is confirmatory.[260] The starting point is a conceptual model. The hypotheses are deduced from literature and then valuated empirically. In the context of the empirical method of the classical contingency theory, specific statistical procedures and methods, also a lack of representativeness of the samples in a lot of empirical studies is criticized.[261] In this empirical work the sample's representativeness of the basic population was proven by a χ^2-test.[262] Additionally, the measurement method of this work, the PLS method, was chosen according to the nature of the empirical data and object of analysis[263]. Finally, the measurement's criteria are analyzed and discussed on all measurement levels, i.e. the levels of the items, the constructs and the structural models.[264]

The classical contingency approach analyzes current organizational structures and therefore cannot predict optimal future structures. As a consequence it might postulate organizational conservatism, i.e. traditional organizational structures which have been successful in the past.[265] One of these conservative organizational structures is the tayloristic organization. For the last decades the tendency to introduce such structures has been empirically shown.[266] In the context of this research such a point of criticism can also be refuted because only the current state of organizational structure is assessed.

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257 See Kieser (1999), p. 170.

258 For an example of such a procedure see Burns and Stalker (1961), p. 94f. Within this context two points have to be differentiated: 1) the reason of systematic relations and 2) the statistical explanation for them. A high correlation does not automatically imply a high degree of scientific explanation because variables that are statistically highly correlating can be independent from a scientific point of view. Therefore, a systematic check of statistical correlation is indispensable. See Rasch, Friese, Hofmann and Naumann (2004), p. 118.

259 See Frese (1992), p. 191.

260 See D.

261 See Otley (1980), p. 419.

262 See F 1.2.

263 See F 2.

264 See F 3 and G 2.

265 See Child, Ganter and Kieser (1987), p. 87.

266 See Köhl, Esser, Kemmner and Förster (1989), p. 252f. and Schultz-Wild, Nuber, Rehberg and Schmierl (1989), p. 172ff.

The classical contingency theory makes assumptions about the optimal fit between the environment and the organizational structure. But it sometimes does not consider cultural differences or even explicitly assumes that cultural differences do not exist. HICKSON et al. for example show that in the Japanese, British and Swedish context organizational size is correlated with degree of specialization, decentralization and formalization.[267] Such a generalization is problematic because the understanding of elements of the organizational structure differs from country to country. This point of criticism does also not apply to this research because it is limited to Germany and the generalizability of its finding to other countries is not assumed.

Finally, the classical contingency theory does not consider the influence of management as an additional contingency variable because it regards the organizational structure as functionally only dependent on situational variables. Other influences on the organizational structure such as the management's willingness to dominate are not considered.[268] This led to the extension of the contingency approach to take the individual's influence on the organizational structure into account.

But this extension was also criticized. Although the correlation between personal characteristics of managers and organizational structure was shown, the explanatory power of such characteristics was not compared with the one of classical contingency variables.[269] This research does not have this shortcoming because it compares the degree of influence of the different contingency variables. Additionally, it is problematic to assume that only one single person influences organizational structure. Often a group of managers such as a board of managers influences the organizational structure. This point is not valid in the context of this investigation because only medium-sized companies are analyzed in which the CEO's influence is significant and where generally no board exists to determine organizational structure. It is also criticized that the organizational structure is influenced by a number of persons in the history of the organization. To understand the influence of these different personalities, their characteristics and their influence on the design of the organization have to be analyzed; this would be almost impossible.[270] In contrast, this study believes

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267 See Hickson, Hinings, McMillan and Schwitter (1964).

268 See Clegg and Dunkerly (1980), p. 433ff., Clegg (1981), p. 545 and Benson (1977), p. 10.

269 See for example Miller and Dröge (1986) and Miller, Dröge and Toulouse (1988). For an overview of such studies see Breilmann (1990), p. 175ff.

270 See Kieser and Kubicek (1992), p. 223.

that in medium-sized companies the influence of the current CEO is so high that he dominates the influence of former managers.

4 Application of the Contingency Theory to Early Warning Behavior, Research Model and its Variables

4.1 Application of the Contingency Theory to Early Warning Behavior

According to research question two the factors influencing early warning behavior have to be analyzed. Traditionally the contingency approach aims to explain organizational structure with contingency variables. As seen above, the extended contingency theory tries to explain even more – the design of the organization. "The construct of organization design […] is much broader than the traditional construct of organization structure: design denotes any macro-level organizational property."[271] Talking about organization design, LEWIN and STEPHENS think of "means to achieving results"[272]. One of these means is information processing.[273] Therefore, the aspect of environmental scanning and interpreting these data is important within the integrated framework of LEWIN and STEPHENS.[274] Their extension of the classical contingency theory which includes the classical contingency approach will be applied to early warning. In the context of this work the assumption of the Cartesian approach about organizations gradually adapting to traditional contingency variables is applied because empirical findings have shown that successful organizations tend to adapt gradually to their environment and that the existence of a limited number of stages often remains theoretical and presents a reductionistic view of reality.[275] This gradual adaptation to the environment will be reflected by hypotheses in the context of research question three about the success of early warning behavior. Organizations with successful early warning behavior will align their early warning behavior more with traditional contingency variables than unsuccessful organizations.[276]

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271 Lewin and Stephens (1994), p. 187.
272 Ibid., p. 188.
273 See Ibid., p. 188.
274 See Ibid., p. 202. See Kiesler and Sproull (1982), p. 556 for scanning as a specialized form of information processing.
275 See Gerdin and Greve (2004), p. 322 and Donaldson (2001), p. 141ff. Yasai-Ardekani and Nystrom also followed this approach for their analysis of the contingency theory in the context of scanning. See Yasai-Ardekani and Nystrom (1996).
276 See also G 2.1.

Following the presentation of the underlying theory the contingency variables of the research model can be specified. Within the classical contingency approach environmental uncertainty is considered as the most important contingency variable because it essentially influences the design of organizations.[277] The strong influence of this variable was also analyzed in numerous empirical studies in the context of early warning[278] and YASAI-ARDEKANI and NYSTROM empirically showed that environmental uncertainty is the contingency variable which mostly influences scanning behavior.[279] These studies are followed and will take environmental uncertainty, measured by perceived strategic uncertainty,[280] as the contingency variable to be analyzed. Additionally, the model of LEWIN and STEPHENS will be applied with its eight attitudes as contingency variables that influence early warning behavior. They are locus of control, tolerance for ambiguity, need for achievement, risk propensity, egalitarianism, moral reasoning, Machiavellianism and trust in people.

In the following, the design variables of early warning behavior and then the measures of success will be derived. Finally, the entire research model will be presented.

4.2 Selection of Design Variables of Early Warning Behavior and Success Measures

As seen above, early warning behavior comprises two steps: the process of scanning and interpretation. Scanning has already been analyzed empirically and literature has applied standardized design variables to describe it. These variables will be presented in the following section. On the other hand, interpretation has not yet been examined empirically in a large sample. Therefore, the relevant design variables of interpretation have to be developed. They will be presented in the second section.

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277 See Burns and Stalker (1961), Child (1975), Bourgeois, McAllister and Mitchel (1978), Argote (1982) and Lawrence and Lorsch (1967).

278 See Aguilar (1967), Daft, Sormunen and Parks (1988), Sawyerr (1993), Auster and Choo (1993), Yasai-Ardekani and Nystrom (1996), Elenkov (1997) and May, Stewart and Sweo (2000).

279 See Yasai-Ardekani and Nystrom (1996), p. 198.

280 See D 1.

4.2.1 Scanning

The description of scanning behavior via design variables has already often been used for empirical research.[281] Table 1 shows the result of the review of literature concerning relevant studies. Only studies which analyze individual scanning behavior in large samples are listed below with the design variables they examined.

	Frequency	Sources	Scope	Delegation
AGUILAR (1967)	●	●		
FARH et al. (1984)	●		●	
DAFT et al. (1988)	●	●		
AUSTER and CHOO (1993)	●	●		
SAWYERR (1993)	●	●		
FISHER (1996)	●		●	
YASAI-ARDEKANI and NYSTROM (1996)	●	●	●	●
ELENKOV (1997)	●	●		
MAY et al. (2000)	●	●		
MCGEE and SAWYERR (2003)	●	●		

Table 1: Examined Design Variables of Scanning in Empirical Works

This study follows the most extensive approach applied by YASAI-ARDEKANI and NYSTROM, who consider scanning frequency, sources of scanning, scope of scanning and degree of delegation.[282]

Scanning frequency is the number of times managers detect data about the environment useful for the anticipation of risks and chances for the organization.[283] This data is derived from **scanning sources**. First, the sources can be differentiated by looking at the organizational boundary[284] because data can originate from the outside as well as from the inside of an organization.[285] Examples of outside sources are customers, suppliers, trade shows, television news; examples of inside sources are subordinates, peers, internal reports and databases.[286] Additionally, sources can be

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281 See Aguilar (1967), Daft, Sormunen and Parks (1988), Sawyerr (1993), Yasai-Ardekani and Nystrom (1996) and Elenkov (1997).
282 See Yasai-Ardekani and Nystrom (1996).
283 See Hambrick (1981), p. 305, Hambrick (1982), p. 163, Farh, Hoffmann and Hegarty (1984), p. 203, Daft, Sormunen and Parks (1988), p. 125 and Elenkov (1997), p. 293.
284 See Aldrich and Herker (1977), p. 218ff.
285 See Aguilar (1967), p. 63f.
286 See Ibid., p. 64f., Elenkov (1997), p. 294 and Daft, Sormunen and Parks (1988), p. 126.

divided into personal and impersonal sources[287] such as publications or the output of management information systems.[288] Considering these two criteria of classifying sources this study arrives at four basic sources (internal, personal sources; internal, impersonal sources; external, personal sources and external, impersonal sources) and four composite sources (external, internal, personal and impersonal sources). Figure 12 gives an overview about the classification of scanning sources:

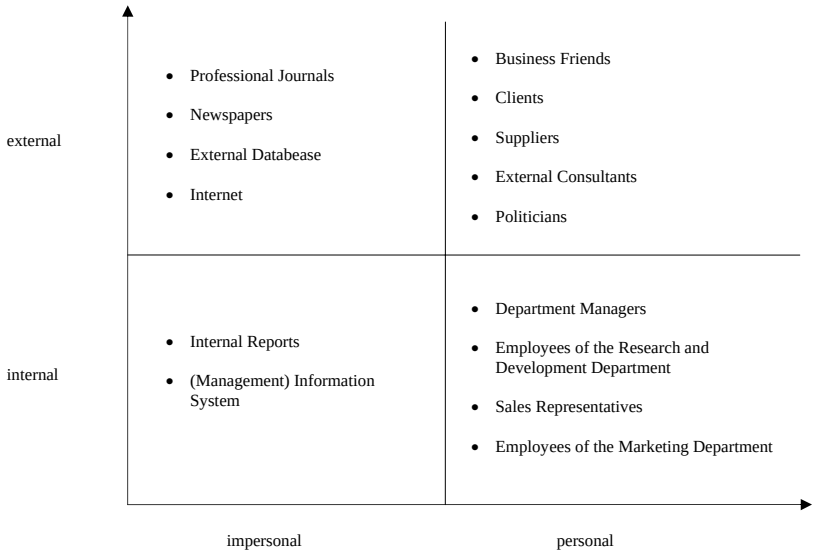

Figure 12: Classification of Scanning Sources[289]

Scanning behavior differs also concerning **scope**. Executives can have a broad scanning focus and look at a number of environmental sectors or they scan in a

[287] See Aguilar (1967), p. 64, Culnan (1983), Rhyne (1985), p. 323 and Daft, Sormunen and Parks (1988), p. 126 and Elenkov (1997), p. 294.

[288] See Aguilar (1967), p. 65, Kefalas and Schoderbek (1973), p. 66 and Smeltzer, Fann and Nikolaisen (1988), p. 60.

[289] Own compilation. A similar overview is provided by Aguilar (1967), p. 66.

narrowly focused way.[290] The last design variable of scanning is **degree of delegation**. Managers can perform the task of scanning on their own or delegate it to others.[291]

4.2.2 Interpretation

The design variables for interpretation are formally deduced because "research into environment-structure relationships gives scant attention to interpretation"[292] and therefore no established framework can be adopted.[293] Figure 13 shows how dimensions of interpretation are deduced.

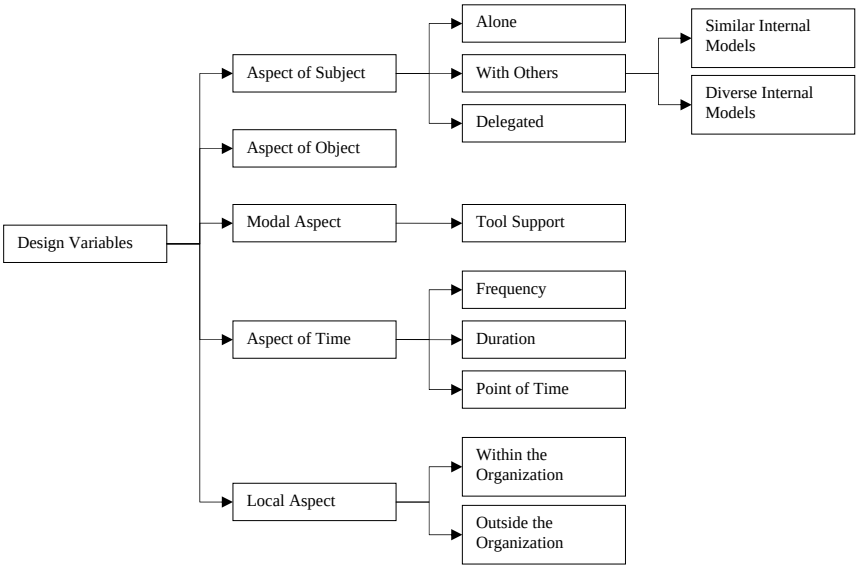

Figure 13: Formal Deduction of Design Variables of Interpretation[294]

From these exhaustive aspects of interpretation the design variables are deduced. The person who interprets corresponds to the aspect of subject. The interpretation can be

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290 See Yasai-Ardekani and Nystrom (1996), p. 189.
291 See Ibid., p. 189f. and Choudhury and Sampler (1997), p. 27f.
292 Daft and Weick (1984), p. 293.
293 Only the possibility of a change in the environment is interpreted to be a threat or an opportunity is analyzed in related studies. See Mintzberg, Raisinghani and Théorêt (1976), Nutt (1984), Dutton and Duncan (1987) and Thomas and McDaniel (1990). Additionally, Martins and Kambil analyze a personal bias in managers' interpretation of new information technology. See Martins and Kambil (1999). See also Dentson, Dutton, Kahn and Hart (1996), Sharma (2000) and Gioia and Thomas (1996).
294 Own compilation.

done alone, with others or it can be delegated. "Many participants may play some part in scanning or data processing, but the point at which data converges and is interpreted for organizational level action is assumed to be at the top manager level."[295] Therefore, it is sufficient to consider the two possibilities of interpreting alone or with others. This last kind of interpretation is directly related to the concept of internal models.[296] They can be considered as glasses through which a person looks at himself and at the world.[297] "Mental models [i.e. internal models] are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action."[298] These models reduce complexity and make personal action possible.[299] The design variable **diversity of internal models** within the process of interpretation comprises both ways of interpretation mentioned above. Interpreting by itself means that the diversity of internal models within the process of interpretation is very low. On the other hand, interpreting with others can signify that the executive involves a lot of different people with different internal models to interpret data gathered by scanning, or that the executive only interprets together with very few people who have similar internal models. This difference is reflected by high and low values of diversity of internal models within the process of interpretation.

From the aspect of object no design variable is deduced. As seen in the introductory part about early warning behavior, the object of interpretation is to obtain data by scanning.[300] Therefore, no additional design variable is needed.

The modal aspect is reflected by the **degree of tool support**. Within the context of early warning, there is a wide range of instruments to interpret data concerning future trends. With a long time horizon, no traditional instruments are of interest. Therefore, the focus is on scenario-analysis which is mostly applied in this context.[301]

From the aspect of time two design variables are deduced. There are three dimensions of time: frequency, duration and point of time. To accomplish the purpose of this study, duration of interpretation does not have to be considered because the question

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295 Daft and Weick (1984), p. 285.
296 For a detailed presentation of internal models see Schäffer (2001), p. 107ff.
297 Johnson-Laird (1983), p. 3f. "Like a pane of glass framing and subtly distorting our vision, mental models determine what we see." Senge (1992), p. 235. See also Kim (1993), p. 39.
298 Senge (1992), p. 8. See also Krieg (1971), p. 81.
299 See Weber, Grothe and Schäffer (2000), p. 241.
300 See Daft and Weick (1984), p. 286.
301 See Herzhoff (2004), p. 162. For the importance of this instrument see Leemhuis (1985), Schoemaker (1995) and Tessun (1997).

about duration of interpretation does not make sense within the context of early warning and therefore no hypotheses concerning the duration of interpretation can be found in literature. Frequency of interpretation is reflected by the design variable **intensity of interpretation**. This notion is selected because within the context of interpretation the main component of intensity is frequency. The final design variable is **fixity of time for interpretation**. It is deduced from the last aspect of time: point in time of interpretation. Executives can have fixed dates for the interpretation of data, e.g. every first day of the month, or they do not have a specifically assigned point of time.

4.2.3 Measures of Success

Success is measured first specifically by the success or the effectiveness of early warning. Additionally, the overall success of the organization, measured by the economic success, is considered. **Success of early warning** or early warning effectiveness means that the objective of early warning is realized, i.e. the detection of relevant potential risks and chances at a point of time which is so early that the organization still can react.[302] **Economic success** means the overall success of the organization. The relevant aspects of this success will be discussed in E 4.2.

4.3 Research Model

After the deduction of the design variables of early warning behavior, the research model can be presented. As seen above, the theoretical background of this work is the classical contingency theory. Therefore the influence of the environment is analyzed – in this case the uncertainty of it, measured by perceived strategic uncertainty[303] – on the design variables of early warning. In addition to that, the extension of the contingency theory proposed by LEWIN and STEPHENS is examined. They postulate a relationship between eight attitudes of the individual and the design variables of early warning.[304] According to the contingency theory, the alignment of the design variables with the environment leads to success. This is analyzed by success of early warning and economic success. Figure 14 shows the complete research model:

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302 See Yasai-Ardekani and Nystrom (1996), p. 194.
303 See D 1.
304 See Lewin and Stephens (1994), p. 188.

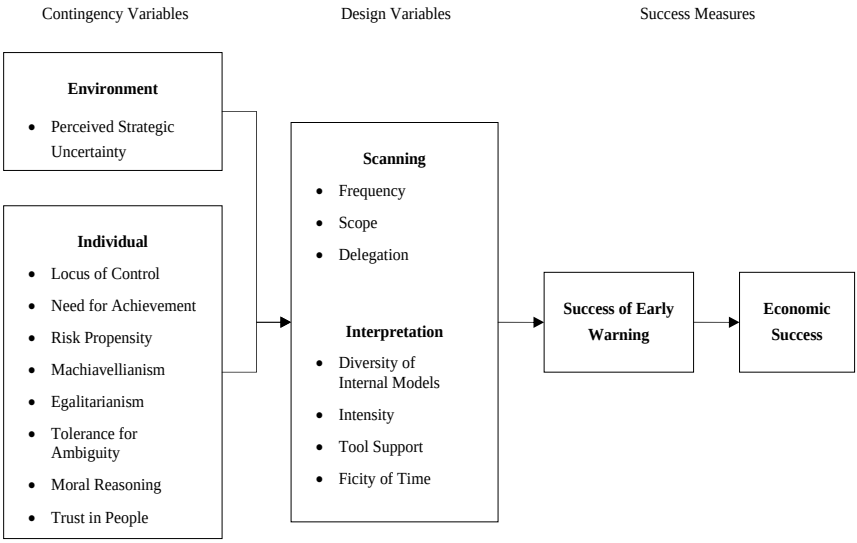

Figure 14: Research Model

The following section will examine which aspects of the research model have been empirically analyzed so far.

5 State of Empirical Research

Information processing, defined as "the gathering, interpreting [of data], and synthesis of information"[305] relevant to organizational decision making has been analyzed by various empirical works within a contingency context. In these analyses the processing of information of the individual or within the organization as a whole is studied. Most of the studies focus on individual behavior. Only the works of GALBRAITH[306] and LEIFER and HUBER[307] analyze information processing behavior of an entire organization. Moreover, all of these empirical studies can be characterized by the analyzed contingency variables, design variables and the nature of the analyzed relationships. The contingency variable analyzed most is the uncertainty of the environment. This contingency variable is operationalized by environmental

[305] Tushman and Nadler (1978), p. 614.
[306] See Galbraith (1977).
[307] See Leifer and Huber (1976).

uncertainty[308] and by the subjective impression of environmental uncertainty, perceived strategic uncertainty.[309] As for the selection of contingency variables two studies have to be stressed. YASAI-ARDEKANI and NYSTROM do not focus on one single contingency variable but test a broad range of contingency variables such as environmental change, organizational size and technological inflexibility. They show that environmental uncertainty is the contingency variable that influences scanning behavior the most.[310] FISHER's is the only work testing the influence of a personal attitude on information processing. She tests the relationship between locus of control and perceived usefulness of data. All empirical studies focus on the relationship between design variables of scanning. Sources of scanning are the design variables analyzed most often. The most complete list of design variables of scanning was analyzed by YASAI-ARDEKANI and NYSTROM who, apart from sources, considered scope and delegation of scanning. No work empirically analyzes the step of interpretation. The final criterion to characterize the empirical studies is the nature of the analyzed hypotheses. Except for two studies simple causal relationships between contingency variables and the design variables of scanning are analyzed by means of regression analysis. Only GARG et al. and YASAI-ARDEKANI and NYSTROM analyze optimal fit hypotheses. YASAI-ARDEKANI and NYSTROM followed the classical contingency approach and analyzed whether a relationship between a contingency variable and a design variable occurred to a higher extent in the case of organizations with high scanning effectiveness than in the case of organizations with low scanning effectiveness.

Considering the state of research on the basis of the here used research model a research gap is discovered. The extension of the classical contingency approach, the influence of personal attitudes on organizational structure, has not been tested yet. Also, the step of interpretation has not been analyzed yet. Exactly this gap will be closed with this empirical investigation.

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308 See Aguilar (1967), Auster and Choo (1993), May, Stewart and Sweo (2000) and McGee and Sawyerr (2003).

309 See Daft, Sormunen and Parks (1988), Sawyerr (1993) and Elenkov (1997).

310 See Yasai-Ardekani and Nystrom (1996), p. 196.

An overview of the empirical studies is provided in table 2.

Author/s (year)	**Data and Method**	**Analysis**	**Level**
AGUILAR (1967)	137 top and middle managers within the industrial manufacturing industry with a focus on pharmaceutical companies; questionnaires; correlation analysis	Relationship between environmental uncertainty and use of four scanning sources	I
KHANDWALLA (1972)	CEOs of 92 companies; questionnaires; correlation analysis	Relationship between quality of competition and use of data	I
LEIFER and HUBER (1976)	12 work units within a health and welfare organization; field study	Relationship between perceived environmental uncertainty and scanning frequency	O
GALBRAITH (1977)	Metastudy and various case-studies, e.g. within the aircraft production industry	Relationship between task uncertainty and information processing	O
DAFT et al. (1988)	50 medium-sized North-American manufacturing companies; questionnaires; correlation analysis	Relationship between perceived strategic uncertainty and scanning frequency, use of four scanning sources	I
AUSTER and CHOO (1993)	115 Canadian CEOs in the telecommunications and publishing industries; questionnaires; correlation analysis	Relationship between environmental uncertainty and scanning frequency, use of scanning sources	I
SAWYERR (1993)	CEOs of 47 manufacturing firms in Nigeria; questionnaires; correlation analysis	Relationship between perceived strategic uncertainty and scanning frequency, use of four scanning sources	I
FISHER (1996)	98 managers of Australian companies grouped in nine industries; questionnaires; ordinary least square regression	Relationship between locus of control and perceived usefulness of data	I
YASAI-ARDEKANI and NYSTROM (1996)	100 North American business organizations; questionnaires; multiple regression with dummy variables	Relationship and optimal fit between the contingency variables environmental change, organizational size, technological inflexibility, the organization's orientation toward low cost and the design variables scanning frequency, scope and delegation of scanning	I
ELENKOV (1997)	Managers of 141 medium-sized Bulgarian manufacturing and sales companies; questionnaires; correlation analysis	Relationship between perceived strategic uncertainty and scanning frequency, use of four scanning sources	I
MAY et al. (2000)	96 Russian Managers of medium and large organizations; questionnaires; regression analysis	Relationship between environmental uncertainty and four scanning sources	I
MCGEE and SAWYERR (2003)	CEOs of 153 small high-technology manufacturing firms; questionnaires; correlation analysis	Relationship between environmental uncertainty and use of four scanning sources	I
GARG et al. (2003)	105 CEOs of North-American single business manufacturing firms with 50 to 99 employees; questionnaire; hierarchical and multiple regression	Optimal fit between the contingency variables environmental dynamism in the internal and external environment and scanning focus per sector	I
I = Individual; O = Organizational			

Table 2: Literature Overview of Studies Dealing with Information Processing within a Contingency Context

After the presentation of the underlying theory of this work, the deduction of the research model and the literature review, now hypotheses can be deduced.

D Deduction of Hypotheses

The classical contingency theory and its extension are the basis for the following deduction of hypotheses. These theories assume an influence of environmental uncertainty and personal attitudes on organizational design. As seen above, the process of early warning is part of organizational design and therefore is also influenced by environmental uncertainty and managerial attitudes. The hypotheses are deduced on the basis of relevant literature. Numerous studies already exist about the relationship between environmental uncertainty and scanning behavior. These studies developed hypotheses and empirically examined them.[311] In order to put forth hypotheses about the relationship between managerial attitudes and design variables of early warning, psychological literature is consulted. Additionally, hypotheses already proposed by LEWIN and STEPHENS are discussed. The facts that empirical research has already been done in this area and that LEWIN and STEPHENS have already developed hypotheses on the basis of their model lead to a confirmatory procedure, i.e. first hypotheses are deduced from literature, next they are empirically examined. Otherwise an explorative procedure, e.g. a case study, would have been appropriate because this method is only based on empirical data and generates new hypotheses from them.[312]

The first paragraph deals with a hypothesis about environmental uncertainty, measured by perceived strategic uncertainty, and with hypotheses about its relationship with design variables of early warning, the second with hypotheses about the attitudes proposed by LEWIN and STEPHENS and the design variables. In each paragraph, first, the contingency variable will be explained followed by a deduction of the hypotheses. In the third paragraph, a hypothesis about the relationship between the success of early warning and the economic success of an organization will be derived.

1 Relationship between Environmental Uncertainty and the Design Variables of Early Warning Behavior

DUNCAN defines organizational environment as the “relevant physical and social factors outside the boundary of an organization that are taken into consideration during

311 See C 5.

312 For a comparison of both procedures and their application see Martin and Bateson (2004), p. 126ff., Jobson (1999), p. 9ff. and Chatfield (1995), p. 25.

organizational decision making."[313] Literature about uncertainty of this environment is extensive, and many studies have been conducted in this field. These studies either use an intersubjective or a subjective measure in order to capture environmental uncertainty. Intersubjective measures can be firm-specific[314] or industry-wide.[315] These industry-wide measures help to understand an industry and allow comparison to others. Data used for this purpose comes from archives and national institutes of statistics and allows replication.[316] On the other hand, there are perceptual or subjective measures. They are based on the personal judgment of a person, e.g. manager, and help researchers to understand the executive perspective of the environment.[317] The purpose of this study is to understand managerial behavior. Therefore, this study follows BOYD et al. who use perceptual measures for studying managerial decision making and behavior.[318] They argue that although intersubjective measures help to understand constraints imposed on the firm, e.g. degree of competition measured by number of competitors and their market share, managerial action is primarily dependent on what managers perceive and on how they interpret their environment.[319] BOYD et al. further show that there exists only a moderate correlation between perceptual and intersubjective measures. So it is not possible to analyze intersubjective measures in order to substitute perceptual ones.[320]

Therefore this study will concentrate on the subjective measure perceived environmental uncertainty. It "exists when decision makers do not feel confident that they understand what the major events or trends in an environment are, or when they

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313 Duncan (1972), p. 314. See also Thompson (1967), p. 26f. and Galbraith (1973), p. 5.

314 For examples of firm-specific intersubjective measures see Prescott (1986), p. 335ff. and Rasheed and Prescott (1992), p. 199.

315 In this context Dess and Beard developed an industry-wide construct. See Dess and Beard (1984). It was further developed by Sharfman and Dean. See Sharfman and Dean (1991). For a critique of these measures see Dess and Rasheed (1991), p. 703ff.

316 See Yasai-Ardekani (1986), p. 10 for strengths and weaknesses of the intersubjective approach.

317 See Lawrence and Lorsch (1967), p. 24ff. They strengthen the importance of subjective measures by analyzing the plastic industry as an example. Yasai-Ardekani provides an overview about strengths and weaknesses of the perceptual approach. See Yasai-Ardekani (1986), p. 10f. For a critique of perceptual measures see also Bourgeois (1985), p. 550.

318 See Boyd, Dess and Rasheed (1993), p. 209ff.

319 See Ibid., p. 209 and Anderson and Paine (1975), p. 813f.

320 See Boyd, Dess and Rasheed (1993), p. 211ff. See also Tosi, Aldag and Storey (1973), p. 30ff., Osborn and Hunt (1974), p. 240f., Downey, Hellriegel and Slocum (1975), p. 613ff. and Bourgeois (1985), p. 550. Yasai-Ardekani also argues that other factors such as personality influence the perception of the environment. Therefore, perceptual measures do not only reflect the intersubjective environmental uncertainty. See Yasai-Ardekani and Nystrom (1996), p. 188.

feel unable to accurately assign probabilities to the likelihood that particular events and (or changes) will occur."[321]

It was DUNCAN who first developed a concept to describe environmental uncertainty,[322] which is often applied in research about scanning.[323] He combined works of organizational researchers and decision theorists.[324] According to him, the environment can be characterized by the way it influences the organization in the context of organizational actions. He divides the organizational environment into two layers. The first is the task environment, "which directly impacts business strategy … [and] involves elements with which the organization has direct contacts."[325] In the research model presented above, this layer includes customers, competitors, suppliers and technologies. The second layer is the general environment with which the organization is in indirect contact. It includes the economic, the political/legal and the socio-cultural sector.[326]

The feeling of incertitude is caused by two dimensions of environmental uncertainty: 1) the rate of change or variability and 2) complexity which refers to the number of events occurring and their interdependence.[327] But these two characteristics of the environment described above are not sufficient to cause scanning. "Unless the external events are considered important to organizational performance, managers have little interest in them."[328] Not all data is considered to be strategically relevant, and managers will not be interested in it.[329] An important sector for a high-tech company is for example the technology sector whereas for companies in other industries this highly dynamic and complex area might not be of any importance at all. Together,

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321 Milliken (1987), p. 135. See also Galbraith (1977), p. 35f. and Shivers-Blackwell (2006), p. 28.

322 See Duncan (1972). For a detailed discussion about the possibilities to categorize environmental uncertainty see Miller (1992), p. 313ff.

323 See for example Bourgeois (1980), p. 25, Daft, Sormunen and Parks (1988), p. 124 and Elenkov (1997), p. 288.

324 His classification also follows Aguilar who found 16 categories of the environment based on managers' responses when asked about perceived sources of uncertainty. See Aguilar (1967), p. 40ff.

325 Elenkov (1997), p. 287. See also Dill (1958), p. 410f.

326 Some authors argue that technology is part of the general environment. See Ashegian and Ebrahimi (1990), Sawyerr (1993), p. 290. But most of the researchers consider technology to be part of the task environment as organizations are in direct contact with technology. See Daft, Sormunen and Parks (1988) p. 124, Elenkov (1997), p. 293 and McGee and Sawyerr (2003), p. 386 and 391.

327 See Duncan (1972), p. 314ff., Tung (1979), p. 673f. and Daft, Sormunen and Parks (1988), p. 125.

328 Daft, Sormunen and Parks (1988), p. 131f. See also Elenkov (1997), p. 288.

329 See Pfeffer and Salancik (1978), p. 269.

uncertainty and importance create perceived strategic uncertainty.[330] Perceived strategic uncertainty is higher in sectors of the task environment than in sectors of the general environment. Customer tastes, competitive actions, technologies and suppliers' policies are complex and change rapidly over time. In comparison to the last mentioned sectors of the task environment, the economic, regulatory and socio-cultural sectors are less dynamic and complex.

DAFT et al. show this difference in the context of North American manufacturing companies.[331] Using a questionnaire they interviewed 50 CEOs about their perception of the organizational environment and their scanning behavior. Three out of the four sectors with the highest perceived strategic uncertainty are sectors of the task environment.[332] In the context of Nigerian manufacturing executives SAWYERR shows that perceived environmental uncertainty in sectors of the task environment was higher than in sectors of the general environment.[333] Studies focusing on the perception of the environment by managers of small enterprises come to similar results.[334] BRUSH for example finds that managers of small businesses perceive data about immediate marketplace environment to be more important than data about remote marketplace environment.[335]

This relationship, however, was not validated by ELENKOV who conducted an empirical analysis with a sample of 141 medium-sized Bulgarian companies.[336] He shows that the political/legal sector is the one perceived as the most strategically uncertain sector and that the sectors of the general environment do not have significantly higher scores of perceived strategic uncertainty than the sectors of the task environment.[337] This can be explained by the environment of these Bulgarian organizations, which is characterized by networks of political power these organizations are heavily depending on in times of post-communism.[338] Within the context of Germany, one cannot expect such an importance of the political/legal sector

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330 See Daft, Sormunen and Parks (1988), p. 124 and Elenkov (1997), p. 288.
331 See Daft, Sormunen and Parks (1988), p. 131f.
332 The order of sectors depending on degree of perceived strategic uncertainty was the following: 1) customer (task), 2) economic (general), 3) competitor (task) and 4) technological (task).
333 See Sawyerr (1993), p. 293.
334 See Dollinger (1985), p. 27, Smeltzer, Fann and Nikolaisen (1988), p. 61 and Brush (1992), p. 46.
335 See Brush (1992), p. 46.
336 See Elenkov (1997).
337 See Ibid., p. 297f.
338 See Ibid., p. 291ff.

because such networks of political power do not exist and put forth the following hypothesis:

H1: Perceived strategic uncertainty in sectors of the task environment will be greater than in sectors of the general environment.

Top executives attempt to foresee chances and risks in the future by getting data about their environment. Whenever they perceive the environment as highly uncertain, they scan more frequently in order to reduce this uncertainty. "Similarly, in environments that are not perceived as uncertain, where the perceived uncertainty is already at some quite manageable level, we would expect to find low perceived uncertainty and also less boundary spanning activity."[339]

The above cited reasoning can be explained by the fact that managers have a considerable time constraint and have to concentrate on relevant activities.[340] The relevance of a manager's activity is related to its importance for the organization. In an environment with high perceived strategic uncertainty extensive search for data is extremely important and has to be conducted as quickly and often as possible.[341] In contrast, a manager cannot be expected to scan an environment characterized by low perceived strategic uncertainty with the same attention as an environment with high perceived strategic uncertainty because a manager generally "invests in information only so long as the expected marginal return from the information gained exceeds the expected marginal cost."[342] Therefore, executives will acquire data more frequently in an environment that is perceived to be strategically uncertain than in an environment that is perceived to be strategically certain.[343] This is also in accordance with the resource-based view. WILENSKY argues that if an organization depends heavily on the environment, more resources will be attributed to the scanning process and therefore, the frequency of scanning will increase.[344]

In a field study comprising twelve work units within a health and welfare organization, LEIFER and HUBER confirm such a positive relationship between perceived

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339 Leifer and Huber (1976), p. 234.

340 This is supported by Cyert and March who assume that managers are limited in their ability to collect and to process information. See Cyert and March (1963), p. 77ff.

341 See Pfeffer and Salancik (1978), p. 269.

342 Cyert and March (1963), p. 45. Only when the individual is motivated he will look for information. See MacCrimmon and Taylor (1976), p. 1400.

343 See Boyd and Fulk (1996), p. 4f. and 12.

344 See Wilensky (1967), p. 10.

uncertainty[345] and scanning frequency.[346] DAFT et al. also show that perceived strategic uncertainty has a positive relationship with scanning frequency of managers.[347] In the context of executives of Nigerian manufacturing companies, SAWYERR also shows such a positive and significant correlation between perceived strategic uncertainty and scanning frequency of competitors, technologies as well as of the economic and socio-cultural sector.[348] AUSTER and CHOO also show greater scanning activity – measured by scanning frequency – under highly uncertain circumstances.[349]

ELENKOV cannot provide evidence for a positive relationship between perceived strategic uncertainty and scanning frequency in the case of Bulgarian managers.[350] His findings contradict those of DAFT et al. and their successors.[351] Again, the specific situation of the country in which the study was conducted has to be considered. The Bulgarian economy is mainly influenced by dominant networks of political power. Other sectors which may even be highly uncertain matter significantly less. Therefore, they do not need to be observed with such a high frequency even when the degree of perceived strategic uncertainty is high.[352] When MAY et al. examined scanning behavior of executives in Russia, they conducted their research in a similar environment as ELENKOV.[353] They also come to the result that perceived strategic uncertainty does not influence scanning frequency,[354] and explain these results by giving the following reason: "In relatively stable environments, executives may be more reactive to changing events and increasing complexity because they have not become desensitized to these phenomena. In environments characterized by instability, abrupt change and periods of intense complexity certainty is more the exception than

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345 At this time the concept of perceived strategic uncertainty was not yet developed. So Leifer and Huber analyze perceived uncertainty. See Leifer and Huber (1976), p. 234.

346 See Ibid., p. 236. This was also supported by Culnan (1983), p. 200.

347 See Daft, Sormunen and Parks (1988), p. 132.

348 See Sawyerr (1993), p. 293. The correlation coefficients for the remaining three sectors are also positive but not significant. For an explanation considering the specificity of the Nigerian market see Sawyerr (1993), p. 296.

349 See Auster and Choo (1993), p. 200. See also the findings of Boyd and Fulk (1996), p. 12.

350 See Elenkov (1997), p. 297.

351 See Daft, Sormunen and Parks (1988), p. 132, Sawyerr (1993), p. 293, Auster and Choo (1993), p. 200 and Boyd and Fulk (1996), p. 12.

352 See Elenkov (1997), p. 299.

353 See May, Stewart and Sweo (2000).

354 In contrast to previous analysis they decompose perceived strategic uncertainty. Only for the aspect of importance a correlation with scanning frequency can be found. For the dimensions of complexity and of rate of change no significant correlation can be shown. See Ibid., p. 420.

the rule."[355] Therefore, high perceived strategic uncertainty in such turbulent environments does not induce any higher scanning frequency. By not conducting the study in a context similar to Bulgaria or Russia, characterized by a turbulent environment, the following hypotheses are deduced:

H 2a: Perceived strategic uncertainty will have a positive relationship with scanning frequency.

H 2b: Such an alignment between perceived strategic uncertainty and scanning frequency will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

As seen above, AGUILAR shows that top executives use various sources for scanning.[356] Personal sources refer to direct personal interaction or communication via phone, whereas impersonal sources are written and include newspapers and reports. Both types of sources are relevant to obtain data. Following the information richness theory of DAFT and LENGEL, personal sources are richer in information than impersonal ones.[357] In this context "[r]ichness is defined as the potential information-carrying capacity of data."[358] They argue that personal sources such as face-to-face communication allow direct feedback and the resulting information is much more specific and personalized than information obtained from impersonal sources.[359] Figure 15 gives an overview about different media and their information richness and speed of feedback.

When uncertainty is high, executives have specific questions about issues of their environment and want in-depth understanding. Additionally, the time aspect of getting data becomes extremely important.[360] Only personal data characterized by high speed of feedback compared to the one of impersonal sources correspond to this demand of timeliness.[361] Therefore, the information richness theory assumes that the use of personal sources is adequate in the case of an environment perceived as strategically

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355 Ibid., p. 419.
356 See Aguilar (1967), p. 63ff.
357 See Daft and Lengel (1984), p. 196ff. See also Holland, Stead and Leibrock (1976), p. 164 and Keegan (1974), p. 418f.
358 Daft and Lengel (1984), p. 196.
359 See Bruns and McKinnon (1993), p. 104 and Eisenhardt (1990), p. 42ff.
360 See Kefalas and Schoderbek (1973), p. 65.
361 See McGee and Sawyerr (2003), p. 389.

uncertain.[362] Only if perceived strategic uncertainty is low, written, impersonal sources are sufficient for top executives' needs.[363]

Information Richness	Medium	Type of Source	Feedback
High	Face-to-Face	Personal	Immediate
↑	Telephone	Personal	Fast
	Written, Personal	Personal	Slow
	Written, Formal	Impersonal	Very Slow
Low	Numeric, Formal	Impersonal	Very Slow

Figure 15: Communication Media and Information Richness[364]

The results of the information richness theory are reflected by empirical findings. HOLLAND et al. show a positive relation between task uncertainty and face-to-face communication.[365] KURKE and ALDRICH find out that managers who work in a dynamic environment prefer verbal media to written sources.[366] LINDSAY and RUE support the result that the higher the perceived environmental uncertainty is, the higher the use of external experts such as consultants.[367] In the context of the Bulgarian economy, ELENKOV shows that with rising perceived strategic uncertainty, the use of personal sources rises,[368] whereas "the use of impersonal sources of environmental scanning by Bulgarian business executives was not associated with the level of strategic uncertainty."[369] This result can be explained by the role of personal connections in Eastern European countries where the organizational environment is

362 See Daft and Lengel (1984), p. 199.
363 See Ibid., p. 199.
364 See Daft and Lengel (1984), p. 199. See also Daft and Macintosh (1981), p. 209.
365 See Holland, Stead and Leibrock (1976), p. 164 and Daft and Lengel (1986), p. 561.
366 See Kurke and Aldrich (1983), p. 981.
367 See Lindsay and Rue (1980), p. 394 and 396ff.
368 See Elenkov (1997), p. 297.
369 Ibid., p. 298.

highly uncertain.[370] ELENKOV's findings are also supported in the context of small businesses.[371]

On the other hand, DAFT et al. show that with rising perceived strategic uncertainty, the managerial use of personal sources augments more than the use of impersonal sources.[372] SAWYERR follows their research design and finds out that with rising perceived strategic uncertainty, the use of both sources rises.[373] The context of SAWYERR's study explains this divergence. The Nigerian manufacturing companies depend very much on government regulations about importing raw material and currency devaluation. Announcements concerning these issues are unilaterally communicated by impersonal media which explains their importance. The assumptions of the information richness theory and the study of ELENKOV will be followed leading to the these hypotheses:

H 3a: Perceived strategic uncertainty will have a positive relationship with use of personal sources.

H 3b: Such an alignment between perceived strategic uncertainty and use of personal sources will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

H 4a: Perceived strategic uncertainty will have no relationship with use of impersonal sources.

H 4b: The alignment between perceived strategic uncertainty and use of impersonal sources will be the same for organizations with effective early warning behavior and for organizations with ineffective early warning behavior.

The underlying reasoning of the last hypotheses is that the higher the degree of perceived strategic uncertainty is, the higher the need for richer information. According to the information richness theory, rich information is derived from personal sources. These personal sources are not only important for the first step of early warning, i.e. scanning, but also for the second step, i.e. interpretation. A variety of personal opinions can help to reduce the bias of filtering and selective perception of one single impersonal source.[374] Therefore, within the context of an environment characterized by a highly perceived strategic uncertainty, the diversity of internal

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370 See Puffer (1994), p. 43ff., Pearce (1991), p. 76ff. and Beamish (1992), p. 470f.

371 See McGee and Sawyerr (2003), p. 392. They also show that with rising perceived strategic uncertainty the use of personal sources is more frequent, whereas the use of impersonal sources remains constant.

372 See Daft, Sormunen and Parks (1988), p. 132f. See also Daft and Macintosh (1981), p. 215ff.

373 See Sawyerr (1993), p. 293.

374 See Nystrom and Starbuck (1984), p. 60ff. and Van de Ven (1986), p. 602.

models of people with whom managers speak for interpretation of early warning issues is extremely important. Therefore, the following hypotheses are put forth:

H 5a: Perceived strategic uncertainty will have a positive relationship with diversity of internal models within the process of interpretation.

H 5b: Such an alignment between perceived strategic uncertainty and diversity of internal models will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

As seen above, the organizational boundary is an additional aspect that helps to classify the sources of data a top executive uses to scan the environment.[375] Data can either be gained from within or from outside the company. Internal sources include data coming from employees of research and development, marketing or sales department as well as internal reports and memos. External sources comprise discussions with clients, business peers or consultants as well as newspapers or magazines related to the specific business.[376] Both sources are important for the executive to get data about his environment. But with rising perceived strategic uncertainty a manager will want to get more direct contact with the environment and to interact directly with outsiders who possess richer information. The preference for external data in these conditions, if quality of data is extremely important, can also be explained by information dilution within an organization.[377] In addition, information changes on its way up in hierarchy.[378] Therefore, it is expected that with rising perceived strategic uncertainty executives will supplement internal data with additional external data.

In the context of technical people of research and development groups BROWN and UTTERBACK find that the higher perceived uncertainty is, the higher the use of external sources.[379] This correlation was also found by BLANDIN and BROWN

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375 See Aguilar (1967), p. 63ff. and Culnan (1983), p. 197.

376 See Daft, Sormunen and Parks (1988), p. 126 and McGee and Sawyerr (2003), p. 387.

377 See Daft and Weick (1984) and their information richness theory. See also Elenkov (1997), p. 294. Kefalas and Schoderbek hypothesize the same way. See Kefalas and Schoderbek (1973), p. 65.

378 "The quality of information finally received by A – that is, its substantive content – will probably be very different from that originally put into the communication system at the lowest level. The selection principles used by officials below A to determine which data to pass on and which to omit will always differ from those of A himself." Downs (1966), p. 118.

379 See Brown and Utterback (1985), p. 307ff. They analyze 199 organizations within 15 industrial sectors in the United States of America. Lindsay and Rue support this result and show that the

analyzing scanning behavior of managers of four firms of wood products.[380] ELENKOV compares the use of external and internal sources and shows that the higher perceived strategic uncertainty is, the higher the use of external sources of data compared to internal sources of data.[381] He argues that "top business executives usually require the approval of the crucially important political and economic power networks"[382] in highly uncertain situations. For this, there is no additional need for internal data. Therefore, the use of them remains constant.

Two studies contradict these results. MCGEE and SAWYERR find in the context of small enterprises that with rising perceived strategic uncertainty, the use of external sources augments more than the use of internal sources.[383] Additionally, DAFT et al. show that with rising perceived strategic uncertainty, the managerial use of both sources increases no matter whether it is an external or an internal source.[384]

In analogy to hypotheses 3 and 4 and following the information richness theory and the study of ELENKOV one does not expect a positive relationship between perceived strategic uncertainty and internal sources. This is only expected between perceived strategic uncertainty and external sources. Therefore, the following hypotheses are derived:

H 6a: Perceived strategic uncertainty will have a positive relationship with use of external sources.

H 6b: Such an alignment between perceived strategic uncertainty and use of external sources will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

H 7a: Perceived strategic uncertainty will have no relationship with use of internal sources.

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higher the perceived environmental uncertainty is, the higher the use of external experts such as consultants. See Lindsay and Rue (1980), p. 394 and 396ff.

380 See Blandin and Brown (1977), p. 118.

381 See Elenkov (1997), p. 298. In this context, Sawyerr can only show such a significantly positive relationship for the sectors of the remote environment. See Sawyerr (1993), p. 293f.

382 Elenkov (1997), p. 294.

383 See McGee and Sawyerr (2003), p. 392 and 394. The study was conducted with North American manufacturing companies which do business in the high-technology industry. The enterprises had a minimum of 2 employees and a maximum of annual sales of 20 million Dollars. See McGee and Sawyerr (2003), p. 391. Pineda shows the same for importance of strategic decisions. The more important a decision is the more frequent the use of external sources. See Pineda, Lerner, Miller and Phillips (1998), p. 65. As importance is part of perceived strategic uncertainty, this result is also relevant in this context.

384 See Daft, Sormunen and Parks (1988), p. 132f.

H 7b: Such an alignment between perceived strategic uncertainty and use of internal sources will be the same for organizations with effective early warning behavior and for organizations with ineffective early warning behavior.

The study has shown that within an environment with high perceived strategic uncertainty executives stress data about the environment. The resulting need of timely data does not only induce frequent but also a broad scope of scanning[385] and high intensity of interpretation.

YASAI-ARDEKANI and NYSTROM show empirically the first relationship.[386] In addition to that study, the accounting literature also analyzes the relationship between uncertainty and the usefulness of data with a broad scope. They show a positive relationship between environmental uncertainty and perceived usefulness of the scope of management control systems and argue: "More mechanistic, formal MCS [management control systems] tend to provide incomplete information in uncertain conditions and require rapid reformulation to cope with the unfolding unpredictability. However, in a complex situation there is a need for more information within the MCS."[387] CHONG and CHONG[388] as well as GORDON and NARAYANAN[389] show empirically this relationship. Furthermore, CHONG analyzes within the context of the contingency theory how managers of Australian manufacturing companies use their management accounting system.[390] He finds out that given high task uncertainty,[391] broad use of data leads to positive managerial performance, whereas under the circumstance of low task uncertainty, broad scope of data coming from the management accounting system is dysfunctional and even leads to negative managerial performance.[392] Therefore, a positive relationship between task uncertainty and scope of scanning is assumed. Based on the studies presented above, the following hypotheses can be stated:

H 8a: Perceived strategic uncertainty will have a positive relationship with scope of scanning.

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385 See Chenhall and Morris (1986), p. 137f.
386 See Yasai-Ardekani and Nystrom (1996), p. 198f.
387 Chenhall (2003), p. 138. In this context the use of the word data would be more precise.
388 See Chong and Chong (1997), p. 272.
389 See Gordon and Narayanan (1984), p. 44.
390 See Chong (1996).
391 Task uncertainty is defined as the difference between the amount of information required to perform the task and the amount of information already processed. See Galbraith (1973), p. 4.
392 See Chong (1996), p. 419.

H 8b: Such an alignment between perceived strategic uncertainty and scope of scanning will be higher for organizations with effective early warning behavior than for organizations with infective early warning behavior.

H 9a: Perceived strategic uncertainty will have a positive relationship with intensity of interpretation.

H 9b: Such an alignment between perceived strategic uncertainty and intensity of scanning will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

High perceived strategic uncertainty leads managers to take greater responsibility for environmental scanning. The reasons for this are twofold. First, top managers are more interested in the development of the environmental sectors because of their high strategic importance. Second, under such conditions they find it more difficult to understand the environment and therefore become more involved in scanning.[393] On the other hand, executives of organizations operating in an environment perceived to be strategically certain will tend to delegate this task. Therefore, the following hypotheses are derived:

H 10a: Perceived strategic uncertainty will have a negative relationship with delegation of scanning.

H 10b: Such an alignment between perceived strategic uncertainty and delegation of scanning will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

THOMPSON states that organizations deal with uncertainty by creating a corresponding structure.[394] Such a corresponding structure can be a formal planning system.[395] In accordance with this, LINDSAY and RUE empirically show that with rising complexity and instability of the environment the use of tools such as computer models increases.[396] Therefore, it can be concluded:

H 11a: Perceived strategic uncertainty will have a positive relationship with degree of tool support for interpretation.

H 11b: Such an alignment between perceived strategic uncertainty and degree of tool support will be higher for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.

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393 See Utterback (1979), p.136. Eisenhardt reasons in a similar way by stating that managers rely on real-time information under highly uncertain environments. See Eisenhardt (1989), p. 551.

394 See Thompson (1967), p. 51ff.

395 See Burns and Stalker (1961), p. 35f.

396 See Lindsay and Rue (1980), p. 394 and 396ff.

After the deduction of the hypotheses about the first contingency variable, perceived strategic uncertainty, the eight attitudes proposed by LEWIN and STEPHENS[397] will be considered.

2 Relationship between the Personality of the CEO and the Design Variables of Early Warning Behavior

In analogy to the former paragraph, first the attitudes will be described, and then the hypotheses about these attitudes will be derived.

2.1 Locus of Control

The term locus of control reflects the individual's orientation to control.[398] It "measures an individual's perception of how much control he is able to exert over the events in his life. A person with a high value of locus of control believes that the consequences of his behavior stem from his own efforts."[399] On the other hand, individuals with an external locus of control "believe that their destinies are controlled by luck or chance."[400]

Before the practical implication of this attitude is examined, the difference to self-efficacy which is closely related to locus of control will be pointed out. Self-efficacy is a key element of BANDURA's theory of social learning and refers to the belief of an individual in his capacity to perform a task.[401] The main difference between these two conceptions is that "internal versus external locus of control (I-E) is a generalized construct covering a variety of situations, whereas self-efficacy is task specific, examining the individual's conviction that he or she can perform a specific task at a specific level of expertise."[402] Within the context of this work, the concentration is on the more general concept – locus of control.

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397 See Lewin and Stephens (1994).
398 See Legerski, Cornwall and O'Neill (2006), p. 1523.
399 Miller and Toulouse (1986), p. 1392. See also Lefcourt (1991), p. 414.
400 Fisher (1996), p. 362. See also Miller and Minton (1969), p. 370.
401 See Bandura (1977) and Bandura (1977). In this context Bandura is also using the term "cognitive representation of contingencies". Bandura (1977), p. 165.
402 Gist (1987), p. 478.

The relationship between locus of control and various important aspects of behavior within the business context has been extensively analyzed.[403] By their empirical studies, MITCHELL[404] and SEEMANN[405] show that individuals with an external locus of control are more alienated from their work than individuals with an internal locus of control.[406] On the other hand, the latter also seem to be more satisfied with their work.[407] ANDERSON et al.,[408] JAMES and WRIGHT[409] and SIU et al.[410] provide empirical evidence that these individuals can also cope better with stressful situations and are more task-oriented.

Internally oriented individuals are much more active and entrepreneurial than externally oriented ones.[411] This statement is supported by the empirical findings of BROCKHAUS,[412] DURAND and SHEA,[413] MILLER and DRÖGE[414] and MILLER and TOULOUSE[415]. It has also been shown that internally oriented individuals are very creative[416] and innovative.[417] Due to their opinion that they are able to influence the environment, individuals with an internal locus of control invent new products and dare to change a product line. For this they often scan the environment. The study of MILLER et al. empirically supports this reasoning by a data sample of 33 firms.[418]

In contrast, VANDENBOSCH and HUFF cannot prove any correlation between locus of control and a predisposition towards scanning.[419] They explain this result with the fact that locus of control strongly influences the professional choice between what they call convergent jobs, e.g. auditing, control, financial accounting, and divergent jobs, e.g. marketing, sales and strategy. The scanning requirements of these jobs are predetermined. Therefore, the influence of locus of control on scanning frequency is

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403 For an overview of studies see Jennings and Zeithaml (1983), p. 418.
404 See Mitchell (1975) and Mitchell, Smyser and Weed (1975).
405 See Seemann (1967).
406 See also Spector and O'Connell (1994) and Spector, Cooper, Sanchez, O'Driscoll and Sparks (2002).
407 Organ and Greene (1974) and Pryer and Distefano (1971) empirically show this relationship.
408 See Anderson, Hellriegel and Slocum (1977).
409 See James and Wright (1993).
410 See Siu, Spector, Cooper, Lu and Yu (2002), p. 622.
411 See Shivers-Blackwell (2006), p. 31.
412 See Brockhaus (1975).
413 See Durand and Shea (1974).
414 See Miller and Dröge (1986).
415 See Miller and Toulouse (1986).
416 See Burroughs and Mick (2004), p. 407.
417 See Miller, Kets de Vries and Toulouse (1982), p. 239 and 244.
418 See Miller, Kets de Vries and Toulouse (1986).
419 See Vandenbosch and Huff (1997), p. 96.

only indirect and no correlation can be shown between locus of control and scanning frequency.[420] In the here presented context the result of their study cannot be applied because the work of a CEO can neither be classified as only convergent nor as only divergent. Therefore, this work will follow the study of MILLER et al.[421] and the others above mentioned studies about individuals with an internal locus of control and arrive at the following hypotheses:

H 12: Locus of control will have a positive relationship with scanning frequency.

The locus of control does not only influence the scanning frequency but also the scope of scanning and the intensity of interpretation. SEEMANN and EVANS for example ask people suffering from tuberculosis about what they know about their illness. Externally oriented patients have less knowledge about their disease than internally oriented patients.[422] These findings are supported by the setting of a reformatory. Patients with an internal locus of control search for data more often and are able to remember relevant information better.[423] SRINIVASAN and TIKOO also analyze the relationship between locus of control and behavior in search of data.[424] For this purpose they focus on data search of individuals who want to buy a new car. It is their finding that individuals with an internal locus of control engage in more intensive data search than externals. "Internals may be gathering more information to find out which cars are more suitable and get exactly what they want."[425] Other studies also show that individuals with an internal locus of control are more active, ask more questions, gather and use more information.[426] TRICE and PRICE-GREATHOUSE discover that young women who are internally oriented seek more data about AIDS than women who are externally oriented.[427] PLUMLY and OLIVER are able to show that individuals with an internal locus of control gather more data in the process of searching for a job than individuals with an external locus of control.[428] There are two

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420 See Ibid., p. 87 and 96.
421 See Miller, Kets de Vries and Toulouse (1986).
422 See Seemann and Evans (1962). This study is interesting in the context of early warning. Although more information might have negative connotations for the patients, internals tend to be better informed.
423 See Seemann (1963).
424 See Srinivasan and Tikoo (1992).
425 Ibid., p. 500f.
426 See Dawis and Phares (1967), Phares (1968) and Miller, Kets de Vries and Toulouse (1982).
427 See Trice and Price-Greathouse (1987).
428 See Plumly and Oliver (1987). The study of Coleman and Deleire can be seen in analogy. They derive theoretically and prove empirically that teenagers with an internal locus of control are more likely to make educational investments. See Coleman and Deleire (2003).

possible explanations for the relationship between locus of control and search for data. Individuals with a high internal locus of control are interested in their surroundings because they consider themselves being able to influence their environment, or because they are more apt to recognize the relevance of certain pieces of data. The latter reasoning is proposed by DAWIS and PHARES.[429]

In the context of high environmental uncertainty FISHER points out that individuals with an external locus of control perceive information about the environment to be more useful than internals.[430] Yet this finding does not imply that externals look for more information in general. This relationship was analyzed by LEFCOURT. In a meta-study comprising over 400 empirical studies of locus of control, he came to the conclusion that individuals with an internal locus of control want a more in-depth understanding of their surroundings and are more perceptive.[431] So it can be concluded:

H 13: Locus of control will have a positive relationship with scope of scanning.

H 14: Locus of control will have a positive relationship with intensity of interpretation.

"To articulate a strategic vision and to undertake formal planning implies the belief that the environment is tractable[.]"[432] Therefore, CEOs with an internal locus of control are "likely to believe in the concept of strategy, engage in strategic planning, implement the structures and processes for monitoring the environment[.]"[433] Following LEWIN and STEPHENS an internal locus of control will lead to a formalized process of detecting opportunities and threats. This reasoning is supported by EVANS who finds out that internally oriented individuals are perceived by their subordinates as people who seem to be very structured.[434] DURAND and NORD also find a statistically significant positive correlation of locus of control with structuring.[435]

On the other hand, ZALTMAN et al. argue that, because of the fact that individuals with an internal locus of control are entrepreneurial, they prefer less bureaucratic

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429 See Dawis and Phares (1967), p. 549.
430 See Fisher (1996), p. 365.
431 See Lefcourt (1982), p. 51ff.
432 Lewin and Stephens (1994), p. 195.
433 Ibid., p. 195.
434 See Evans (1974), p. 176f.
435 See Durand and Nord (1976), p. 432.

organizational design to keep their organizations responsive.[436] The empirical findings of MILLER and TOULOUSE go in a similar direction, showing no relationship between locus of control and structural variables.[437] As the structural variables measured by MILLER and TOULOUSE do not apply to the context of scanning this study follows the argument of LEWIN and STEPHENS and the empirical studies of EVANS[438] and DURAND and NORD[439] and arrive at the following hypotheses:

H 15: Locus of control will have a positive relationship with degree of tool support for interpretation.

H 16: Locus of control will have a positive relationship with fixity of time for interpretation.

Regarding the relationship between locus of control and the interaction with other individuals, there are contradictory results.[440] Therefore, no hypotheses about the relationship between locus of control and the use of personal sources, delegation of scanning and diversity of internal models within the process of interpretation are derived from that.

2.2 Tolerance for Ambiguity

"Tolerance for ambiguity is the psychological characteristic that affects how people react to ambiguity."[441] Individuals with high tolerance for ambiguity do not feel uncomfortable with data that is unclear, fragmented, multiple, probable, vague or unstructured.[442] A more specific definition of tolerance for ambiguity as "the way an individual perceives and processes information about ambiguous situations"[443] is provided by FURNHAM.[444]

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436 See Zaltman, Duncan and Holbek (1973), p. 121ff. They argue that "it is a non bureaucratic type of organizational structure [that] facilitates the process of innovation". See Zaltman, Duncan and Holbek (1973), p. 121.

437 See Miller and Toulouse (1986), p. 1403. See also Burns and Stalker (1961), p. 34f.

438 See Evans (1974), p. 176f.

439 See Durand and Nord (1976), p. 432.

440 Runyon states that, given managers with an internal locus of control, the relationship between managers and subordinates is more authoritarian and supervisors care less. See Runyon (1973), p. 288. The later finding is empirically supported by Durand and Nord. "These results indicated that external supervisors were perceived as showing more consideration than were internal supervisors." Ibid., p. 434. See also the following two studies: Goodstadt and Hjelle (1973) and Mitchell, Smyser and Weed (1975). Pryer and Distefano, however, find a negative relationship between internal locus and control. See Pryer and Distefano (1971).

441 Wright and Davidson (2000), p. 69. See also Lamberton (2005), p. 77.

442 See Norton (1975), p. 608.

443 Furnham (1994), p. 404.

444 See also Furnham and Ribchester (1995), p. 180.

As a person who is tolerant for ambiguity does not consider ambiguity to be a threat[445] and is therefore looking for broad data. This relationship is supported by works of ASHFORD and CUMMINGS,[446] BENNETT et al.[447] and YURTSEVER[448]. It is their finding that individuals with high tolerance for ambiguity seek more feedback from colleagues or supervisors than individuals with low tolerance for ambiguity. In addition, in two different studies GUL finds out that individuals with high tolerance for ambiguity feel less confident when they have to decide and look for more data than individuals with low tolerance for ambiguity.[449]

Furthermore, managers with high tolerance for ambiguity are more risk seeking than managers with low tolerance for ambiguity.[450] The findings of ENTRIALGO et al. are similar. They show that individuals with high tolerance for ambiguity exhibit an entrepreneurial orientation.[451] Therefore, they are more innovative and more engaged in acquiring data about the environment for new opportunities. The innovative character of a person with high tolerance for ambiguity is confirmed by the empirical works of NAKATA and SIVAKUMAR who show a negative correlation between the innovativeness of managers and their avoidance of uncertainty.[452]

LEWIN and STEPHENS reason within the context of environmental analysis: "People with low tolerance for ambiguity prefer to reduce complex issues to more tractable forms, to deal with a minimum of information from the environment. […] People with high tolerance for ambiguity prefer the converse: they are more likely to experiment, to try a variety of approaches, to seek diverse opinions."[453] Therefore, CEOs with high tolerance for ambiguity will engage in broader scanning of the environment.[454] VANDENBOSCH and HUFF come to the same conclusion. "Hence, it would seem that executives who are relatively more tolerant for ambiguity would tend to be more

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445 See McCaskey (1976), p. 64.
446 See Ashford and Cummings (1983) and Ashford and Cummings (1983).
447 See Bennett, Herold and Ashford (1990).
448 See Yurtsever (2001).
449 See Gul (1984), p. 273 and Gul (1986), p. 102.
450 See Judge, Thoresen, Pucik and Welborne (1999), p. 113, Johanson (2000), p. 534 and Lamberton (2005), p. 77.
451 See Entrialgo, Fernández and Vázquez (2000), p. 198f.
452 See Nakata and Sivakumar (1996).
453 Lewin and Stephens (1994), p. 196.
454 See Ibid., p. 196.

prone to scanning behavior because they are not fearful of the ambiguity that often results."[455] They also prove it empirically.[456]

Only the findings of one study do not coincide with the above mentioned. MCGEE et al. also analyze whether or not individuals "who are intolerant of ambiguity will […] seek significantly more information to reduce the level of ambiguity than those processors who are tolerant of ambiguity."[457] But MCGEE et al. do not find that individuals who differ in their tolerance for ambiguity search for significantly different amounts of data.[458] This finding should be disregarded because the authors conclude that the specific way they measured this personality variable within their experiment "does not appear to be useful in describing, understanding, or predicting human information processing."[459] Therefore, in accordance with the studies cited above that empirically support a positive relationship between tolerance for ambiguity and the search of data, the following hypotheses are derived:

H 17: Tolerance for ambiguity will have a positive relationship with scanning frequency.

H 18: Tolerance for ambiguity will have a positive relationship with scope of scanning.

H 19: Tolerance for ambiguity will have a positive relationship with diversity of internal models within the process of interpretation.

H 20: Tolerance for ambiguity will have a positive relationship with intensity of interpretation.

LEWIN and STEPHENS argue that CEOs with high tolerance for ambiguity "do not feel compelled to know what their subordinates are doing at all times (thus reducing ambiguity). […] They are more likely to delegate tasks and authority."[460] Although until now no empirical research has examined this relationship, this work will follow the cited reasoning and will arrive at the following hypothesis:

H 21: Tolerance for ambiguity will have a positive relationship with delegation of scanning.

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455 Vandenbosch and Huff (1997), p. 85.
456 See Ibid., p. 91.
457 McGee, Shields and Birnberg (1978), p. 689.
458 See Ibid., p. 690.
459 See Ibid., p. 681. Therefore, their way of capturing this attitude will not be adopted.
460 Lewin and Stephens (1994), p. 196.

2.3 Need for Achievement

The attitude need for achievement is based on MCCLELLAND's theory of economic growth. He does not believe in "the economist's model of development [which] is a rational one in which enlightened self-interest of man converts pressures acting on the economic system from inside or outside into activities resulting in greater productivity or wealth."[461] According to him, the reason why this rational model still exists is the way people look at inventions. "If the invention proved an economic success, we almost unconsciously assume that the promotion of the invention was economically justifiable on rational grounds at the time. This clearly does not seem to have been the case in many instances. It was only the simultaneous irrational efforts of many people that ultimately justified the enterprise of some of them."[462] He therefore concludes that the economic growth of a society depends directly on an attitude called achievement motivation or need for achievement.[463] This attitude captures the individual internal motivation. Individuals with a high need for achievement do not limit themselves to do the required task in an average way but spend a considerable amount of their time thinking how to do things better. According to his theory every society is characterized by a typical level of need for achievement. Children are socialized in a country-specific manner and will attain a country typical level of need for achievement.[464] As people with higher need for achievement are more entrepreneurial, the society in which they live will prosper significantly more than societies characterized by a low need for achievement. So, in order to reach high economic growth, children should be educated to reach a high need for achievement.[465] MCCLELLAND tries to base his theory on economic facts. But later research can hardly support his theory.[466] Nevertheless, need for achievement is the one personal trait that has received most

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461 McClelland (1976), p. 8.

462 Ibid., p. 14.

463 See Ibid., p. 36.

464 See McClelland (1965).

465 See McClelland (1976), p. 340ff. Connor shows that teaching need for achievement is almost impossible and not reasonable because "if a need for achievement does exist, it may have heavy knowledge, ability, and opportunity components as well as goal and value components, all of which require identification before they can be manipulated. […] There is little justification for investment in such a program at this time." Connor (1971), p. 19. See also Kolb (1965), p. 790.

466 Mazur and Rosa do not find a significant correlation between economic growth and need for achievement. They conclude that "[n]eed for achievement does not generally predict the economic growth of nations." Mazur and Rosa (1977), p. 769. In addition to that see Schatz (1971), p. 183ff. For a theoretical economic discussion see Schatz (1993).

attention in psychological literature concerned with success of individuals in general[467] and of managers specifically[468].

In the context of organizations, science first analyzed whether entrepreneurs have indeed a higher need for achievement than the general population. For example, this relationship is supported by the findings of HORNADAY and BUNKER[469] and HORNADAY and ABOUD[470]. In a second step, the relationship between need for achievement and personal or organizational success has been analyzed.[471] Entrepreneurs with high need for achievement in comparison to other entrepreneurs are shown to be extraordinarily successful.[472] The relationship between need for achievement and success is not limited to entrepreneurs. RUF and CHUSMIR provide an example of 454 managers in Florida whose high need for achievement correlates with work-related dimensions of success such as status, wealth, personal and professional fulfillment.[473]

Need for achievement also influences scanning behavior. Executives with high need for achievement like to anticipate future developments because they engage in long-term planning.[474] They are "likely to carefully analyze the situations which they can proactively manipulate rather react passively to the actions of their clients and competitors."[475] These theoretical assumptions are confirmed by the empirical works of MILLER and TOULOUSE who show using an example of 97 managers in Quebec that high need for achievement significantly correlates with the frequency of environmental analysis. Therefore, it is not only the scanning frequency that is affected by the need for achievement of managers.[476] DURAND and SHEA[477] as well as ENTRIALGO et al.[478] are able to demonstrate that managers with high need for achievement tend to show a more proactive behavior in searching for data and

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467 See Atkinson (1964), p. 242ff.
468 See Gilmer (1971), p. 208f.
469 See Hornaday and Bunker (1970).
470 See Hornaday and Aboud (1971).
471 See Kirk and Brown (2003), p. 46f. and Amyx and Alford (2005), p. 346 and 353f.
472 See Wainer and Rubin (1969), p. 178ff., Davidsson (1989), p. 220 and Lee and Tsang (2001), p. 586 and 593.
473 See Ruf and Chusmir (1997), p. 631ff.
474 See Miller and Dröge (1986), p. 541 and Miller and Toulouse (1986), p. 1391.
475 Entrialgo, Fernández and Vázquez (2000), p. 191. See also Miller and Dröge (1986), p. 541.
476 See Miller and Toulouse (1986), p. 1402.
477 See Durand and Shea (1974).
478 See Entrialgo, Fernández and Vázquez (2000).

gathering more information about their environment by talking to different people, for example. Therefore, the following hypotheses are deduced:

H 22: Need for achievement will have a positive relationship with scanning frequency.

H 23: Need for achievement will have a positive relationship with scope of scanning.

H 24: Need for achievement will have a positive relationship with intensity of interpretation.

H 25: Need for achievement will have a positive relationship with diversity of internal models within the process of interpretation.

MILLER and DRÖGE analyze the behavior of CEOs with high need for achievement. For this purpose they interviewed managers of ninety-three companies.[479] They reached the conclusion that these individuals want to be constantly in touch with the organization and prefer formal mechanisms within the organization.[480] CEOs with high need for achievement stress controlled personal achievement and show distaste for disorder. This prompts them to apply formal rules and policies. In an empirical study MILLER and TOULOUSE find out also that high need for achievement is directly correlated with formalization.[481] This work is in agreement with LEWIN and STEPHENS who conclude that "CEOs high in need for achievement [… will foster] highly formalized strategic planning"[482] and conclude:

H 26: Need for achievement will have a positive relationship with degree of tool support for interpretation.

H 27: Need for achievement will have a positive relationship with fixity of time for interpretation.

Individuals with high need for achievement "strongly prefer to take immediate responsibility for doing things. They are not satisfied unless they feel that they were personally and directly responsible for an achievement."[483] In consequence, they tend not to delegate tasks. MILLER and TOULOUSE prove this assumption empirically and find out that high need for achievement is correlated negatively with task delegation.[484] The following hypothesis can be put forth:

H 28: Need for achievement will have a negative relationship with delegation of scanning.

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479 See Miller, Dröge and Toulouse (1988).
480 See Ibid., p. 554 and Lewin and Stephens (1994), p. 192.
481 See Miller and Toulouse (1986), p. 1402.
482 Lewin and Stephens (1994), p. 191.
483 Miller, Dröge and Toulouse (1988), p. 541.
484 See Miller and Toulouse (1986), p. 1402. For the underlying reason of this finding see Miller and Toulouse (1986), p. 1391.

2.4 Risk Propensity

According to SITKIN and WEINGART, risk propensity is defined as "an individual's current tendency to take or avoid risks."[485] To describe the attitude of an individual towards risk within the organizational context, two major approaches can be identified. The first one is derived from the framework of expected utility.[486] Within this model "risk is most commonly conceived as reflecting variation in the distribution of possible outcomes, their likelihoods, and their subjective values."[487] The subjective values of outcome-likelihood combinations are attributed by decision makers according to their utility function. Its curvature reflects the risk attitude of the individual.[488] The second approach, the psychometric one, is not formalistic. This approach describes risk propensity as the attitude of individuals towards risk with an intellectual and emotive dimension. "Individuals with high risk propensity are willing – indeed they enjoy – to take risks with high stakes."[489] In the context of the work this approach will be followed because it is much broader.[490]

PENNINGS and SMIDTS show the existence of a strong correlation between risk propensity and innovativeness. Individuals with high risk propensity are "open to new experiences and novel stimuli, are willing to use information about new concepts, ideas, products or services, and readily recognize the potential application of new ideas."[491] Additionally they can be described as flexible[492] and entrepreneurial. The latter is the result of a meta-study of STEWART and ROTH.[493] In an additional study NICHOLSON et al. show a strong link between risk propensity and openness.[494] LEWIN and STEPHENS conclude: "For this they are consequently looking for new opportunities and chances."[495] This is validated by SHAPIRA who analyzes after how

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485 Sitkin and Weingart (1995), p. 1575. See also Kogan and Wallach (1964), p. 2, Das and Teng (2001) and Nicholson, Soane, Fenton-O'Creevy and Willman (2005), p. 158ff.

486 For the basis of the expected utility framework see Neumann and Morgenstern (1953), p. 15ff., Schoemaker (1982) and Hogarth and Einhorn (1990).

487 March and Shapira (1987), p. 1404. See also Arrow (1965), p. 11ff.

488 See Pennings and Smidts (2000), p. 1337. An overview about measuring risk attitude by expected utility functions is provided by Harvey (1990).

489 Lewin and Stephens (1994), p. 197.

490 See MacCrimmon and Wehrung (1990), p. 423ff. and Shapira (1995), p. 22ff.

491 Pennings and Smidts (2000), p. 1339. See also Pennings and Smidts (2000), p. 1344.

492 See Wally and Baum (1994), p. 936.

493 See Stewart and Roth (2001). These results are contrary to the findings of Brockhaus. He does not find risk propensity a "distinguishing characteristic of entrepreneurs." Brockhaus (1980), p. 509. See also Miner and Raju (2004), p. 5ff and Miner (1990), p. 221ff.

494 See Nicholson, Soane, Fenton-O'Creevy and Willman (2005), p. 166.

495 Lewin and Stephens (1994), p. 197.

many years managers change their employer.[496] He finds that managers with high risk propensity more often look for new opportunities within their professional environment than managers with low risk propensity. These findings can be applied to scanning, so that it is expected that CEOs with high risk propensity scan more often and with a broader scope.

On the other hand, it can also be argued that individuals with low risk propensity try everything in order to reduce uncertainty and therefore scan the environment to get data about future developments in various sectors. In the context of portfolio management the inclination of individuals with low risk propensity to reduce uncertainty has been shown.[497] But no study was able to show that this relationship exists in conditions that are less technical and that these results are therefore transferable to early warning. So the reasoning of the above mentioned studies is followed arriving at the following hypotheses:

H 29: Risk propensity will have a positive relationship with scanning frequency.

H 30: Risk propensity will have a positive relationship with scope of scanning.

H 31: Risk propensity will have a positive relationship with intensity of interpretation.

2.5 Egalitarianism

Egalitarianism reflects the demand that all humans should be equal in rights, property and consumption and therefore "implies some 'anonymity' or 'impartiality' assumption".[498] An egalitarian person rejects the perception of the world as a just place[499] whereas a non-egalitarian person believes "that people receive the rewards and punishments they deserve."[500]

The underlying rationale of this attitude is RAWLS theory of ethics which has fundamentally changed the philosophical discussion about ethics within Western moral philosophy since 1971.[501] RAWLS argues that no equal opportunities on earth and not even within a society exist because life begins with a random lottery and individuals start from an advantaged or disadvantaged position. In order to eliminate

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496 See Shapira (1995).
497 See Pennings and Smidts (2000), p. 1344.
498 Kolm (1977), p. 1.
499 See Rubin and Peplau (1973), p. 66.
500 Bass, Barnett and Brown (1989), p. 188.
501 See Rawls (1971).

the risk of being born into a wrong family or wrong class[502] he demands that no one should profit of or have disadvantages from the lottery of birth. This means that the welfare of those who are off the worst has to be maximized until the welfare of every society member is equal. This redistribution of wealth leads to a society everyone would choose to enter if no data about the outcome of the lottery at the time of birth were available.

The economic literature understands the realization of egalitarianism as the equal distribution of income and property.[503] Egalitarianism has been criticized economically on the ground of equality-efficiency losses. The second fundamental theorem of welfare economics states that such loss can only prevented under the assumption of a) complete markets and b) the possibility of incentive-neutral wealth transfer. Whereas the first condition seems to hold up with rising competition and transparency, the extensive literature about aggregated deadweight loss provides clear evidence that no lump-sum transfers are possible without access burden.[504] The economic point of view shows which degree of equality can be achieved with instruments such as markets and taxes.[505]

Although egalitarianism might have failed on a national level, it is still applied to other contexts. Within the organizational context this ideal causes structures and decisions to be judged by the standard of justice and fairness for all employees.[506] "What is just and fair to egalitarians depends on affirmative answers to questions such as the following: are the less fortunate (such as unskilled employees, disadvantaged groups, minority workers, weak competitors) helped as much – or more – by this decision?"[507] Egalitarian CEOs want to make the decision making process more democratic, so that it includes a wider spectrum of individuals from a variety of levels within the company.[508] Therefore, "RAWLS's theory, with its concern for individual self-esteem, provides a philosophical underpinning for business managers once again to consider

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502 In this context he speaks about the veil of ignorance that everyone has before entering this world. See ibid, p. 136ff. As a result of this ignorance about the circumstances of future life people will tend to opt for equality. See Ibid., p. 100ff. For a critique of Rawls assumptions see for example Buchanan (1976).

503 See Puttermann, Roemer and Silvestre (1998), p. 861.

504 See for example Ramsey (1927) and Aaron and Munnel (1992).

505 See Lampman (1993).

506 See Moriarty (2005), p. 458ff. In contrast, Phillips and Margolis argue that states and companies are different kinds of entities and therefore require different ethical theories. See Phillips and Margolis (1999), p. 619ff.

507 McGuire (1977), p. 26.

508 See ibid., p. 26.

workers as individuals capable of thinking, feeling, and contributing to corporate decision making rather than cogs of the machine."[509]

In this context, LEWIN and STEPHENS reason as follows: "Since egalitarians believe that all members of the organization should be treated fairly, such CEOs would initiate structures for 'employee voice' (HIRSCHMAN) – i.e. access to communication and decision-making networks. […] Egalitarian CEOs, because of their respect for the individual and preference for power equalization […] will implement multiple avenues for bottom-up and lateral communications[.]"[510] This type of communication is also reflected by the scanning process of CEOs with a high degree of egalitarianism. They use their employees more often as a source of scanning than CEOs with a low degree of egalitarianism. Therefore, the following hypothesis is deduced:

H 32: Egalitarianism will have a positive relationship with use of internal, personal sources for scanning.

2.6 Moral Reasoning

Literature stresses the importance of ethical behavior within the organizational context.[511] "Formally defined, ethical behavior is that which is […] accepted as 'good' and 'right' as opposed to 'bad' or 'wrong' in a particular setting."[512] In practice, the actual ethical behavior of individuals is hard to predict. One possibility to estimate such behavior is to analyze the individual's ethical judgment, i.e. "the degree to which he or she considers a particular behavior morally acceptable"[513], because many empirical works show that ethical behavior is directly linked to the ability to judge ethically.[514] Based on these studies CANDEE concludes that the structure of moral reasoning can be analyzed in order to predict ethical behavior and choices.[515]

This structure is reflected by the stage of cognitive moral development (CMD).[516] "[T]he CMD stage that a person attains governs the reasoning process for considering ethical decisions, and also dictates the sort of issues that the individual considers to fall

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509 Shin and Zashin (1982), p. 11 (format of source not adopted). See also McGuire (1977), 26f.
510 Lewin and Stephens (1994), p. 194.
511 See Bass, Barnett and Brown (1989), p. 183 and the sources mentioned there.
512 Sims (1992), p. 505 (format of source not adopted).
513 Bass, Barnett and Brown (1989), p. 189.
514 See Trevino (1986), p. 603, Stratton, Flynn and Johnson (1981), p. 36ff., Vallerand, Deshaies, Cuerrier, Pelletier and Mongeau (1992), p. 103f. and Lewin and Stephens (1994), p. 197.
515 See Candee (1976), p. 1293.
516 For alternative measurements of moral behavior see Hosmer (1997).

within the moral domain."[517] The model of CMD was developed by KOHLBERG[518] who bases his typology on the two main moral philosophies: teleological[519] and deontological[520] moral reasoning. He postulates six stages of moral development clustered in groups of preconventional, conventional, principled levels of moral reasoning.[521] As individuals mature and develop, their process of moral decision making becomes more complex and sophisticated; they get to higher levels of moral development. The mature individual is finally characterized by a cognitive moral decision-making process.[522] Accordingly, BEU et al. point out that "[i]ndividuals with higher levels of cognitive moral development will behave ethically more often than those with lower levels of cognitive moral development."[523] This is validated by other researchers.[524]

LEWIN and STEPHENS argue that in the organizational context, persons with a high CMD "will establish a climate of ethicality throughout their organization, and will attempt to prevent wrongs committed in the name of the organization"[525] towards other people. These authors conclude that managers with a high degree of moral reasoning supporting this purpose have to scan the socio-cultural sector of their environment constantly. This reasoning of LEWIN and STEPHENS can be fundamentally

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517 Lewin and Stephens (1994), p. 197.

518 See Kohlberg, Levine and Hewer (1983), p. 5ff. For a description of the shortcomings of Kohlberg's construct see Kay (1982), p. 30ff.

519 "Teleological theory holds that certain actions are right because they have positive consequences in terms of the various goods humans desire: for example, happiness, friendship, economic outcomes, and the traditional notion of the common good." Cherry and Fraedrich (2000), p. 174. See also Finnis (1988), p. 84 for a definition of teleological ethics.

520 Deontological theorists believe that an action is inherently right regardless of its consequences. Kant is one of the most important representatives. See Laczniak and Murphy (1993), p. 57ff. and Ashmore (1987), p. 93ff.

521 The preconventional level comprises stage 1 (punishment and obedience orientation) and stage 2 (instrumental relativist orientation). The conventional level comprises stage 3 (interpersonal concordance) and stage 4 (society maintaining orientation). The last level, the principled or postconventional, autonomous one comprises stage 5 (social contract orientation) and stage 6 (universal ethical principle orientation). See Kohlberg (1972), p. 17ff. and 409ff. Weber shows the occurrence of these categories empirically. See Weber (1990), p. 335ff.

522 See Kohlberg (1972), p. 16 and Kohlberg (1974), p. 5ff.

523 Beu, Buckley and Harvey (2003), p. 92.

524 One example for this empirical research is the work by Candee. He finds that persons characterized by a higher stage of moral structure more often make moral choices consistent with human rights than people characterized by a lower stage of moral structure. See Candee (1976). These findings were empirically confirmed. See Randall (1989) and Bass, Barnett and Brown (1989). Very view empirical research has been conducted in the organizational context. Lovell is an exception. He applies the types of moral reasoning to accounting theories of control. See Lovell (1977), p. 154ff.

525 Lewin and Stephens (1994), p. 198f.

questioned. High degree of moral reasoning does not necessarily influence ethical behavior. There are other variables to explain ethical behavior. One of them is the ability to perform a specific task.[526] MOORES and CHANG for example find out that in the context of software piracy the ethical judgment and the actual behavior are not correlated[527] whereas the technical expertise is correlated with using illegal copies of software.[528] Other factors that influence ethical behavior in general are social norms[529] and the assessed consequences of an act perceived to be unethical.[530] This influence has been empirically shown in the context of unethical workplace behavior.[531] Although evidence exists about other variables than the degree of moral reasoning influencing ethical behavior this work applies the studies which show a positive relationship between moral reasoning and ethical actions. The reason is that these studies show this correlation in a general context and do not focus on single ethical situations as software piracy. Therefore, this study follows the above presented reasoning of LEWIN and STEPHENS and concludes:

H 33: Moral reasoning will have a positive relationship with the frequency of scanning the socio-cultural sector.

2.7 Machiavellianism

MACHIAVELLI in his "Discourses on The First Ten Books of Titus Livius"[532] and in his short novel "The Prince"[533] describes the Italian history of the 15th and 16th century from the angle of the leaders and their way to exert and retain power. His main message is that a prince should be prepared to take any actions required to achieve his goals. From this point of view the attitude Machiavellianism is derived. "[W]e define Machiavellianism in terms of the individual's beliefs about whether other people can and should be manipulated to achieve desired ends. Above all, individuals who are high in Machiavellianism believe in the acceptability of treating people as a means toward ends."[534]

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526 See Sheppard, Hartwick and Warshaw (1988) and the reply of Ajzen (1991).
527 See Moores and Chang (2006), p. 176.
528 See Peace, Galletta and Thong (2003).
529 See Dubinsky and Loken (1989).
530 See Hunt and Vitell (1986), Marshall and Dewe (1997) and Morris and McDonald (1995).
531 See Loch and Conger (1996) and Thong and Yap (1998).
532 Machiavelli (1950).
533 Ibid.
534 Lewin and Stephens (1994), p. 192. See also Wrightsman (1991), p. 376 and Geis (1978), p. 305.

Although MACHIAVELLI provides advice to the 16th century's Italian leaders, his views about achieving and retaining power can be applied to top executives.[535] "A definition of the twentieth century Machiavellian administrator is one who employs aggressive, manipulative, exploiting and devious moves in order to achieve personal and organizational objectives."[536] In order to achieve desired ends, a highly Machiavellian individual might use manipulative, persuasive, and deceitful behavior.[537] GRAMS and ROGERS confirm this description empirically.[538] LAMDAN and LORR[539] as well as DURKIN[540] show the correlation of high Machiavellianism with the tendency to regard persons as objects.

Machiavellian structure also influences early warning behavior. "Machiavellian people are very high in need for control. Hence it can be expected that high-Machiavellianism CEOs will implement hierarchical organization structures, and centralized control and monitoring systems – that is, some variant of a mechanistic organization design."[541] A hierarchical organization with formalized processes and a low degree of delegation will help the Machiavellian individual to retain control. This is supported by the empirical findings of DURAND and NORD, who analyze the relationship between Machiavellianism and the initiation of structure.[542] They conduct their study within a textile and plastic company and examine the degree of Machiavellianism for 49 managers. For this, subordinates are asked about their supervisors.[543] The result of this study is that Machiavellianism and the initiation of structure are positively correlated.[544] According to their measurement method, the greater the managerial initiation of structure is the lower the degree of delegation.[545] In addition, GEMMILL and HEISLER also observe that Machiavellianism is positively correlated with the perceived opportunity to exercise formal control in a specified environment.[546]

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535 See Gable and Dangello (1994), p. 599. For an overview of studies about Machiavellianism within the business context see Gable and Dangello (1994), p. 600. See also Bedell, Hunter, Angie and Vert (2006).
536 Calhoon (1969), p. 211. See also Jay (1967), p. 17.
537 See Hunt and Chonko (1984), p. 31.
538 See Grams and Rogers (1989).
539 See Lamdan and Lorr (1975).
540 See Durkin (1970).
541 Lewin and Stephens (1994), p. 192.
542 See Durand and Nord (1976).
543 See Ibid., p. 433.
544 See Ibid., p. 433.
545 See Ibid., p. 429.
546 See Gemmill and Heisler (1972), p. 58.

The two cited studies support the reasoning of LEWIN and STEPHENS from where the following hypotheses are deduced:

H 34: Machiavellianism will have a negative relationship with delegation of scanning.

H 35: Machiavellianism will have a positive relationship with degree of tool support for interpretation.

H 36: Machiavellianism will have a positive relationship with fixity of time for interpretation.

2.8 Trust in People

Individuals with high trust in people have high confidence in the goodness of people in general.[547] "Trust in people […] reflects the individual's basic philosophy of human nature: Are people essentially good or evil, hardworking or lazy, trustworthy or dishonest, generous or stingy? [… It is a] basic belief in the goodness of human nature [that] implies a fundamental assumption that people tend to behave virtuously."[548] Interpersonal trust is an important social resource that facilitates cooperation and enables coordinated social interaction.[549] In the organizational context ROBERTS and O'REILLY stress the importance of trust in people and consider this attitude the basis for open communication. They reason that only managers with high trust in people will listen to other individuals and respect their opinions.[550] Their argumentation is followed and concluded:

H 37: Trust in people will have a positive relationship with use of personal sources.

H 38: Trust in people will have a positive relationship with diversity of internal models within the process of interpretation.

CEOs with high trust in people believe in the intrinsic motivation of their employees and their feeling of responsibility for tasks delegated to them. Because of this they are inclined to delegate tasks and to empower their employees. They will "officially assign specific scanning tasks to specific managers, based on their functional expertise and responsibilities."[551] In accordance with this, MACAULEY[552] and POWELL[553] show

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547 See Rosenberg (1957), p. 26.
548 Lewin and Stephens (1994), p. 194. See also Williams (2001), p. 377.
549 See Coleman (1988), p. 102.
550 Roberts and O'Reilly (1974), p. 205.
551 Yasai-Ardekani and Nystrom (1996), p. 187. Aaker for example proposes this delegation of scanning for which trust in people is a prerequisite. See Aaker (1983), p. 79ff.
552 See Macauley (1963).

that trust in people reduces the inclination to monitor others. Therefore, the following hypothesis is put forth:

H 39: Trust in people will have a positive relationship with delegation of scanning.

Having analyzed the relationships between the two types of contingency variables, the relationship between success of early warning and the economic success of an organization will finally be considered.

3 Relationship between Success of Early Warning and Economic Success

Success of early warning is the prerequisite to react on time to possible risks and chances.[554] Only organizations which can anticipate trends are able to remain competitive and profitable. A strong link between success of early warning and the economic success of an organization is therefore assumed. Nevertheless, it is clear that the economic success of an organization is also determined by a broad number of other factors.[555]

On the basis of eighty-one case studies MILLER and FRIESEN analyze the intelligence/rationality factor of organizations which comprises areas such as environmental scanning and build ten archetypes – six of successful and four of unsuccessful firms.[556] They find out that environmental scanning as well as general intelligence activities are perceived to be substantial only in well performing companies whereas they are considered poor in low performing companies.[557] For US Fortune 500 companies SUBRAMANIAN et al. analyze the relationship between organizational performance, measured by growth and profitability, and advanced scanning systems.[558] They find out that firms using advanced systems are characterized by higher growth and profitability than firms without such systems. In a following study, SUBRAMANIAN et al. pursue this research question with six hundred hospitals of the American Hospital Association. Similarly to the former study, they

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553 See Powell (1990).

554 See Daft and Weick (1984), p. 286, Milliken (1990), p. 42, Garg, Walters and Priem (2003), p. 725f. and Child (1997), p. 47.

555 See Hirsch (1975), p. 332.

556 See Miller and Friesen (1977).

557 "One fact is particularly worth noting. That is that the highest intelligence/rationality score amongst the failure archetypes is lower than the lowest intelligence/rationality score amongst the successful archetypes. The intelligence factor discriminates perfectly amongst failure and successful archetypes." Ibid., p. 269.

558 See Subramanian, Fernandes and Harper (1993).

find out that hospitals with advanced scanning systems have better occupancy rates and lower expenditures per bed.[559]

Therefore it can be concluded:

H 40: Success of early warning will have a positive relationship with economic success.

4 Overview of Hypotheses

Table 3 provides an overview about all derived hypotheses deduced in this section.

		Sign
H 1	Perceived strategic uncertainty in sectors of the task environment will be greater than in sectors of the general environment.	no sign
Hypotheses about Perceived Strategic Uncertainty Perceived strategic uncertainty will have a relationship with		
H 2a	Scanning Frequency	+
H 3a	Use of Personal Sources	+
H 4a	Use of Impersonal Sources	0
H 5a	Diversity of Internal Models	+
H 6a	Use of External Sources	+
H 7a	Use of Internal Sources	0
H 8a	Scope of Scanning	+
H 9a	Intensity of Interpretation	+
H 10a	Delegation of Scanning	-
H 11a	Degree of Tool Support	+

[559] See Subramanian, Kumar and Yauger (1994).

		Sign
Hypotheses about the Alignment to Perceived Strategic Uncertainty The alignment between perceived strategic uncertainty and the following design variable will be … (+: higher, 0: the same, -: lower) for organizations with effective early warning behavior than for organizations with ineffective early warning behavior.		
H 2b	Scanning Frequency	+
H 3b	Use of Personal Sources	+
H 4b	Use of Impersonal Sources	0
H 5b	Diversity of Internal Models	+
H 6b	Use of External Sources	+
H 7b	Use of Internal Sources	0
H 8b	Scope of Scanning	+
H 9b	Intensity of Interpretation	+
H 10b	Delegation of Scanning	-
H 11b	Degree of Tool Support	+
Hypotheses about Locus of Control Locus of Control will have a relationship with		
H 12	Scanning Frequency	+
H 13	Scope of Scanning	+
H 14	Intensity of Interpretation	+
H 15	Degree of Tool Support	+
H 16	Fixity of Time for Interpretation	+
Hypotheses about Tolerance for Ambiguity Tolerance for Ambiguity will have a relationship with		
H 17	Scanning Frequency	+
H 18	Scope of Scanning	+
H 19	Diversity of Internal Models	+
H 20	Intensity of Interpretation	+
H 21	Delegation of Scanning	+
Hypotheses about Need for Achievement Need for achievement will have a relationship with		
H 22	Scanning Frequency	+
H 23	Scope of Scanning	+
H 24	Intensity of Interpretation	+
H 25	Diversity of Internal Models	+
H 26	Degree of Tool Support	+
H 27	Fixity of Time for Interpretation	+
H 28	Delegation of Scanning	-

		Sign
Hypotheses about Risk Propensity Risk propensity will have a relationship with		
H 29	Scanning Frequency	+
H 30	Scope of Scanning	+
H 31	Intensity of Interpretation	+
Hypothesis about Egalitarianism Egalitarianism will have a relationship with		
H 32	Use of Internal, Personal Sources	+
Hypothesis about Moral Reasoning Moral reasoning will have a relationship with		
H 33	Frequency of Scanning the Socio-Cultural Sector	+
Hypotheses about Machiavellianism Machiavellianism will have a relationship with		
H 34	Delegation of Scanning	-
H 35	Degree of Tool Support	+
H 36	Fixity of Time for Interpretation	+
Hypotheses about Trust in People Trust in people will have a relationship with		
H 37	Use of Personal Sources	+
H 38	Diversity of Internal Models	+
H 39	Delegation of Scanning	+
Hypotheses about Success of Early Warning Success of early warning will have a relationship with		
H 40	Economic Success	+

Table 3: Overview of Hypotheses about the Relationship between Contingency and Design Variables of Early Warning Behavior

E Operationalization of the Research Model

The following chapter presents the operationalization of the research model. First, basic aspects of the operationalization are described, and then the operationalization of the design variables of early warning behavior follows with its two steps, scanning and interpretation. The third paragraph explains the operationalization of the contingency variables. These are environmental uncertainty and managerial attitudes. Finally, the operationalization of success measures used in this work is presented.

1 Basic Aspects of the Operationalization

In this study, the relationships between variables which are not directly observable are analyzed. Such variables are defined as constructs and are measured by indicators that determine them.[560] The first step to develop such a construct is conceptualization, i.e. the description of its relevant dimensions. In the second step, the construct is operationalized by one or various indicators.[561] If possible, tested constructs are used for this analysis. Therefore, a modification of an existing construct or the development of a new one is only done when no tested one exists. Two reasons lead to the measurement of the constructs on the 7-point-Likert scale: 1) Most of the constructs taken from literature are tested on the 7-point-Likert scale and 2) in the context of the here used pretest, the participants showed a preference for the 7-point-Likert scale in comparison to the 6-point-Likert scale.

A questionnaire was developed based on these constructs. The methodology of a written interrogation was adopted because it is the most efficient way to get data from a large number of participants.[562] This preliminary questionnaire was tested in pretests and within the academic environment.[563] The resulting final version of the questionnaire contains the constructs, presented in the following.

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560 See Nunnally (1978), p. 2. For a detailed introduction to constructs and their indicators see F 2.2.
561 See Churchill Jr. (1979), p. 66.
562 See Bortz and Döring (2003), p. 253 and 53ff.
563 See F 1.1 for a detailed explanation of the methodology and a description of the development of the questionnaire.

2 Operationalization of Early Warning Behavior

2.1 Scanning

2.1.1 Scanning Frequency and Sources

Scanning frequency is the frequency an executive scans the environment. It is measured on a scale from 1 (never) to 7 (every day) by asking how often he receives useful data in order to be able to detect chances and risks. The construct scanning frequency comprises four parts. Each part is related to one type of source: 1) internal, personal, 2) internal, impersonal, 3) external, personal and 4) external, impersonal sources. For each source examples are provided. Within each of these four blocs, for each of the seven sectors of the environment (customers, technologies, competitors, suppliers and political/legal, economic, socio-cultural conditions)[564] the executive is asked how often he gets useful data from these specific sources of early warning. Scanning frequency comprises the sum of these four parts. This construct was developed by HAMBRICK[565] and CULNAN[566], and validated later by works of DAFT et al.,[567] ELENKOV[568] and MCGEE and SAWYERR.[569]

Examples of internal, personal sources are employees such as department managers, researchers, sales representatives and employees of the marketing department.

Indicators of the Construct 'Internal, Personal Sources'
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen von Mitarbeitern, z.B. von Abteilungsleitern, Forschern, Mitarbeitern aus dem Vertrieb und dem Marketing bezüglich folgender Bereiche?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 4: Operationalization of the Construct 'Internal, Personal Sources'

564 See D 1 for an explanation of these sectors.
565 See Hambrick (1981), p. 305 and Hambrick (1982), p. 163.
566 See Culnan (1983), p. 197.
567 See Daft, Sormunen and Parks (1988), p. 129.
568 See Elenkov (1997), p. 296.
569 See McGee and Sawyerr (2003), p. 391f.

Examples of internal, impersonal sources are internal reports and the management information system.

Indicators of the Construct 'Internal, Impersonal Sources'
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen aus unternehmensinternen Berichten oder aus Ihrem (Management-)Informationssystem bezüglich folgender Bereiche?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 5: Operationalization of the Construct 'Internal, Impersonal Sources'

Examples of external, personal sources are business peers, clients, suppliers, external consultants and politicians.

Indicators of the Construct 'External, Personal Sources'
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen von Geschäftsfreunden, Kunden, Zulieferern, externen Beratern, Politikern bezüglich folgender Bereiche?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 6: Operationalization of the Construct 'External, Personal Sources'

Examples of external, impersonal sources are professional journals, newspapers, external databases and the internet.

Indicators of the Construct 'External, Impersonal Sources'
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen aus Fachzeitschriften, Zeitungen, externen Datenbanken und dem Internet bezüglich folgender Bereiche?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 7: Operationalization of the Construct 'External, Impersonal Sources'

2.1.2 Scope of Scanning

The scope of scanning is the amplitude of an executive's scanning horizon. It is measured by asking about the perceived usefulness of broad data within the context of early warning. Originally, it was developed by CHENHALL and MORRIS and applied to the scope of management information systems.[570] Because the dimensions of the construct are not useful within the context of early warning, the concept of perceived usefulness of data is adopted. Therefore it is necessary to ask about the usefulness of broad data within each of the seven sectors of the environment (customers, technologies, competitors, suppliers and political/legal, economic, socio-cultural conditions) for the early detection of chances and risks.

Indicators of the Construct 'Scope of Scanning'
Wie nützlich sind Ihres Erachtens folgende Informationen für die Früherkennung?
Informationen über das Verhalten potenzieller Kunden
Informationen über allgemeine technologische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen
Informationen über potenzielle Wettbewerber
Informationen über potenzielle Zulieferer
Informationen über allgemeine politische und gesetzgeberische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen
Informationen über allgemeine wirtschaftliche Entwicklungen, die Ihr Unternehmen nicht direkt betreffen
Informationen über allgemeine soziokulturelle Entwicklungen, die Ihr Unternehmen nicht direkt betreffen

Table 8: Operationalization of the Construct 'Scope of Scanning'

[570] See Chenhall and Morris (1986), p. 32.

2.1.3 Degree of Delegation

The degree of delegation is the degree to which an executive delegates the task of scanning. For each of the seven sectors of the environment the CEO is asked to what extent he delegates the task of scanning. This construct was developed and used by YASAI-ARDEKANI and NYSTROM.[571]

Indicators of the Construct 'Degree of Delegation'
Welche Bereiche der Informationsbeschaffung erledigen Sie persönlich; welche haben sie delegiert?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 9: Operationalization of the Construct 'Degree of Delegation'

2.2 Interpreting

2.2.1 Diversity of Internal Models

The construct diversity of internal models describes the diversity of these models for the partners with whom an executive interprets data about potential chances and risks for his organization. The construct asks to which extent the executive agrees that he interprets data about potential chances and risks with each type of possible partners.

[571] See Yasai-Ardekani and Nystrom (1996), p. 194.

Indicators of the Construct 'Diversity of Internal Models'
Inwieweit stimmen sie folgenden Aussagen zu? Bei der Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen diskutiere ich mit …
Mitarbeitern
Kunden
Zulieferern
Geschäftsführern oder Vorständen
Unternehmensberatern
Anwälten/Steuerberatern
Freunden und Familienangehörigen
Anderen Personen

Table 10: Operationalization of the Construct 'Diversity of Internal Models'

2.2.2 Intensity of Interpretation

The intensity of interpretation describes the degree of intensity a manager executes the interpretation process. Intensity has two dimensions: importance and frequency.[572] Importance is covered by the question about the importance attributed to interpretation of potential risks and chances by the executive. In addition to that, frequency of interpretation is elicited from a scale from 1 (never) to 7 (daily).

Indicators of the Construct 'Intensity of Interpretation'
Inwieweit stimmen Sie folgende Aussagen zu?
Die Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen erachte ich als sehr wichtig.
Welcher Aussage stimmen Sie zu?
Informationen über mögliche Chancen und Risiken für mein Unternehmen interpretiere ich …

Table 11: Operationalization of the Construct 'Intensity of Interpretation'

2.2.3 Degree of Tool Support

The degree of tool support is the degree to which the interpretation of data about potential risks and chances is supported by tools or instruments. Instruments for interpreting data obtained from scanning are, for example, scenario-writing, simulation, morphological analysis or war games. In practice only the scenario technique is spread out.[573] So the construct asks about the degree to which the

[572] See Jung (1921), p. 123f.

[573] See Fahey, King and Narayanan (1981), p. 35. They examine the use of instruments within the process of early warning. See also Herzhoff (2004), p. 162.

interpretation of data of potential chances and risks is supported by tools such as the scenario analysis.

Indicators of the Construct 'Degree of Tool Support'
Inwieweit stimmen sie folgender Aussage zu?
Die Interpretation von Informationen über mögliche Chancen und Risiken wird in meinem Unternehmen von Instrumenten wie der Szenarioanalyse unterstützt.

Table 12: Operationalization of the Construct 'Degree of Tool Support'

2.2.4 Fixity of Time for Interpretation

Fixity of time for interpretation is the extent to which executives interpret data about potential chances and risks apart from their regular business. Do they have a fixed time or date for interpretation or do they interpret during their daily routine?

Indicators of the Construct 'Fixity of Time for Interpretation'
Inwieweit stimmen Sie folgenden Aussagen zu?
Informationen über mögliche Chancen und Risiken für mein Unternehmen interpretiere ich außerhalb meines normalen Tagesgeschäftes.

Table 13: Operationalization of the Construct 'Fixity of Time for Interpretation'

3 Operationalization of Contingency Variables

3.1 Environmental Uncertainty

The environment of the organization comprises all factors outside the organization which influence its decisions.[574] First, the adjacent accounting literature is studied in order to measure the perceived uncertainty of the organizational environment.[575] Different measurements of environmental uncertainty are used. This can be illustrated by examples of studies which analyze the perceived usefulness of broad data derived from the management information system. GORDON and NARAYANAN's uncertainty construct,[576] for example, comprises the dimension of intensity of competition, the dynamic and unpredictable nature of certain environmental sectors

[574] See Duncan (1972), p. 314 and Garg, Walters and Priem (2003), p. 726.
[575] See D 1 for the difference between intersubjective and perceptual measures of environmental uncertainty.
[576] See Gordon and Narayanan (1984).

and specific elements of change.[577] CHENHALL and MORRIS use a different construct to capture environmental uncertainty.[578] They ask about the lack of data and the impossibility to assign probabilities to future outcomes of developments within environmental sectors. Other studies which also treat the same topic use individual ways to measure environmental uncertainty.[579] "The application of a single valid and reliable measure of environmental uncertainty would assist in comparing the results of studies examining uncertainty[.]"[580] This is especially true because there might not exist a high correlation between two perceptual measures.[581]

In contrast to this adjacent literature, scanning literature is dominated by a unique construct for uncertainty: perceived strategic uncertainty. Its basis is DUNCAN's concept of perceived environmental uncertainty.[582] He differentiates between task and general environment. The organization is in direct contact with the task environment; the contact with the general environment, however, is only indirect. Within this research outlay, the first layer, i.e. task environment, includes customers, technologies, competitors and suppliers. The second layer, i.e. general environment, includes political/legal,[583] economic and socio-cultural conditions. In all of these seven sectors[584] perceived environmental uncertainty is derived from complexity and rate of change. Later research postulates that the importance a sector has for an organization also causes incertitude.[585] So together, uncertainty and importance create perceived strategic uncertainty. Following DAFT et al.,[586] ELENKOV[587] and SAWYERR,[588] a multiplicative rather than a linear function of uncertainty and importance is assumed:

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577 This construct is for example used by Chong and Chong who analyze the relationship between environmental uncertainty, strategic decisions, management accounting systems and performance. See Chong and Chong (1997), p. 271.

578 See Chenhall and Morris (1986), p. 24.

579 See for example Gul and Chia (1994).

580 Chenhall (2003), p. 138. See also Miller (1993), p. 698.

581 See Downey, Hellriegel and Slocum (1975), p. 621ff.

582 See Duncan (1972).

583 They are also called regulatory conditions.

584 Various researchers varied this scale in minor ways. For example Garg et al. omit the suppliers and considered only six sectors. See Garg, Walters and Priem (2003), p. 732.

585 See Pfeffer and Salancik (1978), p. 269, Daft, Sormunen and Parks (1988), p. 131f. and Elenkov (1997), p. 288.

586 See Daft, Sormunen and Parks (1988), p. 130.

587 See Elenkov (1997), p. 296.

588 See Sawyerr (1993), p. 292. The only difference is that Sawyerr uses a five-point-Likert scale. This concept is further applied by McGee and Sawyerr (2003). See McGee and Sawyerr (2003), p. 391.

$$PSU = EU \cdot EI$$

with *PSU:* *Perceived Strategic Uncertainty*
EU: *Environmental Uncertainty*
EI: *Environmental Importance*

Formula 1: *Perceived Strategic Uncertainty*[589]

Now the items of this intricate construct are described that consist of three sub-constructs: environmental complexity, environmental rate of change and environmental importance.

Each sub-construct first gives an explanation of the element of uncertainty: complexity, rate of change and importance. Then, the executive has to rate the degree of this element for each of the seven sectors of the environment (customers, technologies, competitors, suppliers and legal/political, economic, socio-cultural conditions). These seven sectors are described in the first sub-construct. By assessing seven sectors simultaneously, the CEO is able to compare sectors. The three mentioned sub-constructs are described in the following.

The construct itself was used before by DAFT et al.,[590] ELENKOV,[591] SAWYERR[592] and MAY et al.[593].

Environmental Complexity

"Complexity refers to the heterogeneity of external events that are relevant to the organization."[594] The larger the number and diversity of different external events, the more complex is the environment.[595]

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589 See Daft, Sormunen and Parks (1988), p. 130, Sawyerr (1993), p. 292 and Elenkov (1997), p. 296. In accordance with these researchers, the notions 'environmental uncertainty', 'environmental complexity', 'environmental rate of change' and 'environmental importance' are adopted although they do not indicate the subjective character of these measures.
590 See Daft, Sormunen and Parks (1988), p. 128f.
591 See Elenkov (1997), p. 295.
592 See Sawyerr (1993), p. 292.
593 See May, Stewart and Sweo (2000), p. 410.
594 Child (1972), p. 4 and see Duncan (1972), p. 314f.
595 See Daft, Sormunen and Parks (1988), p. 125.

Indicators of the Construct 'Environmental Complexity'
Wie komplex sind Ihres Erachtens folgende Bereiche der Unternehmensumwelt für Ihr Unternehmen? Unter komplex verstehen wir die Anzahl und Unterschiedlichkeit von Ereignissen im jeweiligen Bereich.
Kunden (Individuen oder Firmen, die Ihre Produkte kaufen, Kundentrends, Nachfrage nach Ihren Produkten, typischer Kunde bezüglich Einkommen und Alter)
Technologien (Allgemeine Technologien, Produktionstechnologien)
Wettbewerber (Wettbewerb innerhalb Ihrer Industrie, beispielsweise Preiswettkampf, Eintritt und Austritt von Wettbewerbern)
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich (Politische Bedingungen auf Bundes-, Landes- und kommunaler Ebene, Gesetzgebung, z.B. Steuergesetzgebung, Umweltauflagen)
Wirtschaftliche Rahmenbedingungen (Allgemeine wirtschaftliche Bedingungen, z.B. Inflation, Zinsniveau, Wechselkurs, Bundes-, Landes- und Kommunalausgaben, wirtschaftliche Produktivität, Wirtschaftswachstum)
Soziokultureller Bereich (Gesellschaftliche Werte, Normen und Einstellungen, Geschmack bezüglich Lifestyle)

Table 14: Operationalization of the Construct 'Environmental Complexity'

Environmental Rate of Change

Following DUNCAN the rate of change refers to the frequency of changes occurring within the environment of an organization.[596] If rate of change is high, the environment changes so rapidly that the top executive feels uncertain about it.

Indicators of the Construct 'Environmental Rate of Change'
Wie dynamisch sind Ihres Erachtens folgende Bereiche der Unternehmensumwelt für Ihr Unternehmen? Unter dynamisch verstehen wir die Häufigkeit und Änderungsgeschwindigkeit von Trends und Entwicklungen im jeweiligen Bereich.
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 15: Operationalization of the Construct 'Environmental Rate of Change'

[596] See Duncan (1972), p. 316f. and Osborn and Hunt (1974), p. 233f.

Environmental Importance

The construct environmental importance explains the dependence of the organization on the environment.[597] Therefore, the importance of a sector is the extent to which organizational goals are influenced by the resources provided by this sector.[598]

Indicators of the Construct 'Environmental Importance'
Wie stark ist Ihres Erachtens die wirtschaftliche Situation Ihres Unternehmens von Ereignissen im jeweiligen Bereich abhängig?
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 16: Operationalization of the Construct 'Environmental Importance'

3.2 Personality

3.2.1 Locus of Control

"An internal locus of control [i.e. high value of locus of control] indicates that an individual believes that he or she is responsible for the reinforcement experienced: in effect, that the person's actions, characteristics, qualities, etc. are prominent determinants of the experiences being queried."[599] The opposite is true for a person with low value of locus of control. This study uses JAKOBY and JACOB's construct.[600] It is based on the translation made by ROST-SCHAUDE[601] of ROTTER's construct locus of control.[602]

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597 See Osborn and Hunt (1974), p. 234f.
598 See Hickson, Hining, Lee, Schneck and Pennings (1971), p. 217.
599 Lefcourt (1991), p. 420.
600 See Jakoby and Jacob (1999), Jakoby and Jacob (2004).
601 See Rost-Schaude (1982).
602 See Rotter (1966).

Indicators of the Construct 'Locus of Control'
Inwieweit stimmen Sie folgenden Aussagen zu?
Ich übernehme gerne Verantwortung.
Es hat sich für mich als gut erwiesen, selbst Entscheidungen zu treffen, anstatt mich auf das Schicksal zu verlassen.
Bei Problemen und Widerständen finde ich in der Regel Mittel und Wege, um mich durchzusetzen.
Erfolg ist oft mehr von Leistung, als von Glück abhängig.
Ich habe häufig das Gefühl, dass ich viel Einfluss darauf habe, was mit mir geschieht.
Bei wichtigen Entscheidungen orientiere ich mich selten am Verhalten anderer.

Table 17: Operationalization of the Construct 'Locus of Control'

3.2.2 Tolerance for Ambiguity

"[T]olerance for ambiguity is the way an individual perceives and processes information about ambiguous situations."[603] DALBERT's construct is chosen,[604] because the German scale is often applied to psychological studies and arrives at satisfactory reliability measures.[605]

Indicators of the Construct 'Tolerance for Ambiguity'
Inwieweit stimmen Sie folgenden Aussagen zu?
Ich mag es, wenn Überraschungen auftreten.
Ich beschäftige mich gerne mit scheinbar unlösbaren Aufgaben.
Ich probiere gerne Dinge aus, auch wenn nicht immer etwas dabei herauskommt.
Ich lasse die Dinge gerne auf mich zukommen.
Ich habe es nicht gerne, wenn die Arbeit gleichmäßig verläuft.
Ich warte geradezu darauf, dass etwas Aufregendes passiert.
Wenn um mich herum alles drunter und drüber geht, fühle ich mich so richtig wohl.
Ich muss nicht wissen, was auf mich zukommt.

Table 18: Operationalization of the Construct 'Tolerance for Ambiguity'

3.2.3 Need for Achievement

Need for achievement is the willingness to achieve personal goals. The underlying motivation can be intrinsic as well as extrinsic caused by peers or competitors. Three major aspects of need for achievement can be differentiated: the aspect of future-orientation, level of ambitiousness and persistence.[606] MODICK's construct which

[603] Furnham (1994), p. 404. See also McCaskey (1976), p. 64.
[604] See Dalbert (1999).
[605] See for example Steiners (2005), p. 151.
[606] See Jenkins (1987), p. 923f. and Hansemark (2003), p. 302.

contains these three dimensions is selected.[607] The original construct contains 21 items. After the pretest, under formal and contextual aspects, it is shortened to eight items.

Indicators of the Construct 'Need for Achievement'
Inwieweit stimmen Sie folgenden Aussagen zu?
Ich halte es für wichtig, mehr zu leisten als andere.
Mir scheint es erstrebenswert, in der Gesellschaft weiter zu kommen.
Ich stelle große Anforderungen an meine Arbeit.
Andere finden, dass ich hart arbeite.
Meistens habe ich viel zu tun.
Nachdem ich eine schwierige Arbeit begonnen habe, fällt es mir schwer, diese zu unterbrechen.
Wenn ich ein selbst gestecktes Ziel nicht erreicht habe, setze ich alles daran, es doch noch zu schaffen.
Durchhaltevermögen ist eine wichtige Eigenschaft.

Table 19: Operationalization of the Construct 'Need for Achievement'

3.2.4 Risk Propensity

Risk propensity is the attitude of individuals towards risk. Individuals with high risk propensity even seek risks.[608] Such persons concentrate more on short term rather than on long term consequences. For the purpose of this study, the German construct of SEIPEL[609] is applied. It is part of his scale of self-control which comprises six related aspects.[610]

Indicators of the Construct 'Risk Propensity'
Inwieweit stimmen Sie folgenden Aussagen zu?
Manchmal riskiere ich etwas, nur um Spaß zu haben.
Hin und wieder setzte ich mich Risiken aus, um mich herauszufordern.
Ich finde es manchmal aufregend, Sachen zu machen, für die ich Schwierigkeiten bekommen könnte.
Aufregung und Abenteuer sind für mich wichtiger als Sicherheit.

Table 20: Operationalization of the Construct 'Risk Propensity'

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607 See Modick (1977). Modick's construct of need for achievement is strongly based on Hermann's construct. See Hermans (1970).

608 See Kogan and Wallach (1964), p. 2.

609 See Seipel (2004). This construct is the translation of the self-control scale of Grasmick, Tittle, Bursik and Arneklev (1993).

610 The other aspects are impulsiveness, simple tasks, physical activities, self-centredness and temper. See Seipel (2004) and Grasmick, Tittle, Bursik and Arneklev (1993).

3.2.5 Egalitarianism

Egalitarianism describes the belief that every individual should have similar income and possess the same.[611] In consequence, for the distribution of wealth and income the individual level of achievement does not count.[612] The German construct of CHRISTOPH et al.[613] is selected. Two items, however, are slightly adapted because various persons, who took part in the pretest, did not find the formulation of these indicators understandable.

Indicators of the Construct 'Egalitarianism'
Inwieweit stimmen Sie folgenden Aussagen zu?
Es ist gerecht, dass nicht alle Menschen gleich viel verdienen und ein gleich hohes Vermögen besitzen.
Bei Chancengleichheit ist es gerecht, dass einige Menschen bei höherer Leistung mehr Einkommen erzielen.
Es ist gerecht, dass man das, was man sich durch Arbeit verdient hat, behält, auch wenn das heißt, dass einige Menschen vermögender sind als andere.
Es ist gerecht, dass Menschen, die viel leisten, mehr verdienen als andere.
Es ist gerecht, dass Eltern ihr Vermögen an ihre Kinder weitergeben.
Einige Menschen sind begabter und intelligenter als andere. Es ist gerecht, dass es dadurch für sie einfacher ist, ein höheres Einkommen zu erzielen.

Table 21: Operationalization of the Construct 'Egalitarianism'

3.2.6 Moral Reasoning

The degree of moral reasoning describes how individuals think about ethical problems. The higher the degree of moral reasoning the more likely ethical behavior occurs.[614] The construct of KRETTENAUER and BECKER,[615] was chosen which is based on the socio-moral reflection measure by GIBBS.[616] It comprehends the development stages of socio-moral reasoning.[617] As a result of the pretest, the original eleven item construct is shortened to eight items, because the three eliminated ones are too highly correlated to others.

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611 See McGuire (1977), p. 21.
612 See Rubin and Peplau (1973), p. 66.
613 See Christoph, Jardin, Lippl, Stark and Wegener (1998), p. 52f. See also Stark, Liebig and Wegener (2004).
614 See Diessner, D. and Dolen (1993), p. 869.
615 See Krettenauer and Becker (2001) and Krettenauer (2000).
616 See Gibbs (1979).
617 See Krettenauer and Becker (2001), p. 189f. and Basinger, Gibbs and Fuller (1995), p. 542f.

Indicators of the Construct 'Moral Reasoning'
Wie wichtig sind folgende Sachverhalte für Sie?
Versprechen gegenüber einem Freund halten
Versprechen gegenüber jemandem einhalten, den man kaum kennt
Die Wahrheit sagen
Einem Fremden das Leben retten
Einem Freund das Leben retten
Dinge, die anderen gehören, nicht wegnehmen
Sich an Gesetze halten
Bestrafung bei Gesetzesbruch

Table 22: Operationalization of the Construct 'Moral Reasoning'

3.2.7 Machiavellianism

The construct Machiavellianism describes persons with manipulative behavior.[618] CHRISTIE's construct Mach IV contains 21 items and is often used for empirical research.[619] Based on this, CLOETTA developed a German construct[620] here chosen.

Indicators of the Construct 'Machiavellianism'
Inwieweit stimmen Sie folgenden Aussagen zu?
Man sollte nur dann den wahren Grund seiner Handlungen sagen, wenn es einem nutzt.
Am sichersten fährt man mit der Annahme, dass alle Menschen auch einen bösartigen Zug haben.
Mit Aufrichtigkeit kommt man nicht immer weiter.
Bedeutend und unredlich zu sein, ist alles in allem besser als unbedeutend und ehrlich zu sein.
Man soll seine Bekanntschaften auch unter dem Gesichtspunkt auswählen, ob sie einem nützen können.
Meistens ist es günstiger, seine wahren Absichten für sich zu behalten.
Wenn man jemanden um etwas bittet, kann man falsche Gründe vorschieben, von denen man sich Erfolg verspricht.
Ein weit gestecktes Ziel kann man nur erreichen, wenn man sich auch etwas außerhalb des Erlaubten bewegt.

Table 23: Operationalization of the Construct 'Machiavellianism'

3.2.8 Trust in People

Trust in people describes "one's degree of confidence in the trustworthiness, honesty, goodness, generosity, and brotherliness of people in general."[621] ROSENBERG's construct[622] was chosen and adapted to the German context.

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618 See Hunt and Chonko (1984), p. 31.

619 See Christie (1970), p. 17. See Shackleton, Pitt and Marks (1985), p. 11f. for a detailed discussion of Machiavellianism and Christie's construct.

620 See Cloetta (1974), Cloetta (2004).

621 Wrightsman (1991), p. 404.

Indicators of the Construct 'Trust in People'
Inwieweit stimmen Sie folgenden Aussagen zu?
Man kann nicht vorsichtig genug sein im Umgang mit anderen Menschen.
Die meisten Leute streben eher nach ihrem eigenen Vorteil.
Wenn man nicht Acht gibt, werden andere Leute einen ausnutzen.
Niemand kümmert sich um einen, wenn es einem schlecht geht.
Menschen sind grundsätzlich unkooperativ.

Table 24: Operationalization of the Construct 'Trust in People'

4 Success

An intersubjective and a subjective method to measure success exist for the measurement of environment uncertainty.[623] The intersubjective method tries to get success measures from data such as market reports or annual reports.[624] Two major problems occur within the context of intersubjective measures. First, they are industry-specific and do not allow the comparison of industries.[625] Second, executives are not inclined to reveal these data.[626] On the other hand, the subjective method asks the participant to asses the success in a more abstract way.[627] In this context the subjective bias of the respondent is an important danger.[628] Contrary to the two approaches of measuring environmental uncertainty, these two approaches for measuring success highly correlate.[629] Therefore, the second approach was chosen which reduces the danger that questions about success are not answered.

4.1 Success of Early Warning

Only YASAI-ARDEKANI and NYSTROM measure the success of scanning.[630] Their measurement asks about the extent to which the scanning system "has contributed to awareness of problems, knowledge of strengths and weaknesses, and awareness of environmental conditions."[631] The participants of the pretest considered this construct

622 See Rosenberg (1957), p. 26f. and Wrightsman (1991), p. 404f.
623 See Naman and Slevin (1993), p. 114f.
624 See Boeker (1997), p. 160.
625 See Dehler (2001), p. 227 and Bauer (2002), p. 220.
626 See Garg, Walters and Priem (2003), p. 733.
627 See Durand (2003), p. 827.
628 See Thornton (1968), p. 451ff. and Chong and Chong (1997), p. 274.
629 See Garg, Walters and Priem (2003), p. 733 and the there mentioned sources.
630 See Yasai-Ardekani and Nystrom (1996).
631 Ibid., p. 194.

to be too vague. Together with the participating CEOs a construct was developed that comprises the success of scanning and interpretation, i.e. early warning, for all seven sectors of organizational environment. Here, success has two dimensions: relevance and timeliness. Only if these two conditions are fulfilled, the organization will be able to react successfully to potential chances and risks.[632]

Indicators of the Construct 'Success of Early Warning '
Inwieweit treffen die folgenden Aussagen auf Ihr Unternehmen zu? Rechtzeitig erkennt Ihr Unternehmen relevante Chancen und Risiken in folgenden Bereichen
Kunden
Technologien
Wettbewerber
Rohstoffe/Zulieferer
Politisch/rechtlicher Bereich
Wirtschaftliche Rahmenbedingungen
Soziokultureller Bereich

Table 25: Operationalization of the Construct 'Success of Early Warning'

4.2 Economic Success

Economic success is measured by the indicators profit margin, i.e. profit per sales, and value creation of the company. The profit margin is often used in empirical studies in order to evaluate the economic success of an organization.[633] The value creation of the company is taken as a second indicator because it goes beyond the financial success and therefore responds to the critique of a pure analysis of the profit margin.[634] The participants have to compare the value of the profit margin and the value creation of their organization with the values of their competitors. This technique allows the consideration of industry specific differences in regard to profit margin and value creation.[635] This construct was also used by DEHLER[636] and STEINERS[637].

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632 See Daft and Weick (1984), p. 286.

633 See Steiners (2005), p. 112 and the sources mentioned there. See also Garg, Walters and Priem (2003), p. 733.

634 See Günther (1997), p. 50ff.

635 See Dess, Ireland and Hitt (1990), p. 8ff. The same is true for strategic groups. See Hatten, Schendel and Cooper (1978), p. 601. See also Schäffer and Willauer (2003), p. 100.

636 See Dehler (2001), p. 425.

637 See Steiners (2005), p. 116.

Indicators of the Construct 'Economic Success'
Umsatzrendite (Betriebsergebnis vor Steuern/Umsatz)
Steigerung des Unternehmenswertes

Table 26: Operationalization of the Construct 'Economic Success'

F Methodological Conception of the Analysis

This section is about the methodological aspects of this work. The first part describes which data is collected and how it can be characterized. After this, the basis of the quantitative analysis is shown. It comprises amongst others an introduction to modeling structural equations and the fit criteria for constructs. The following part deals with the concrete measurements of constructs and the application of the fit criteria to the measurements presented before. Finally, the cluster analysis is presented.

1 Data Collection and Data Basis

1.1 Data Collection

According to the research questions the influence of the individual's personality on his scanning and interpretation behavior has to be analyzed. Therefore, a context has to be considered in which the personality of the individual influences the organization and the early warning process to an extremely high degree. This is the case in small and medium-sized companies.[638] In these companies the CEO is responsible for early warning and corporate culture does not influence this process to a high degree.[639] However, small companies do not have significant freedom for strategic maneuver, so that strategic issues and early warning are not considered to be very important by their CEOs.[640] Therefore, medium-sized companies are analyzed, following the European Union's definition of medium-sized companies as companies with 1) a number of employees over 50 and below 250 and 2) with maximum annual sales of 50 million Euros or with a maximum balance sheet total of 43 million Euros.[641]

The second criterion for the selected organizations to be analyzed is industry. The German manufacturing industry was chosen because it is the most important industry of the German economy and, at the time of the data collection, most of the employees

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638 See Miller and Toulouse (1986), p. 1402.
639 See Ritvo, Salipante and Notz (1979), p. 229f.
640 This is for example reflected by the focus of strategic management research on large businesses. See Chaganti (1987), p. 61.
641 See Gemeinschaft (2003), p. 39.

in Germany were employed within this industry.[642] For the analysis the five most important sectors were selected:[643]

- Manufacture of transport equipment (annual sales 2004: 290 billion Euro),[644]
- Manufacture of electrical equipment (annual sales 2004: 174 billion Euro),[645]
- Manufacture of machinery (annual sales 2004: 157 billion Euro),[646]
- Food products, beverages and tobacco (annual sales 2004: 145 billion Euro),[647]
- Manufacture of chemicals, chemical products and man-made fibers (annual sales 2004: 130 billion Euro).[648]

These five sectors represent 66.6% of sales and 66.5% of employees of the manufacturing industry in Germany.[649]

A third criterion is independency from other companies such as a parent company. This criterion grants freedom in determining early warning behavior.

Table 27 provides an overview of the German organizations which fulfill all three selection criteria.[650] They are the basic population of this study.

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642 See Bundesamt' (2005), p. 101.

643 For a similar proceeding see Aust (1999), Karlshaus (2000), Dehler (2001), Frank and Reitmeyer (2003) and Steiners (2005).

644 See Bundesamt' (2005), p. 391. This sector comprises the classification numbers 34 (manufacture of motor vehicles, trailers and semi-trailers) and 35 (manufacture of other transport equipment). See Bundesamt (2003), p. 15.

645 See Bundesamt' (2005), p. 391. This sector is also called manufacture of electrical and optical equipment and comprises the classification numbers 30 (manufacture of office machinery and computers), 31 (manufacture of electrical machinery and apparatus not elsewhere classified), 32 (manufacture of radio, television and communication equipment and apparatus) and 33 (manufacture of medical, precision and optical instruments, watches and clocks). See Bundesamt (2003), p. 14f.

646 See Bundesamt' (2005), p. 391. This sector is also called manufacture of machinery and equipment not elsewhere classified. See Bundesamt (2003), p. 13.

647 See Bundesamt' (2005), p. 391. This sector comprises the classification numbers 15 (manufacture of food products and beverages) and 16 (manufacture of tobacco products). See Bundesamt (2003), p. 15f.

648 See Bundesamt' (2005), p. 391. For the classification see Bundesamt (2003), p. 8f.

649 See Bundesamt' (2005), p. 391.

650 The German Bureau of Statistics does not have a detailed report about the number of organizations per branch and size. This overview was provided by the German Federal Employment Office which examines the situation and development of employment in Germany according to professions, branches and regions. See §§ 280 and 281 SGB(III) (2005). German employers inform the German Federal Employment Office about every employee who is subject

	Size of the Organization (Employees)				Sum	Percentage
	50-100	101-149	150-199	200-249		
Transport Equipment	285	122	81	62	550	6.4%
Electrical Equipment	1,257	525	300	201	2,283	26.4%
Machinery	1,589	624	374	231	2,818	33.6%
Food Products	1,166	495	274	149	2,084	24.1%
Chemicals	467	226	132	83	908	11.5%
Sum	4,764	1,992	1,161	726	8,643	
Percentage	55.1%	23.1%	13.4%	8.4%		

Table 27: Description of the Basic Population

A large sample size is necessary to test the deduced hypotheses by analyzing the relationships between latent construct by means of factor analysis.[651] Therefore, written data collection with a standardized questionnaire is chosen as examination method because it is the most efficient way to get data from a large number of participants.[652]

In a first pretest the eight personal attitudes proposed by LEWIN and STEPHENS[653] were tested. 140 alumni of the WHU Koblenz ('Wissenschaftliche Hochschule für Unternehmensführung') received a survey accompanied by a personalized email. Alumni of this business school were chosen because personal attitudes of managers in general were the subject of this survey and the selected alumni were working in managerial or similar positions. The advantage of choosing alumni of this business school instead of choosing 140 CEOs of the basic population was their willingness to respond. These 140 persons were divided into two groups. One group could answer using a six-point-Likert scale, the other using a seven-point-Likert scale. A total of 54 persons participated (38.6%). 27 of the group with the six-point-Likert scale, 28 of the

to social insurance contribution. See § 28a SGB(IV) (2005). The statistics of the German Federal Employment Office comprises operating sites. An operating site (in German 'Betriebsstätte') is an economically and regionally defined entity. See § 9.1 SGB(IV) (2005). Following this definition, one German company may have various operating sites within Germany. Consequently, this leads to a disparity between the reported number of the German Federal Employment Office and the actual number of companies. For the empirical study it was concluded that this disparity is not very important because companies with 50 to 249 employees generally have only one operating site. Despite this disparity the statistics of the German Federal Employment Office shows the structure of German industry by indicating the number of operating sites per industry sector and size.

651 See F 2 and Homburg and Baumgartner (1995), p. 1093 and Homburg (1998), p. 78.

652 See Bortz and Döring (2003), p. 253 and 53ff. For a detailed discussion of advantages and disadvantages of this method of examination see Berekhoven, Eckert and Ellenrieder (1996), p. 112ff. and Herrmann and Homburg (1999), p. 27f.

653 See Lewin and Stephens (1994) and C 2.

group with the seven-point-Likert scale responded. For both groups the values of the fit criteria were satisfactory.[654] By means of a z-transformation the two groups were combined and, due to the improved data bases, the fit criteria were even fulfilled better. The answers included comments about unclear formulation. These were changed afterwards and MODICK's original construct, need for achievement,[655] which contains 21 items, was shortened to eight items considering aspect of formality and content. Also, the construct degree of moral reasoning was shortened.[656] In summary, the seven-point-Likert scale came up with better values for fit criteria. Additionally, the participants appreciated the possibility of neutral answers which is only possible in the case of the seven-point-Likert scale. Therefore, the seven-point-Likert scale for the final version of the questionnaire was selected.

In a second pretest five CEOs of medium-sized companies were interviewed. During these pilot interviews the expert described early warning within his organization and the industry of his organization. For each sector one CEO was selected and all classes of company sizes of the basic population were represented.

On the basis of a literature review and these pretests the questionnaire was conceptualized and then evaluated by numerous academics in the area of business administration and by other researchers in this field. The five CEOs with whom the interviews were conducted also received the questionnaire and gave feedback. The criteria to evaluate the measures were comprehensibility, completeness and neutrality of the formulation. After this, seven items had to be reformulated due to difficulties of understanding. Also structure and length of the questionnaire were evaluated.[657] It was perceived to be relatively long but appropriate to the examined subject. Additionally, the participants evaluated the structure of the questionnaire as adequate.

The addresses were provided by HOPPENSTEDT which is a company specialized in the sale of addresses of German companies to be used for direct marketing. Their database is updated daily and contains all German organizations with a minimum of sales of 20 million Euros per annum and/or a minimum of 20 employees.[658] It contains

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654 See F 2.6.

655 See Modick (1977).

656 See E 3.2.6.

657 See Hunt, Sparkman and Wilcox (1982), p. 265ff. and Kinnear and Taylor (1991), p. 352ff.

658 Hoppenstedt reported 7,555 organizations for the basic population. The reported number of the German Federal Employment Office for the basic population was 8,643. This can partially be explained by the fact that a large company might have various operating sites within Germany.

the names of the CEOs, so that the questionnaire could be sent to them directly. A careful examination was necessary, however, because larger companies were listed with various sub-companies. A second selection criterion was the independence of the organizations. Only companies that were independent from a mother company were selected for the basic population.

After this re-assessment of the data, random sampling was applied according to the criteria branch and size in order to get to the organizations in the sample.

The final version of the questionnaire was sent out in May 2005 to a total of 4,500 organizations. The cover letter was personally signed by the head of the chair of management accounting and control at the EUROPEAN BUSINESS SCHOOL in Oestrich-Winkel. In order to increase the participation rate the CEOs were offered the following incentives: 1) an individual benchmarking report in which the specific early warning behavior was compared with the average of the industry, 2) the participation at a workshop with the theme 'success factors of early warning' and 3) the participation in a lottery to win bottles of regional wine. The quality of the database was very good as only six questionnaires came back due to wrong addresses.

1.2 Data Basis

The organizations which received the questionnaire were given three weeks to answer. Within this deadline 287 organizations responded (6.4%). After this, the CEOs who did not return the questionnaire were reminded by telephone to complete it, which took over five weeks. But this personal contact led to the participation of over 300 additional CEOs. These CEOs could also fill in the questionnaire via the internet, if requested. A total of 149 CEO filled it electronically. The attitudes of the CEOs who answered in writing and those who answered electronically did not differ significantly. The same was true for their answering behavior. Both was analyzed by means of a t-test. The completeness of all paper questionnaires was thoroughly examined. In various cases the CEOs were asked to add answers to omitted questions. The electronic version was programmed in such a manner that the participant had to answer every question. Until end of July 2005 a total of 621 respondents participated in the study. A total of 24 questionnaires had to be removed from the sample due to a misfit in the classification or the incompleteness of the questionnaire. So this study reached a sample size of 597, which corresponds to a rate of return of 13.3 %. This

response rate is satisfactory, as the response rate for mailed surveys to CEOs normally ranges between 10 and 12 percent.[659]

Figure 16 and 17 show the distribution of the respondents' organizations per sector and per size.

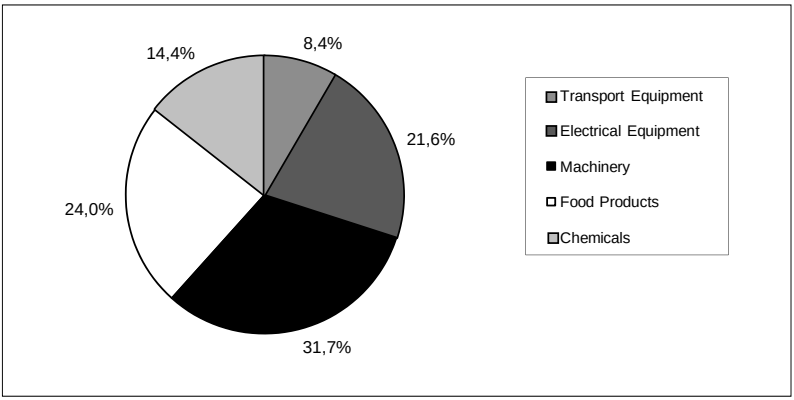

Figure 16: Characterization of Sample According to Sectors

[659] See Hambrick, Geletkanycz et al. (1993), p. 407.

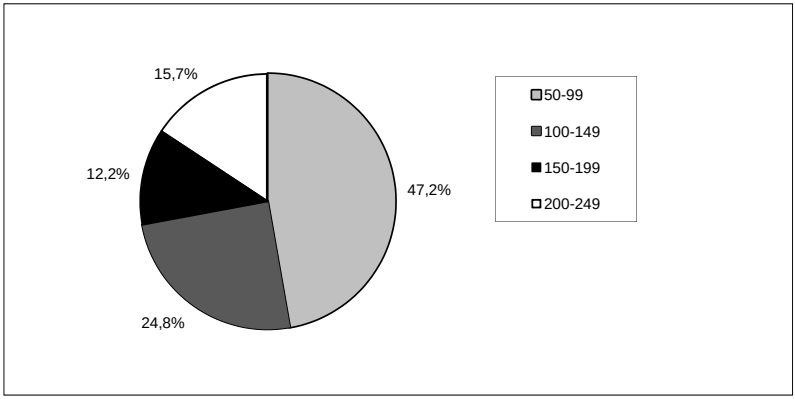

Figure 17: Characterization of Sample According to Organizational Size

The quality of the data received by the empirical investigation strongly depends on the representativeness of the sample. First, the representativeness of the sample regarding size and sectors is analyzed. Table 28 compares the respondents of the sample with the basic population according to these criteria.

	Size of the Organization (Employees)				Sum	Rate of Return	% Population
	50-100	101-149	150-199	200-249			
Transport Equipment	17	9	11	13	50	8.4%	6.4%
Electrical Equipment	48	40	23	18	129	22.6%	26.4%
Machinery	109	34	14	32	189	32.7%	33.6%
Food Products	62	40	16	25	143	24.0%	24.1%
Chemicals	46	25	9	6	86	14.4%	11.5%
Sum	282	148	73	94	597		
Rate of Return	47.2%	25.2%	12.3%	16.7%			
Percentage Population	55.1%	23.1%	13.4%	8.4%			

Table 28: Comparison of the Sample of the Study with the Basic Population

A χ^2-test can prove that the sample is representative for the basic population.[660] The result of this test was that there are no significant differences regarding size and sectors. A χ^2 value of 11.55 with 12 degrees of freedom is calculated which is far below the critical value of 21.03 for a significance level of 5%. The sample is therefore representative for the basic population.

[660] See Bagozzi and Phillips (1982), p. 465 and Homburg and Giering (1996), p. 6.

The sector distribution of the sample almost coincides with the sector distribution of the population. As to size, there is apparently one important difference. Only 47% of the respondents belong to organizations with a number of employees between 49 and 100, whereas its percentage in the basic population is 55%. Within the basic population the category of organizations with a number of employees between 200 and 249 comprises 8%. But 16% CEOs managing organizations of this size answered. This mismatch can be explained by the fact that smaller organizations find the subject of early warning less important. Therefore, a lot of CEOs of smaller organizations refused to answer the questionnaire even when asked by phone.

In this context of representativeness it was also analyzed whether there is a nonresponse bias, i.e. a systematic difference between CEOs of organizations which participated in the investigation and CEOs who did not answer the questionnaire.[661] To answer the discussed question, ARMSTRONG and OVERTON assume that participants, who answer relatively late, are more similar to those who do not answer at all than to persons who answer at a very early stage. This work follows their assumption and divides the sample size into three parts depending on time of answer. Then, all the answers of the first third (organizations that answered very early) are compared with the answers of the last third (organizations that answered very late). The applied t-test allows to find medium differences of the answers. Only in two cases there was a medium difference between these groups at a significance level of 1%. Therefore, it can be concluded that no important nonresponse bias exists.

2 Basis of the Quantitative Analysis

2.1 Introduction to Modeling Structural Equations

The relationships between variables which cannot be observed directly have to be analyzed within the context of this study. The appropriate methodological means for this purpose is structural equation modeling.[662] This method is characterized by a differentiation of the variables between independent (exogenous) and dependent

[661] See Armstrong and Overton (1977).
[662] See Bliemel, Eggert, Fassott and Henseler (2005), p. 10.

(endogenous) ones in order to examine the influence of the independent on the dependent variables.[663] Modeling structural equations allows the following:[664]

1) Modeling relationships between multiple exogenous and endogenous variables[665]
2) Modeling latent variables
3) Modeling errors of measurements for observed variables[666]
4) Testing theoretically deduced hypotheses with empirical data (i.e. confirmatory analysis)[667]

There are two approaches to model structural equations: the covariance based approach and the nonlinear iterative partial least square method.[668] The covariance based approach uses the maximum likelihood function to minimize the difference between the covariance matrix of the sample[669] and the covariance matrix estimated theoretically on the basis of the structural equation.[670] Formative constructs can only be modeled by using MIMIC (multiple indicator multiple cause) or two-constructs models, which increases the number of parameters to be estimated.[671] This approach is based mainly on the theoretical works of JÖRESKOG[672] and became very popular among researchers in the field of social sciences with the software LISREL which was released in the mid-1970ies and was subsequently updated.[673] On the other hand, there is the partial least square method (PLS). Linear regressions are used to model the relationships between variables that cannot be observed directly. The values of these variables and the relationships between them are estimated by the partial least square method using an iterative way.[674] In contrast to LISREL, the partial least square method does not require a multivariate normality distribution of the parameters to be

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663 See Diamantopoulos and Siguaw (2000), p. 1.
664 See Chin (1998), p. 297 and Fassott (2005), p. 20.
665 See Kelloway (1998), p. 2.
666 See Fornell (1987), p. 411.
667 See the introduction to D.
668 See Götz and Liehr-Gobbers (2004), p. 6f., Chin (1998), p. 295 and Fassott (2005), p. 20.
669 See Kelloway (1998), p. 13.
670 See Long (1983), p. 11 and Diamantopoulos and Siguaw (2000), p. 5.
671 See Chin (1998), p. 297f., Götz and Liehr-Gobbers (2004), p. 721 and Bliemel, Eggert, Fassott and Henseler (2005), p. 10.
672 See Jöreskog (1966), Jöreskog (1967), Jöreskog (1969) and Jöreskog (1973).
673 See Jöreskog and Sörbom (1997).
674 See Götz and Liehr-Gobbers (2004), p. 722.

estimated[675] and does not assume independency of observations.[676] Formative constructs can be included directly into the model. PLS was developed by WOLD,[677] JÖRESKOG's doctoral adviser.

The selection of method – LISREL or PLS – depends mainly on the nature of constructs used by the empirical investigation. Therefore, the following paragraph describes constructs in general, explains the difference between formative and reflective constructs and gives an overview about the nature of the employed constructs. Based on this knowledge, a decision about the two methods described above can be made.

2.2 Basics of Constructs

In the context of this study various aspects are examined which cannot be observed directly, for example attitudes as locus of control or need for achievement. Such complex and non-observable issues are called constructs or latent variables by literature about empirical research.[678]

The first step to measure constructs is conceptualization, e.g. the analysis and formulation of the relevant dimensions of each construct. Then, operationalization, e.g. the development of an appropriate tool of measurement, follows.[679] As latent variables cannot be directly measured, they have to be measured indirectly by means of indicators. These indicators, also called factors, are formally associated with the construct.[680] In general, single and multi-indicator constructs are distinguished. A construct with a single indicator is the easiest form of a latent variable because it is only determined by one single indicator.[681] A multi-indicator construct is represented by at least two indicators. Complex constructs should be measured by multiple indicators.[682] Multi-indicator constructs again can be differentiated in one- and multidimensional constructs. If all indicators of a construct can be assigned to one

675 See Chin (1998), p. 297.
676 See Fassott (2005), p. 20.
677 See Wold (1973) and Wold (1975).
678 See for example Bartholomew and Knott (1999), p. l.
679 See Homburg and Giering (1996), p. 5, Churchill Jr. (1979), p. 66 and Bagozzi and Baumgartner (1994), p. 388.
680 See Bagozzi and Phillips (1982), p. 465 and Long (1983), p. 11.
681 See Homburg and Giering (1998), p. 115.
682 See Churchill Jr. (1979), p. 66 and Baumgartner and Homburg (1996), p. 144.

single theoretical dimension, the construct is one-dimensional.[683] Otherwise it is multidimensional.

After the differentiation between single and multi-indicator constructs as well as between one- and multidimensional ones, the differentiation between formative and reflective constructs is presented. This classification is based on the relationship between the construct and its indicators.[684] "The direct reflective model specifies direct effects from a construct to its measures."[685] The basic nature of measuring such a reflective construct is the same for exogenous and endogenous latent variables although the models of measurement are generally specified by other variables. Therefore, the formulas for both reflective models of measurement – exogenous and endogenous latent variables – are depicted in formulas 2 and 3. Figure 18 and 19 are the corresponding graphical representations.

$$x_i = \lambda_i \cdot \xi_1 + \delta_i$$

with x_i: *Indicators of Reflective, Exogenous Variable*
ξ_1: *Reflective, Exogenous Variable*
λ_i: *Factor Loading of the Reflective, Exogenous Variable* ξ_1 *on Indicator* x_i
δ_i: *Measure Specific Random Error of Indicator* x_i

Formula 2: Measurement Model of a Reflective, Exogenous Variable

$$y_i = \lambda_i \cdot \eta_1 + \varepsilon_i$$

with y_i: *Indicator of Reflective, Endogenous Variable*
η_1: *Reflective, Endogenous Variable*
λ_i: *Factor Loading of the Reflective, Endogenous Variable* η_1 *on Indicator* y_i
ε_i: *Measure Specific Random Error of Indicator* y_i

Formula 3: Measurement Model of a Reflective, Endogenous Variable

683 See Anderson, Gerbing and Hunter (1978), p. 435 and Law and Wong (1978), p. l47.
684 See Bagozzi and Baumgartner (1994) and Bagozzi (1994).
685 Edwards and Bagozzi (2000), p. 161. See also Chin (1998), p. 305f.

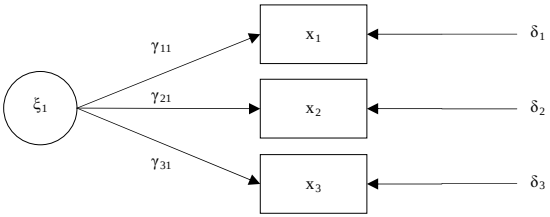

Figure 18: Measurement Model of a Reflective, Exogenous Variable

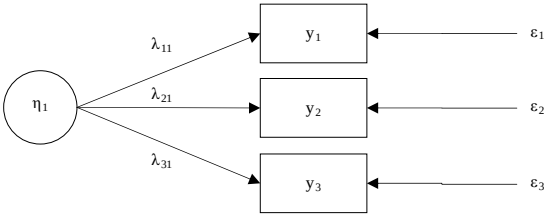

Figure 19: Measurement Model of a Reflective, Endogenous Variable

For reflective, exogenous variables all x_i measures or indicators and their variances are influenced by the construct ξ_1 and the random error δ_i. First, there is the construct common to all the measures. This is multiplied by the individual factor loading of the measure on the construct. Second, there is the random error δ_i which is specific to each x_i measure. The same is valid for reflective, endogenous variables. Only the denomination varies. The latent variable is denominated η, the measures of the indicators y_i and the random error which is specific to each y_i measure is called ε_i. The direction of causality is from the construct to the x_i (y_i) measures, and theses measures have to be correlated. This correlation is reflected by demands of internal consistency.[686] The omission of an indicator out of the measurement model does not alter the meaning of the construct.[687] To enhance this explanation an example is given and explained further.

[686] See Fornell (1982), p. 34. For reasons of clarity the correlation coefficients between the x_i (y_i) measures are not depicted in figures 18 and 19.

[687] See Jarvis, Mackenzie and Podasakoff (2003), p. 201.

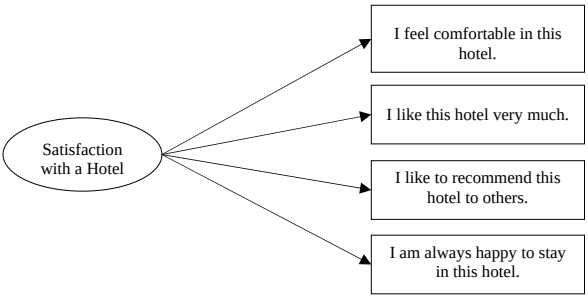

Figure 20: Example of a Reflective Construct[688]

The example shows that every single indicator of the construct 'satisfaction with a hotel' is influenced by the common construct. For this reason the presented construct is – in accordance with formulas 2 and 3 – a reflective construct.

In addition to these reflective constructs there are formative ones because "in many cases, indicators could be viewed as causing rather than being caused by the latent variable measured by the indicators."[689] The measurement of a formative construct "specifies measures as correlated causes of a construct."[690] As seen above the nature of measurement is the same for exogenous and endogenous variables. Formula 4 shows the measurement model of formative, exogenous variables, formula 5 the measurement model of formative, endogenous variables. After these formulas the measurement models of both variables are graphically presented in Figure 21 and 22.

$$\xi_1 = \pi_{\xi_1} \cdot x_i + \zeta_{\xi_1}$$

with ξ_1: *Formative, Exogenous Variable*
x_i: *Indicators of Formative, Exogenous Variable*
$\pi_{\xi 1}$: *Vector Containing Weights of Indicators* x_i
$\zeta_{\xi 1}$: *Construct specific Random Error*

Formula 4: Measurement Model of a Formative, Exogenous Variable

688 Adapted from Albers and Hildebrandt (2005), p. 13.
689 MacCallum and Browne (1993), p. 533. See also Chin (1998), p. 306f.
690 Edwards and Bagozzi (2000), p. 162.

$$\eta_1 = \pi_{\eta_1} \cdot y_i + \zeta_{\eta_1}$$

with η_1: *Formative, Endogenous Variable*
y_i: *Indicators of Formative, Endogenous Variable*
$\pi_{\eta 1}$: *Vector Containing Weights of Indicators* y_i
$\zeta_{\eta 1}$: *Construct specific Random Error*

Formula 5: Measurement Model of a Formative, Endogenous Variable

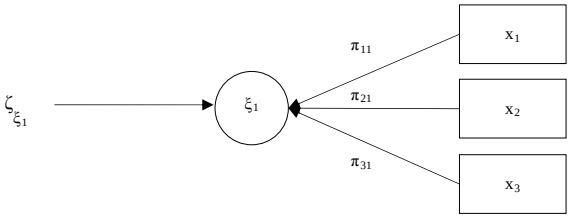

Figure 21: Measurement Model of a Formative, Exogenous Variable

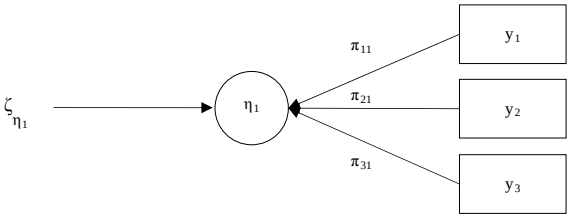

Figure 22: Measurement Model of a Formative, Endogenous Variable

Each x_i measure causes the formative, exogenous variable ξ_1 according to its weight in vector π. For formative, endogenous variables each y_i measure causes the construct η according to its weight which is part of the vector π. For both measurement models the disturbance term ζ is part of the construct. Only at construct level this measurement error is taken into account. As a consequence, the measurements of the individual indicators are assumed to be error-free. The causal relationship is opposite to the reflective model, i.e. the indicators cause the construct. So the variance of each measure is not explained by the latent variable. This causal relationship also implies

that the omission of an indicator will alter the meaning of the construct. To improve the understanding of formative constructs, an example is given below in figure 23.

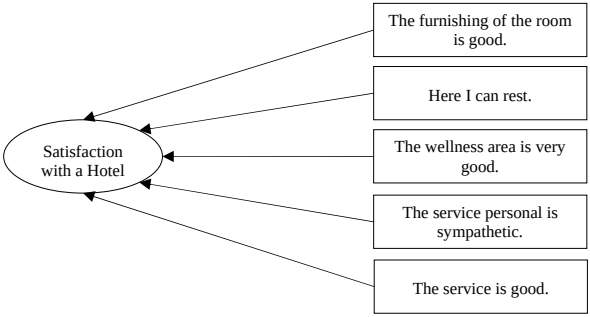

Figure 23: Example of a Formative Construct[691]

The latent variable 'satisfaction with a hotel' is determined by all of its measures. In accordance with formulas 4 and 5 it is a formative construct. Other examples of formative constructs are the construct 'social economic status', viewed as a function of background variables as income, occupational prestige and education,[692] the construct 'stress' viewed as the function of important events in life,[693] the construct 'social support' measured by various supportive incidents,[694] or the construct 'discrimination' viewed as a function of age, sex, race and disabilities.[695]

Within the context of this study the relationships between various constructs are analyzed. Reflective as well as formative constructs are used. The differentiation between formative and reflexive constructs is important in matters of fit criteria as it will be seen below. To prepare further analysis the constructs used in this work are listed below and are classified.

691 Adapted from Albers and Hildebrandt (2005), p. 13.
692 See Bollen and Lennox (1991) and Heise (1972).
693 See Cohen, Cohen, Teresi, Marchi and Velez (1990).
694 See MacCallum and Browne (1993).
695 See Bollen and Lennox (1991).

Construct	Nature	Number of Indicators	Annotation
Contingency Variables			
Perceived Strategic Uncertainty	F	21	· Consists of the three dimensions environmental complexity, environmental rate of change and environmental importance · Each dimension is formative · PSU is the product of environmental uncertainty (complexity plus rate of change) and environmental importance
Locus of Control	R	6	
Tolerance for Ambiguity	R	8	
Need for Achievement	R	8	
Risk Propensity	R	4	
Egalitarianism	R	6	
Moral Reasoning	R	7	
Machiavellianism	R	8	
Trust in People	R	5	
Design Variables			
Internal, Personal Sources	F	7	
Internal, Impersonal Sources	F	7	
External, Personal Sources	F	7	
External, Impersonal Sources	F	7	
Personal Sources	F	14	Personal sources are the sum of internal, personal and external, personal sources
Impersonal Sources	F	14	Impersonal sources are the sum of internal, impersonal and external, impersonal sources
External Sources	F	14	External sources are the sum of external, personal and external, impersonal sources
Internal Sources	F	14	Internal sources are the sum of internal, personal and internal, impersonal sources
Scanning Frequency	F	28	Sum of all four sources
Scope of Scanning	F	7	
Degree of Delegation	F	7	
Diversity of Internal Models	F	8	
Intensity of Interpretation	R	2	
Degree of Tool Support	F	1	
Fixity of Time for Interpretation	F	1	
Success Variables			
Success of Early Warning	F	7	
Economic Success	F	2	
F = Formative; R = Reflective			

Table 29: Overview of Constructs Used

2.3 Selection of Method for Structural Equation Modeling

This study has shown that two approaches for structural equation modeling exist: the covariance approach of LISREL and the partial least square method (PLS). LISREL can only include formative constructs by using MIMIC (multiple indicator multiple cause) or two-constructs models. This increases the number of parameters to be estimated.[696] As the majority of constructs, analyzed within the context of this study, is formative, PLS as the method for the analysis of the here presented empirical data was chosen. The advantage of this choice is that the two difficult assumptions of the covariance approach, i.e. multivariate distribution of the variables and independency of observations,[697] do not have to be considered.

2.4 The Structural Model as Means of Valuating Simple Causal Hypotheses

2.4.1 Overview

The basis of analyzing the relationships of latent constructs with PLS is a structural (equation) model. Such a model displays the theoretically assumed relationships between latent variables. The independent variables are called exogenous variables and influence the dependent ones, called endogenous variables. The model is recursive, i.e. no circular relationship is allowed.[698] Below an example of a structural model is provided.

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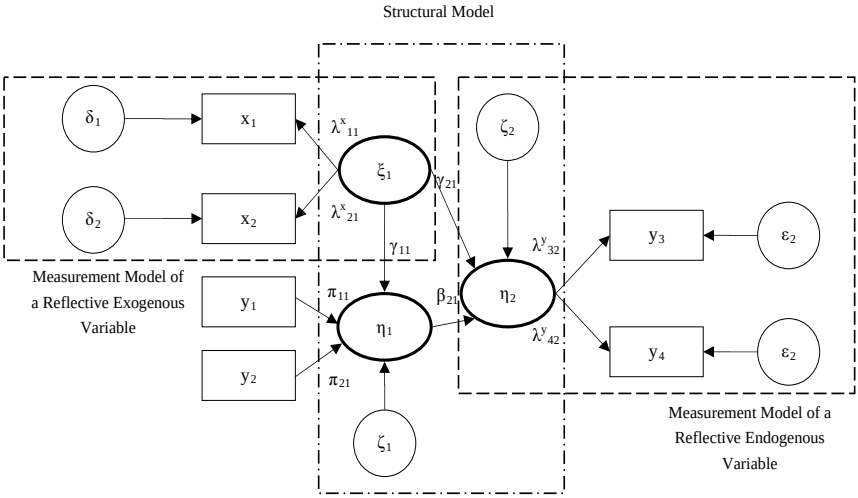
[696] See Götz and Liehr-Gobbers (2004), p. 721 and Bliemel, Eggert, Fassott and Henseler (2005), p. 10. LISREL sums up the values of the single indicators, forms an average and operates with a single index variable. Consequently the influence of a single indicator cannot be analyzed. Therefore, the covariance structure analysis does not allow the figuration of formative constructs. See Fassott (2005), p. 25 and the sources mentioned there.

[697] See Chin (1998), p. 297 and Fassott (2005), p. 20.

[698] See Götz and Liehr-Gobbers (2004), p. 716.



with ξ_1: *Reflective, Exogenous Variable*
$x_{1,2}$: *Indicators of Reflective, Exogenous Variable*
λ^x_{i1}: *Factor Loading of Reflective, Exogenous Variable* ξ_1 *on Indicators* $x_{1,2}$
$\delta_{1,2}$: *Measure Specific Random Error of Indicators* $x_{1,2}$
$\eta_{1,2}$: *Endogenous Variables*
$y_{1,2}$: *Indicators of Endogenous, Formative Variable*
$\pi_{\eta 1}$: *Vector Containing Weights of Indicators* $y_{1,2}$
$\zeta_{\eta i}$: *Construct specific Random Error*
$y_{3,4}$: *Measures of the Reflective, Endogenous Variable* η_2
λ^y_{i2}: *Factor Loading of the Reflective, Exogenous Variable* η_2 *on Indicators* $y_{3,4}$
$\varepsilon_{1,2}$: *Measure Specific Random Error of Indicators* $y_{3,4}$
γ_{i1}.: *Causal Relationship between* ξ_1 *and Endogenous Variables i*
β: *Causal Relationship between Endogenous Variables*

Figure 24: Simple Structural Model

Three constructs (ξ_1, η_1, η_2) are depicted. Arrows show the relationships between them. ξ_1 as the exogenous variable is not influenced by any other latent variable and influences η_1 and η_2. Additionally, η_1 influences η_2. Each of the constructs is measured by two indicators (x_1, x_2; y_1, y_2; y_3, y_4). ξ_1 and η_2 are reflective constructs and η_1 is a formative one. This structural model also has a standardized, mathematical form:

$$\eta = B\eta + \Gamma\xi + \zeta$$

with η: *Vector Containing Values of Endogenous Variables*
B: *Matrix of the Relationship between the Endogenous Variables*
Γ: *Matrix of the Relationship between Exogenous and Endogenous Variables*
ξ: *Vector Containing Exogenous Variables*
ζ: *Vector Containing Measurement Errors of the Endogenous Variables*

Formula 6: Standardized Form of a Structural Equation

Such structural equations or models are subject to fit criteria. These criteria help to valuate these models and will be presented in the following paragraph.

2.4.2 Fit Criteria for Structural Models

In order to determine fit criteria for structural models the criteria proposed by GÖTZ and LIEHR-GOBBERS[699] will be followed. They propose three fit criteria for structural models: 1) coefficient of determination, 2) reliability of path coefficients and 3) effect size.

The coefficient of determination R^2 shows the part of variance of the latent, endogenous variable explained by the exogenous ones. It measures the quality of fit of the regression function.[700] R^2 is a standardized value between 0 and 1. The higher the part of the variance of the endogenous variable explained by the measured exogenous variables, the more the value will approach to 1. This value also depends on the numbers of exogenous variables. Therefore, a general minimum value is difficult to assert. However, a minimum value of 0.3 should be attained.[701]

The second criterion is the reliability of the path coefficients. They describe the influence of the exogenous variables on the endogenous one and can be interpreted as standardized beta-coefficients of a regression analysis. The reliability of the path coefficients is analyzed by t-statistics. PLS generates these values using resampling methods to asses the accuracy of the path coefficients. A significance of 1% corresponds to a t-value over 2.326, a significance of 5% to a t-value between 1.645 and 2.326, finally a significance of 10% to a t-value between 1.282 and 1.645. This is the case of a one-tailed test.[702] Only when path coefficients are significant, a statistically significant relationship between variables exists. On the basis of these path coefficients and of the level of significance hypotheses can be confirmed or rejected.

The last criterion, the effect size f, analyzes whether an exogenous variable has a significant influence on the endogenous one. This means that the explanatory contribution of the exogenous variable can be analyzed. COHEN developed this concept by comparing the coefficient of determination R^2 of the structural model

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699 See Ibid., p. 730f.
700 See Craney and Surles (2002), p. 392.
701 See Cohen, Cohen, West and Aiken (2003), p. 3.
702 See Homburg and Baumgartner (1998), p. 360f.

inclusive the analyzed exogenous variable with the coefficient of determination R^2 of the structural model exclusive the analyzed exogenous variable.[703] The formula is given below:

$$f = \frac{R^2_{incl} - R^2_{excl}}{1 - R^2_{incl}}$$

with R_{incl}: *Coefficient of Determination R^2 of the Structural Model Inclusive the Analyzed Exogenous Variable*

R_{excl}: *Coefficient of Determination R^2 of the Structural Model Exclusive the Analyzed Exogenous Variable*

Formula 7: Effect Size

Based on CHIN et al.,[704] COHEN et al.[705] and GÖTZ and LIEHR-GOBBERS[706] three classes of influence can be differentiated. They are a) significant influence ($0.075 > f \geq 0.01$), b) highly significant influence ($0.25 > f \geq 0.075$) and c) very highly significant influence for $f \geq 0.25$.

To conclude this explanation of fit criteria calculated by PLS for structural models an overview is given:

Criteria	**Aspiration Level**
Coefficient of Determination R^2	≥ 0.3
T-Value of Path Coefficients	$1.645 > t \geq 1.282$ → Significance Level of 10 % $2.326 > t \geq 1.645$ → Significance Level of 5 % $t \geq 2.326$ → Significance Level of 1 %
Effect Size f	$0.075 > f \geq 0.001$ → Significant Influence $0.25 > f \geq 0.075$ → Highly Significant Influence $f \geq 0.25$ → Very Highly Significant Influence

Table 30: Overview of Fit Criteria for Structural Equations

2.5 Moderating Effects as Means of Valuating Alignment Hypotheses

2.5.1 Introduction to Moderating Effects

The analysis of moderating variables is to analyze the influence of an additional exogenous variable on the causal relationship between an exogenous variable and an endogenous one. “In general terms, a moderator is a qualitative (e.g. sex, race, class)

703 See Cohen, Cohen, Teresi, Marchi and Velez (1990), p. 8ff. and p. 410ff. and Chin (1998), p. 316.
704 See Chin, Marcolin and Newsted (2003), p. 195f.
705 See Cohen, Cohen, Teresi, Marchi and Velez (1990), p. 410ff.
706 See Götz and Liehr-Gobbers (2004), p. 731.

or quantitative (e.g. level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable."[707] If a variable is a moderating variable it will change the direction or the intensity of a causal relationship within a structural model. Such an effect is also called effect of interaction. These moderators and their effects are very important because causal relationships are often influenced by additional variables.[708] Figure 25 shows that moderating variables influence the causal relationship between an exogenous and an endogenous variable.Moder

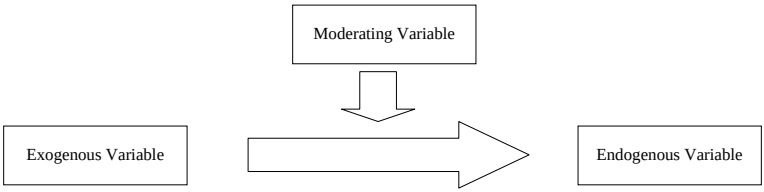

Figure 25: Moderating Effect[709]

2.5.2 Modeling Moderating Effects in the Context of the PLS Method

Empirical research often ignores the effect of interaction[710] or avoids it with an artificial dichotomy and uses dummy variables.[711] PLS is capable to model these effects and can consider them as part of structural models. The analysis of moderating effects is similar to that of a moderated regression.

In case of a moderating effect the structural model is expanded by an additional exogenous variable. This variable is the product of the moderating variable and the other exogenous one which interacts with the endogenous variable. This product is called interaction term. Following CHIN et al.[712] and GÖTZ and LIEHR-GOBBERS[713] one has to distinguish between the effects of interaction caused by reflective and formative constructs. In the context of this study the moderating variable in question – success of early warning – is a formative construct. Therefore, the method for analyzing formative constructs as moderating variables is presented now. First, the

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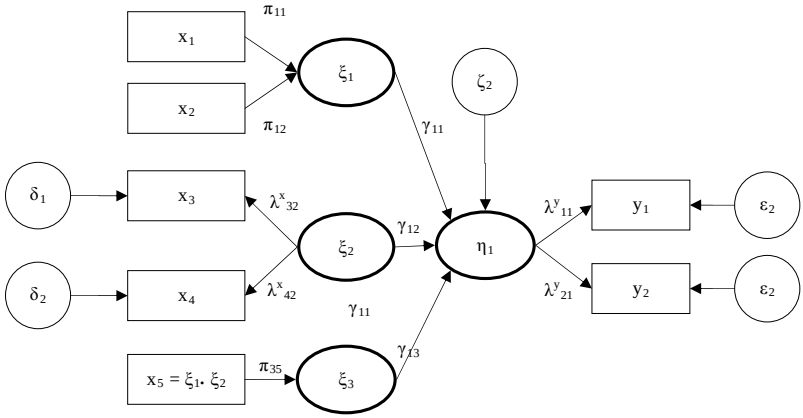
707 Baron and Kenny (1986), p. 104.
708 See Chin, Marcolin and Newsted (2003), p. 193.
709 See Eggert, Fassott and Helm (2005), p. 104.
710 See Homburg and Giering (2001), p. 47.
711 See Yasai-Ardekani and Nystrom (1996), p. 195.
712 See Chin, Marcolin and Newsted (2003), p. 198f.
713 See Götz and Liehr-Gobbers (2004), p. 725.

weights of the indicators which form the formative construct that is supposed to be a moderator have to be calculated by PLS. If the exogenous variable is reflective, its factor loadings have to be considered. If it is formative, the weights of its indicators have to be regarded. Then, the structural model is expanded by the product of the interacting variables, i. e. moderating and exogenous variable. Both, the interaction term and the moderating variable, are modeled as exogenous variables influencing the endogenous one. Based on the structural model, PLS calculates the interaction effect of the moderating variable. It shows the degree of moderation and is valued by 1) the path coefficients and their level of significance and 2) its effect size. The criteria for both are the same as the fit criteria for structural models is presented in F 2.4.2.

Figure 26 shows a structural model that contains the interaction term for a formative construct and the moderating variable as additional exogenous variables.



with x_i: *Indicators of Exogenous Variables*
δ_i: *Measure Specific Random Error of Indicators* $x_{3,4}$
λ^x_{i2}: *Factor Loading of Reflective, Exogenous Variable* ξ_2 *on Indicators* $x_{3,4}$
λ^y_{i1}: *Factor Loading of Reflective, Endogenous Variable* η_1 *on Indicators* $y_{1,2}$
$\pi_{\xi i}$: *Vector Containing Weights of Indicators*
ξ_1: *Moderating Variable*
ξ_2: *Reflective, Exogenous Variable*
ξ_3: *Interaction Term*
η_1: *Reflective, Endogenous Variable*
ε_i: *Measure Specific Random Error of Indicators* $y_{1,2}$
ζ: *Construct Specific Random Error of Endogenous Variable*
$\gamma_{\eta\xi}$: *Path Coefficients of Relationship between Exogenous Variables* ξ *and Endogenous Variable* η_1

Figure 26: Structural Model Containing a Term of Interaction[714]

[714] See Ibid., p. 724.

The model presented in figure 26 can be described formally. Formula 8 explains how the endogenous variable is influenced by the exogenous one, the term of interaction and the moderating variable.

$$(\eta_1) = (\gamma_{11}\gamma_{12}\gamma_{13}) \begin{pmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \end{pmatrix} + (\zeta_1)$$

with η_1: *Reflective, Endogenous Variable*
$\gamma_{\eta\xi}$: *Path Coefficients of Relationship between Exogenous Variables and Endogenous Variable*
ξ_1: *Moderating Variable*
ξ_2: *Reflective, Exogenous Variable*
ξ_3: *Term of Interaction*
ζ_1: *Construct Specific Random Error of Reflective, Exogenous Variable*

Formula 8: Causal Relationship between Exogenous Variables and an Endogenous Variable in Case of Moderating Effect

2.5.3 Valuation of Alignment Hypotheses

Alignment hypotheses in the context of the contingency theory predict in general that successful organizations adapt their organizational structure to contingency variables. In the specific context of this study alignment hypotheses suppose that successful organizations adapt their scanning and interpretation behavior to perceived strategic uncertainty more than unsuccessful organizations.[715] Therefore, it is necessary to analyze whether success of early warning intervenes as a moderating variable. For this, it needs to be judged whether success influences the causal relationship between perceived strategic uncertainty and early warning behavior.[716]

Having studied structural models in general and moderating effects within such structural models, the fit criteria for constructs applied in these models are presented.

2.6 Fit Criteria for Constructs

A high quality of measuring complex constructs is the basis of good empirical work in general[717] and the necessary condition to analyze relationships of dependency.[718]

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715 See hypotheses 2b, 3b 4b, 5b, 6b, 7b, 8b, 9b, 10b and 11b.
716 See Yasai-Ardekani and Nystrom (1996), p. 197.
717 See Peter (1979), p. 6, Churchill Jr. (1979), p. 64ff. and Anderson and Gerbing (1988), p. 411f.
718 See Homburg and Pflesser (1999), p. 415f.

Therefore, fit criteria for constructs have to be considered. In the following paragraph the fit criteria for reflective constructs, then the criteria for formative ones will be presented. The criteria proposed by GÖTZ and LIEHR-GOBBERS[719] who developed criteria which are exhaustive for the analysis of fitness of reflective and formative constructs within the context of PLS are followed.

2.6.1 Fit Criteria for Reflective Constructs

In a model of reflective measurement a latent variable becomes operationalized by means of various indicators. These indicators are measured by an indicator specific error. In order to judge the quality of a reflective construct, one has to analyze the extent the indicators represent the characteristics of the construct and the extent the measurement of these indicators is influenced by errors.

To determine the extent of the criteria reliability and validity is introduced. In this context, the measurement error of every single indicator has to be divided into a systematic and a random error. The random error is explained by factors which influence the measurement non-systematically. The systematic error, in contrast, is independent of randomness and occurs identically at every repetition of the measurement.[720]

If there is no random error, the measurement is completely reliable and the measurement is formally correct.[721] Therefore, complete reliability means that a measurement is reproducible under constant conditions of measurement with a result that is free from random error.[722] The more reliable a measurement, the more the variance of the indicator can be explained by the influence of the construct.[723] The second criterion, validity, is the degree of conceptual correctness of the measurement. It is valid if it measures what it pretends to measure.[724] This signifies that a measurement is completely valid if there is neither a random nor a systematic error. As a reliable measurement only implies the absence of a systematic error and a valid measurement implies the absence of both, the random and the systematic error,

719 See Götz and Liehr-Gobbers (2004), p. 730f.
720 See Churchill Jr. (1987), p. 381 f.
721 See Berekhoven, Eckert and Ellenrieder (1996), p. 87.
722 See Peter (1979), p. 6 and Churchill Jr. (1987), p. 495.
723 See Nieschlag, Dichtl and Hörschgen (1997), p. 722ff.
724 See Churchill Jr. (1979), p. 65.

reliability can be regarded as a necessary but not sufficient condition for validity. For further analysis of reliability and validity the following four criteria are analyzed.[725]

Content validity describes the degree to which indicators of the measurement model belong to the construct. For this, the content of the construct has to be considered. The items should reflect all facets of the meaning of the construct.[726] As there are no intersubjective criteria for the control of content validity it is considered as a general concept which underlies the development and analysis of constructs.[727]

The variance of indicators can be explained with the underlying latent variable. **Indicator reliability** measures how important the influence of a construct is. A common fit criterion is that a minimum of 50% of the variance of the indicator has to be explained by the underlying latent variable.[728] This implies that the weights λ of the latent variable on the indicators x_i (for exogenous variables) and y_i (for endogenous variables) are greater than 0.7. If this criterion is fulfilled, the variance of the indicator determined by the construct is greater than the variance determined by the error of measurement.[729] For newly developed scales values far below 0.7 can be expected.[730] Nevertheless, also for such constructs a minimum value for indicator reliability of 0.4 has to be trespassed.[731] Otherwise the indicator has to be eliminated. Indicators with indicator reliability between 0.4 and 0.7 do not have to be eliminated if the value of the internal consistency is above 0.7.[732]

Whereas indicator reliability measures the reliability of the measurement on the indicator level, construct reliability measures the quality of the model on the construct level.[733] Construct reliability is high if the relationship between the indicators is high. It is measured by the value of **internal consistency**.[734] FORNELL and LARCKER's definition is shown below:

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725 See Götz and Liehr-Gobbers (2004), p. 727f.
726 See Bohrnstedt (1970), p. 92.
727 See Schnell, Hill and Esser (1993), p. 163.
728 See Homburg and Giering (1996), p. 12.
729 See Götz and Liehr-Gobbers (2004), p. 727 and Carmines and Zeller (1979), p. 27.
730 See Hulland (1999), p. 198.
731 See Götz and Liehr-Gobbers (2004), p. 727 and Homburg and Baumgartner (1995), p. 170.
732 See Hulland (1999), p. 198.
733 Therefore, this value has more impact than reliability criteria at the level of the indicators. See Bagozzi and Baumgartner (1994), p. 402 and Chau (1999), p. 218f.
734 See Götz and Liehr-Gobbers (2004), p. 727. It is a measure similar to Cronbach's alpha. The internal consistency was chosen for its two advantages. In contrast to Cronbach's alpha, internal consistency considers the factor loadings of the indicators. In contrast, these loadings are all

$$Internal\ Consistency = \frac{\left(\sum_{i} \lambda_{ij}\right)^2}{\left(\sum_{i} \lambda_{ij}\right)^2 + \sum_{i} \mathrm{var}\left(\varepsilon_{ij}\right)}$$

with j: *Continuous Index for the Reflective Measurement Model*
i: *Continuous Index for the Indicators of the Reflective Measurement Model*
λ_{ij}: *Weight of the Latent Variables j on its Indicators i*
ε_i: *Measure Specific Random Error of Indicator i*

Formula 9: Internal Consistency[735]

The value of internal consistency can vary between 0 and 1. BAGOZZI and YI consider a minimum level of 0.6 as acceptable.[736] This study follows GÖTZ and LIEHR-GOBBERS who demand a minimum value of 0.7.[737] If the value of internal consistency is below the required minimum, indicators with low correlation to other indicators have to be eliminated.[738] This can be done by looking at the item-to-total correlation of the indicators. The single item-to-total correlation is defined as the correlation of an indicator (= item) with the sum of all indicators (= total). In contrast, the corrected item-to-total correlation is the correlation of an indicator with the sum of the remaining indicators after the considered indicator has been removed.[739] In the context of this work the more sophisticated corrected item-to-total correlation is employed and the attribute corrected is omitted.[740] In general, item-to-total correlations should be as high as possible. The item-to-total correlation is used as the criterion to select the indicator which has the lowest relationship with the construct. This indicator then is eliminated in order to increase internal consistency.[741] The procedure of elimination has to be repeated if the value of internal consistency is still below the minimum value.

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equally valued by the calculation of Cronbach's alpha. Additionally, the value of Cronbach's alpha correlates with the number of indicators which is not the case for internal consistency. See Götz and Liehr-Gobbers (2004), p. 734.

735 See Fornell and Larcker (1981), p. 45.

736 See Bagozzi and Yi (1988), p. 82.

737 See Götz and Liehr-Gobbers (2004), p. 727. They base their minimum level on Nunnally (1978), p. 245.

738 See Götz and Liehr-Gobbers (2004), p. 728.

739 See Norušis (1993), p. 146.

740 See Churchill Jr. (1979), p. 68f.

741 See Ibid., p. 68.

The final step of this fit analysis is the examination of **discriminance validity**. Within the measurement models various latent constructs are measured. The dissimilarity of theses measurements then is analyzed by means of the discriminance validity. The variance of the latent variable with its indicators has to be higher than the variance with any other latent variable.[742] First, the variance between the latent variable and its indicators – the average explained variance – has to be taken into account. Formula 10 shows its calculation.

$$AEV = \frac{\sum \lambda_i^2}{\sum_i \lambda_i^2 + \sum_i \operatorname{var}(\varepsilon_i)}$$

with *AEV:* *Average Explained Variance*
λ_i: *Weight of a Latent Variable j on its Indicator i*
ε_i: *Measure Specific Random Error of Indicator i*

Formula 10: Average Explained Variance

The measurements of the latent variables differ, e.g. the problem of multidiscriminancy does not exist, if the average explained variance is higher than the squared correlation between the latent variable and any other latent variable used in the investigation.[743]

Table 31 summarizes the fit criteria for reflective latent variables.

Criteria	**Aspiration Level**
Indicator Reliability	$\geq$ 0.7 (when the construct is newly developed or internal consistency $\geq$ 0.7, the minimum value is 0.4)
Internal Consistency	$\geq$ 0.7
Item-to-Total Correlation	If internal consistency $<$ 0.7, elimination of indicator with lowest item-to-total correlation
Average Explained Variance	Must be higher than the squared correlation between the latent variable and any other latent variable

Table 31: Overview of Fit Criteria for Reflective Constructs

[742] See Hulland (1999), p. 199.
[743] See ibid., p. 199.

2.6.2 Fit Criteria for Formative Constructs

The criteria presented above can only be applied to reflective constructs.[744] Formative constructs have to be tested in a different way. Of the criteria described above only indicator reliability is applicable to formative constructs. Due to the fact that every indicator defines the formative latent construct and that therefore, a correlation between the indicators can be positive, negative or non-existent, content validity,[745] construct validity[746] and discriminance validity[747] cannot be applied to formative constructs. Two other tests have to be conducted.

In the context of **indicator reliability** the weights of the indicators, which are allocated to them by PLS have to be compared. This analysis helps to understand which indicators are most relevant to define the latent construct.[748] As stated above, the indicators of a formative latent construct may have positive, negative or no correlation with other indicators. Therefore, their weights on the latent variable cannot be considered as factor loadings. The values of the weights are relatively small in comparison with values of factor loadings. This is for the PLS technique that allocates the values to the indicators in order to maximize the explained variance of the latent variable. In consequence, small weights cannot be interpreted as evidence for a weak measurement model.[749] Moreover, no indicator can be eliminated due to a small weight because each single indicator defines the latent variable.[750]

Although high correlations between the indicators of a formative construct need not to be considered, **multicollinearity** can be a problem.[751] It is undesirable and arises if one indicator is a linear function of another indicator.[752] GÖTZ and LIEHR-GOBBERS

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744 See Bollen (1989), Kim and Mueller (1971), Nunnally (1978), Harman (1976) and Long (1983).

745 See Götz and Liehr-Gobbers (2004) and the sources cited there: Bollen and Lennox (1991), Cohen, Cohen, Teresi, Marchi and Velez (1990) and Chin and Gopal (1995).

746 See Götz and Liehr-Gobbers (2004), p. 729 and Hulland (1999), p. 201, Krafft (1999), p. 124f. and Rossiter (2002), p. 307f.

747 See Götz and Liehr-Gobbers (2004), p. 730 and Fornell and Larcker (1981), p. 46.

748 See Sambamurthy and Chin (1994), p. 231f.

749 See Götz and Liehr-Gobbers (2004), p. 729 and Chin (1998), p. 307.

750 See Götz and Liehr-Gobbers (2004), p. 729, Bollen and Lennox (1991), p. 308 and Jarvis, Mackenzie and Podasakoff (2003), p. 202.

751 See Grewal, Cote and Baumgartner (2004).

752 See Cohen, Cohen, West and Aiken (2003), p. 6 and Backhaus, Erichson, Plinke and Weiber (2005), p. 88ff.

propose the variance inflation factor to determine multicollinearity.[753] It is defined as:[754]

$$VIF_i = \frac{1}{1 - R_i^2}$$

with *VIF:* *Variance Inflation Factor*
i: *Indicator of the Construct*
R^2_i: *Multiple Coefficient of Determination of Indicator i on all other Indicators*

Formula 11: Variance Inflation Factor

Values over 10 signal multicollinearity.[755] Table 32 summarizes the fit criteria for formative constructs:

Criteria	**Aspiration Level**
Indicator Reliability	Analysis of the weights of the indicators
Multicollinearity	VIF $\geq$ 10

Table 32: Overview of Fit Criteria for Formative Constructs

3 Construct Measuring

In the following analysis the fit criteria presented above are applied to the constructs used in this study.

3.1 Early Warning Behavior

3.1.1 Scanning

3.1.1.1 Scanning Frequency and Sources

Scanning frequency comprises four possible sources of scanning. These four constructs are presented below. The composite constructs internal sources (internal, personal plus internal, impersonal sources), external sources (external, personal plus external, impersonal sources), personal sources (internal, personal plus external, personal sources), impersonal sources (internal, impersonal plus external, impersonal sources) and frequency (all four sources), however, are listed in the appendix.

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753 See Götz and Liehr-Gobbers (2004), p. 729. For alternative measures see Willan and Watts (1978).
754 See Craney and Surles (2002), p. 392 and Ukourmunne, Gulliford and Chinn (2002), p. 479.
755 See Götz and Liehr-Gobbers (2004), p. 729 and Craney and Surles (2002), p. 392f.

Internal, Personal Sources

Information about the Indicators of the Construct 'Internal, Personal Sources'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.41	0.61
Technologien	0.41	0.61
Wettbewerber	0.46	0.75
Rohstoffe/Zulieferer	0.48	0.75
Politisch/rechtlicher Bereich	0.41	0.61
Wirtschaftliche Rahmenbedingungen	0.46	0.75
Soziokultureller Bereich	0.48	0.75
VIF: Variance Inflation Factor		

Table 33: Information about the Construct 'Internal, Personal Sources'

All sectors determine the construct internal, personal sources in the same way. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

Internal, Impersonal Sources

Information about the Indicators of the Construct 'Internal, Impersonal Sources'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.49	1.46
Technologien	0.30	1.59
Wettbewerber	0.19	1.55
Rohstoffe/Zulieferer	0.53	1.43
Politisch/rechtlicher Bereich	0.17	2.81
Wirtschaftliche Rahmenbedingungen	0.27	2.61
Soziokultureller Bereich	0.20	1.85
VIF: Variance Inflation Factor		

Table 34: Information about the Construct 'Internal, Impersonal sources'

The construct internal, impersonal sources is mainly determined by data about suppliers as well as clients. Data about competitors, the political/legal and the socio-cultural sector do not determine the construct to an important degree. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

External, Personal Sources

Information about the Indicators of the Construct 'External, Personal Sources'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.71	1.87
Technologien	0.39	1.96
Wettbewerber	0.71	1.87
Rohstoffe/Zulieferer	0.69	1.65
Politisch/rechtlicher Bereich	0.59	2.18
Wirtschaftliche Rahmenbedingungen	0.20	2.19
Soziokultureller Bereich	0.38	1.75
VIF: Variance Inflation Factor		

Table 35: Information about the Construct 'External, Personal Sources'

The construct external, personal sources is mainly determined by data about customers, competitors, suppliers and political/legal conditions. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

External, Impersonal Sources

Information about the Indicators of the Construct 'External, Impersonal Sources'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.63	1.46
Technologien	0.41	1.55
Wettbewerber	0.64	1.41
Rohstoffe/Zulieferer	0.33	1.48
Politisch/rechtlicher Bereich	0.55	3.19
Wirtschaftliche Rahmenbedingungen	0.59	3.06
Soziokultureller Bereich	0.33	2.00
VIF: Variance Inflation Factor		

Table 36: Information about the Construct 'External, Impersonal Sources'

This construct is mainly determined by data about clients and competitors. External, impersonal sources also provide data about the political/legal and the economic sectors of the general environment. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.1.1.2 Scope of Scanning

Scope of Scanning

Information about the Indicators of the Construct 'Scope of Scanning'		
Description of Indicators	*Weight*	*VIF*
Informationen über das Verhalten potenzieller Kunden	0.41	1.40
Informationen über allgemeine technologische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	0.29	1.28
Informationen über potenzielle Wettbewerber	0.45	1.62
Informationen über potenzielle Zulieferer	0.38	1.32
Informationen über allgemeine politische und gesetzgeberische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	0.33	1.96
Informationen über allgemeine wirtschaftliche Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	0.04	2.12
Informationen über allgemeine soziokulturelle Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	0.28	1.81
VIF: Variance Inflation Factor		

Table 37: Information about the Construct 'Scope of Scanning'

The construct scope of scanning is more determined by sectors of the task environment than by those of the general environment. Within the sectors of task environment data about potential clients and competitors is perceived to be most useful. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.1.1.3 Degree of Delegation

Information about the Indicators of the Construct 'Degree of Delegation'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.07	1.40
Technologien	0.57	1.24
Wettbewerber	0.46	1.45
Rohstoffe/Zulieferer	0.09	1.21
Politisch/rechtlicher Bereich	0.16	2.34
Wirtschaftliche Rahmenbedingungen	0.19	2.42
Soziokultureller Bereich	0.16	1.91
VIF: Variance Inflation Factor		

Table 38: Information about the Construct 'Degree of Delegation'

Delegation is mostly determined by the delegation of scanning the technological sector and competitors. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.1.2 Interpreting

The constructs degree of tool support and fixity of time for interpretation are measured by one indicator. Therefore, an analysis of these constructs in the context of the developed fit criteria is not sensible.

3.1.2.1 Diversity of Internal Models

Information about the Indicators of the Construct 'Diversity of Internal Models'		
Description of Indicators	*Weight*	*VIF*
Mitarbeitern	0.66	1.08
Kunden	0.65	1.44
Zulieferern	0.74	1.54
Geschäftsführern oder Vorständen	0.47	1.08
Unternehmensberatern	0.39	1.19
Anwälten/Steuerberatern	0.40	1.28
Freunden und Familienangehörigen	0.23	1.24
Anderen Personen	0.32	1.22
VIF: Variance Inflation Factor		

Table 39: Information about the Construct 'Diversity of Internal Models'

The construct diversity of internal models is mostly determined by interpretation done together with employees, clients and suppliers. Apart from friends and family all other groups are also important for the interpretation of the data derived from the process of scanning. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.1.2.2 Intensity of Interpretation

Information about the Indicators of the Construct 'Intensity of Interpretation'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Die Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen erachte ich als sehr wichtig.		0.91	-*
Informationen über mögliche Chancen und Risiken für mein Unternehmen interpretiere ich …(1 = nie, 7 = täglich)		0.88	-*
Information about the Construct 'Intensity of Interpretation'			
Internal Consistency	0.89	Average Explained Variance	0.81
**: Calculation not Possible*			

Table 40: Information about the Construct 'Intensity of Interpretation'

Intensity of interpretation is measured by two indicators. Due to this fact no item-to-total correlation is calculated. The indicator reliability, the internal consistency and the average explained variance of the construct are satisfactory. Also, the problem of multidiscriminancy does not exist. All squared correlations between the construct intensity of interpretation and all other latent variables are lower than the average explained variance of the construct.

3.2 Contingency Variables

3.2.1 Environmental Uncertainty

Perceived strategic uncertainty is reflected by three dimensions, i.e. environmental complexity, environmental rate of change and environmental importance.[756]

Environmental Complexity

Information about the Indicators of the Construct 'Environmental Complexity'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.55	1.26
Technologien	0.49	1.23
Wettbewerber	0.08	1.47
Rohstoffe/Zulieferer	0.23	1.24
Politisch/rechtlicher Bereich	0.21	1.23
Wirtschaftliche Rahmenbedingungen	0.04	1.37
Soziokultureller Bereich	0.09	1.30
VIF: Variance Inflation Factor		

Table 41: Information about the Construct 'Environmental Complexity'

Environmental complexity is mostly determined by clients and technologies. The general economic conditions do not contribute to a high extent to environmental complexity. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

[756] See formula 1.

Environmental Rate of Change

Information about the Indicators of the Construct 'Environmental Rate of Change'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.24	1.41
Technologien	0.36	1.50
Wettbewerber	0.30	1.48
Rohstoffe/Zulieferer	0.28	1.29
Politisch/rechtlicher Bereich	0.01	1.50
Wirtschaftliche Rahmenbedingungen	0.21	1.50
Soziokultureller Bereich	0.41	1.55
VIF: Variance Inflation Factor		

Table 42: Information about the Construct 'Environmental Rate of Change'

The rate of change is influenced by all sectors of the task environment. Apart from the socio-cultural sector the general environment has only a minor influence on the environmental rate of change. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

Environmental Importance

Information about the Indicators of the Construct 'Environmental Importance'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.70	1.13
Technologien	0.60	1.16
Wettbewerber	0.50	1.16
Rohstoffe/Zulieferer	0.28	1.19
Politisch/rechtlicher Bereich	0.00	1.54
Wirtschaftliche Rahmenbedingungen	0.17	1.43
Soziokultureller Bereich	0.18	1.38
VIF: Variance Inflation Factor		

Table 43: Information about the Construct 'Environmental Importance'

This dimension of perceived strategic uncertainty is mainly determined by clients, technologies and competitors. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.2.2 Personality

3.2.2.1 Locus of Control

Information about the Indicators of the Construct 'Locus of Control'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Ich übernehme gerne Verantwortung.		0.61	0.41
Es hat sich für mich als gut erwiesen, selbst Entscheidungen zu treffen, anstatt mich auf das Schicksal zu verlassen.		0.75	0.46
Bei Problemen und Widerständen finde ich in der Regel Mittel und Wege, um mich durchzusetzen.		0.75	0.48
Erfolg ist oft mehr von Leistung, als von Glück abhängig.		eliminated	
Ich habe häufig das Gefühl, dass ich viel Einfluss darauf habe, was mit mir geschieht.		0.63	0.48
Bei wichtigen Entscheidungen orientiere ich mich selten am Verhalten anderer.		eliminated	
Information about the Construct 'Locus of Control'			
Internal Consistency	0.79	Average Explained Variance	0.61

Table 44: Information about the Construct 'Locus of Control'

As indicators with an indicator reliability lower than 0.4 have to be eliminated, items 4 and 6 had to be omitted because of an indictor reliability of 0.32 and 0.31. As a consequence of this elimination the internal consistency of the construct went up from 0.68 to 0.79. The criterion for discriminance validity of the construct is fulfilled because no squared correlation between this construct and any other latent variable is higher than the average explained variance of the construct (0.61).

3.2.2.2 Tolerance for Ambiguity

Information about the Indicators of the Construct 'Tolerance for Ambiguity'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Ich mag es, wenn Überraschungen auftreten.		0.69	0.60
Ich beschäftige mich gerne mit scheinbar unlösbaren Aufgaben.		0.73	0.47
Ich probiere gerne Dinge aus, auch wenn nicht immer etwas dabei herauskommt.		0.70	0.52
Ich lasse die Dinge gerne auf mich zukommen.		eliminated	
Ich habe es nicht gerne, wenn die Arbeit gleichmäßig verläuft.		0.63	0.47
Ich warte geradezu darauf, dass etwas Aufregendes passiert.		0.65	0.60
Wenn um mich herum alles drunter und drüber geht, fühle ich mich so richtig wohl.		0.71	0.58
Ich muss nicht wissen, was auf mich zukommt.		0.43	0.43
Information about the Construct 'Tolerance for Ambiguity'			
Internal Consistency	0.82	Average Explained Variance	0.62

Table 45: Information about the Construct 'Tolerance for Ambiguity'

The fourth item is eliminated because its internal reliability is 0.21. As the internal consistency is above the minimum level, the item-to-total correlations of the indicators do not have to be considered. The average explained variance of 0.62 is higher than the squared correlations between the construct tolerance for ambiguity and all other latent variables. Therefore, the problem of multidiscriminancy does not exist.

3.2.2.3 Need for Achievement

Information about the Indicators of the Construct 'Need for Achievement'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Ich halte es für wichtig, mehr zu leisten als andere.		0.69	0.51
Mir scheint es erstrebenswert, in der Gesellschaft weiter zu kommen.		0.69	0.38
Ich stelle große Anforderungen an meine Arbeit.		0.73	0.56
Andere finden, dass ich hart arbeite.		0.70	0.38
Meistens habe ich viel zu tun.		0.63	0.54
Nachdem ich eine schwierige Arbeit begonnen habe, fällt es mir schwer, diese zu unterbrechen.		0.65	0.35
Wenn ich ein selbst gestecktes Ziel nicht erreicht habe, setze ich alles daran, es doch noch zu schaffen.		0.71	0.46
Durchhaltevermögen ist eine wichtige Eigenschaft.		0.43	0.47
Information about the Construct 'Need for Achievement'			
Internal Consistency	0.89	Average Explained Variance	0.61

Table 46: Information the Construct 'Need for Achievement'

The eighth indicator has the very low indicator reliability of 0.43. As the value of internal consistency is very high (0.89), this indicator does not have to be eliminated. The problem of multidiscriminancy does not exist because the average explained variance of the construct is higher than the squared correlations between this construct and all other latent variables.

3.2.2.4 Risk Propensity

Information about the Indicators of the Construct 'Risk Propensity'		
Description of Indicators	*Indicator Reliability*	*Item-to-Total Correlation*
Manchmal riskiere ich etwas, nur um Spaß zu haben.	0.86	0.72
Hin und wieder setzte ich mich Risiken aus, um mich herauszufordern.	0.88	0.70
Ich finde es manchmal aufregend, Sachen zu machen, für die ich Schwierigkeiten bekommen könnte.	0.85	0.71
Aufregung und Abenteuer sind für mich wichtiger als Sicherheit.	0.72	0.66

Information about the Construct 'Risk Propensity'			
Internal Consistency	0.90	Average Explained Variance	0.68

Table 47: Information about the Construct 'Risk Propensity'

The reliability of each single indicator is very high. Therefore, no indicator has to be eliminated. Also the internal consistency of the construct is well above the minimum level (0.90). The problem of multidiscriminancy does not exist because the average explained variance of the construct is higher than the squared correlations between this construct and other latent variables.

3.2.2.5 Egalitarianism

Information about the Indicators of the Construct 'Egalitarianism'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Es ist gerecht, dass nicht alle Menschen gleich viel verdienen und ein gleich hohes Vermögen besitzen.		0.41	0.49
Bei Chancengleichheit ist es gerecht, dass einige Menschen bei höherer Leistung mehr Einkommen erzielen.		0.82	0.53
Es ist gerecht, dass man das, was man sich durch Arbeit verdient hat, behält, auch wenn das heißt, dass einige Menschen vermögender sind als andere.		0.61	0.53
Es ist gerecht, dass Menschen, die viel leisten, mehr verdienen als andere.		0.86	0.51
Es ist gerecht, dass Eltern ihr Vermögen an ihre Kinder weitergeben.		0.52	0.39
Einige Menschen sind begabter und intelligenter als andere. Es ist gerecht, dass es dadurch für sie einfacher ist, ein höheres Einkommen zu erzielen.		eliminated	
Information about the Construct 'Egalitarianism'			
Internal Consistency	0.76	Average Explained Variance	0.62

Table 48: Information about the Construct 'Egalitarianism'

The sixth item is eliminated due to an indicator reliability of 0.28. The resulting value of internal consistency of 0.76 is very high so that no additional indicator has to be eliminated. The problem of multidiscriminancy does not exist because the average explained variance of the construct is higher than the squared correlations between this construct and all other latent variables.

3.2.2.6 Moral Reasoning

Information about the Indicators of the Construct 'Moral Reasoning'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Versprechen gegenüber einem Freund halten		0.77	0.60
Versprechen gegenüber jemandem einhalten, den man kaum kennt		0.68	0.53
Die Wahrheit sagen		0.52	0.42
Einem Fremden das Leben retten		0.76	0.59
Einem Freund das Leben retten		0.69	0.50
Dinge, die anderen gehören, nicht wegnehmen		0.74	0.57
Sich an Gesetze halten		0.55	0.49
Bestrafung bei Gesetzesbruch		0.56	0.49
Information about the Construct 'Moral Reasoning'			
Internal Consistency	0.86	Average Explained Variance	0.57

Table 49: Information about the Construct 'Moral Reasoning'

The reliability of the indicators is higher than the required minimum level of 0.4. As the internal consistency is 0.86 no indicators have to be eliminated. The problem of multidiscriminancy does not exist because the squared correlations between this construct and all other latent variables are lower than the average explained variance.

3.2.2.7 Machiavellianism

Information about the Indicators of the Construct 'Machiavellianism'		
Description of Indicators	Indicator Reliability	Item-to-Total Correlation
Man sollte nur dann den wahren Grund seiner Handlungen sagen, wenn es einem nutzt.	0.57	0.57
Am sichersten fährt man mit der Annahme, dass alle Menschen auch einen bösartigen Zug haben.	0.44	0.50
Mit Aufrichtigkeit kommt man nicht immer weiter.	0.47	0.49
Bedeutend und unredlich zu sein, ist alles in allem besser als unbedeutend und ehrlich zu sein.	eliminated	
Man soll seine Bekanntschaften auch unter dem Gesichtspunkt auswählen, ob sie einem nützen können.	eliminated	
Meistens ist es günstiger, seine wahren Absichten für sich zu behalten.	0.92	0.61
Wenn man jemanden um etwas bittet, kann man falsche Gründe vorschieben, von denen man sich Erfolg verspricht.	0.56	0.46
Ein weit gestecktes Ziel kann man nur erreichen, wenn man sich auch etwas außerhalb des Erlaubten bewegt.	0.52	0.39
Information about the Construct 'Machiavellianism'		
Internal Consistency	0.71	Average Explained Variance 0.81

Table 50: Information about the Construct 'Machiavellianism'

Items four and five have to be eliminated because the values of the indicator reliability are below the required minimum level of 0.4. They are 0.15 and 0.16. The resulting internal consistency is satisfying. Therefore, no more indicators have to be eliminated. The multi discriminance problem does not exist because the squared correlations between this construct with all other latent variables are lower than the average explained variance.

3.2.2.8 Trust in People

Information about the Indicators of the Construct 'Trust in People'			
Description of Indicators		*Indicator Reliability*	*Item-to-Total Correlation*
Man kann nicht vorsichtig genug sein im Umgang mit anderen Menschen.		0.56	0.46
Die meisten Leute streben eher nach ihrem eigenen Vorteil.		0.82	0.54
Wenn man nicht Acht gibt, werden andere Leute einen ausnutzen.		0.70	0.60
Niemand kümmert sich um einen, wenn es einem schlecht geht.		0.72	0.44
Menschen sind grundsätzlich unkooperativ.		0.56	0.42
Information about the Construct 'Trust in People'			
Internal Consistency	0.81	Average Explained Variance	0.53

Table 51: Information about the Construct 'Trust in People'

All items are reversed items. The internal consistency is high and all indicators are reliable. Due to a high value of internal consistency, no indicator has to be eliminated. The average explained variance is higher than all squared correlations between this construct and all other latent variables. Therefore, the problem of multidiscriminancy does not exist.

3.3 Success Measures

3.3.1 Success of Early Warning

Information about the Indicators of the Construct 'Success of Early Warning'		
Description of Indicators	*Weight*	*VIF*
Kunden	0.46	1.26
Technologien	0.42	1.19
Wettbewerber	0.38	1.23
Rohstoffe/Zulieferer	0.23	1.14
Politisch/rechtlicher Bereich	0.13	1.98
Wirtschaftliche Rahmenbedingungen	0.11	2.18
Soziokultureller Bereich	0.09	1.56
VIF: Variance Inflation Factor		

Table 52: Information about the Construct 'Success of Early Warning'

The construct success of early warning is mainly determined by the sectors clients, technology and competitors. As the values of the variance inflation factor for each indicator are far below 10, the problem of multicollinearity does not exist.

3.3.2 Economic Success

Information about the Indicators of the Construct 'Economic Success'		
Description of Indicators	*Weight*	*VIF*
Umsatzrendite (Betriebsergebnis vor Steuern/Umsatz)	0.80	-
Steigerung des Unternehmenswertes	0.30	-
VIF: Variance Inflation Factor		

Table 53: Information about the Construct 'Economic Success'

The construct economic success is mainly determined by the indicator profit on sales. A multicollinearity problem cannot exist because the construct comprises only two indicators.

4 Cluster Analysis

The objective of cluster analysis is to sort cases (e.g. people) into groups or clusters so that the degree of association between members of the same cluster is greater than the degree of association to members of other clusters.[757] In the context of this work this explorative method is used to sort different types of CEOs in groups according to their attitudes relevant within the context of early warning. Then, early warning behavior and its success will be analyzed for each cluster of CEOs.

These Clusters are the result of a process of three steps.[758] 1) The bases of the process are the collected data.[759] In the here shown case this data comprises the data of CEOs and their attitudes. The difference between each attribute (attitudes) is determined for couples of examined objects (CEOs) by means of a proximity measure. 2) A fusion algorithm (e.g. single-linkage, ward algorithm or complete-linkage) is selected and the analyzed objects are grouped according to the proximity value, so that within each group there are only objects with similar characteristics. 3) Finally, the number of groups is determined.

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757 "Eine Menge von Objekten, die durch die Ausprägungen einer Anzahl von Merkmalen charakterisiert werden, soll so in Klassen zerlegt werden, daß die zu einer Klasse gehörigen Objekte möglichst ähnlich und die Klassen untereinander möglichst unähnlich sind." Bergs (1981), p. 4. See also Bock (1974), p. 13 and Vogel (1975), p. 1.

758 See Backhaus, Erichson, Plinke and Weiber (2005), p. 479ff., Bortz and Döring (2003), 382f. and Bergs (1981), p. 23ff.

759 For problems regarding the selection and preparation of data see Bergs (1981), p. 51ff.

Distance measures are applied in the first step.[760] They measure the dissimilarity between objects by comparing all attributes. The selection of an appropriate distance measure depends on the chosen scale of the variables. In the case of interval scaled variables the MINKOWSKI metrics is applied.[761]

$$d_{ij} = \left(\sum_{t=0}^{T} \left| x_{it} - x_{jt} \right|^{k} \right)^{\frac{1}{k}}$$

with d_{ij}: *distance between objects i and j*
x_{it}: *attribute t of object i*
x_{jt}: *attribute t of object j*
k: *MINKOWSKI's constant*

Formula 12: MINKOWSKI's Distance Measure

The second step of cluster analysis is the selection of a fusion algorithm.[762] It is selected according to the two possible modes of clustering: partitional and hierarchical clustering.[763] Partitional clustering methods start with assigning each object to groups. Then, these single objects are exchanged between the groups until the optimal partition is found.[764] Hierarchical clustering can apply two methods – the agglomerative and divisive one.[765] Agglomerative algorithms consider each object of analysis as one single group and agglomerate step-wise; the divisive method takes the opposite direction and first considers all objects as one group and then divides them into more groups.

This study follows BACKHAUS et al. who propose the use of single-linkage and the ward algorithm for clustering large number of objects with attributes that are measured by interval scaled variables.[766] Both algorithms are agglomerative. First, the single-linkage method identifies objects with especially great distance to all others. These objects are then eliminated for further analysis. After that, the ward algorithm is

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760 See ibid., p. 63ff. These distance measures are also called dissimilarity measures. See Everitt, Landau and Leese (2001), p. 41.
761 See Ibid., p. 40, Chakrapani (2004), p. 61 and Borg and Groenen (2005), p. 90.
762 See Everitt, Landau and Leese (2001), p. 99 and Hartigan (1975).
763 See Jain and Dubes (1988).
764 See Guha, Rastogi and Shim (2004), p. 45.
765 See Johnson (1967) and Hubert and Schultz (1975).
766 See Backhaus, Erichson, Plinke and Weiber (2005), p. 516f. and Kohn (2005), p. 551.

applied which is the algorithm mostly used in the context of obtaining groups of objects.[767]

The final step of cluster analysis is to determine the number of groups. As the chosen agglomerative procedures reduce the number of groups from the number of all possible groups to one final group, an additional method has be applied to determine the optimal number of clusters. It should be determined on the basis of statistical reasons and not in respect to content. Therefore, the elbow criterion is applied which will be described in the following.768 According to it, the number of clusters should be reduced until the sum of squared measurement errors augments in a disproportionate way. For a graphical representation the sums of squared measurement errors are depicted in dependency of the amount of groups and the amount of groups is optimal at the determined kink.769 The sum of squared measurement errors is determined by the following formula:

$$V_g = \sum_{k=1}^{K_g} \sum_{j=1}^{J} \left(x_{kjg} - \overline{x}_{jg} \right)^2$$

with V_g: *sum of squared measurement errors of group g*
K: *analyzed objects in group g*
J: *attributes*
x_{kjg}: *value of attribute j of analyzed object k in group g*
$\overline{x}_{kjg}$: *mean of attribute j in group g*

Formula 13: Sum of Squared Measurement Errors

[767] See Bergs (1981), p. 96f. and Punj and Stewart (1983), p. 137ff. For its advantages see Breckenridge (1989), p. 150ff. and Edelbrock (1979), p. 371ff.
[768] See Everitt, Landau and Leese (2001), p. 102 and Backhaus, Erichson, Plinke and Weiber (2005), p. 511.
[769] See G 2.4.3.

G Results of the Empirical Analysis

In this section the results of the empirical analysis are presented. The introductory analysis deals with possible differences between industry sectors and shows the average early warning behavior of German CEOs in the manufacturing industry who participated in this survey. Part two and three of the introductory analysis present the early warning behavior as dependent on success of early warning and on organizational size. The following paragraph deals with the empirical valuation of the research hypotheses deduced in section D. First, the three different types of hypotheses are explained and the adequate methods of analysis are presented. Then, the hypotheses deduced within the context of the classical contingency approach and of its extension are valuated. Relating to the latter mentioned hypotheses, an additional analysis shows to which degree each attitude explains the design variables of early warning. The last paragraph of this section is the concluding analysis. Here, the classical contingency theory is combined with its extension and the explanatory power of both is compared. Then, the relationship between success of early warning and the economic success of the organization is analyzed. Finally, a cluster analysis is conducted in order to obtain groups of CEOs characterized by specific attitudes and early warning behavior.

1 Introductory Analysis

1.1 Differences of Perceived Strategic Uncertainty among Sectors

Table 54 and 55 show the average answers by executives of all five analyzed industry sectors (transport equipment, electrical equipment, machinery, food products and chemicals) about the perceived strategic uncertainty their organization faces. The first table illustrates the three dimensions of perceived strategic uncertainty (complexity, rate of change and importance); the second shows additionally calculated values for overall perceived strategic uncertainty per sector. [770]

[770] For the calculation of perceived strategic uncertainty see formula 1.

Sector Characteristics						
	Complexity		Rate of Change		Importance	
	Mean	SD	Mean	SD	Mean	SD
Transport Equipment	4.11	0.95	3.72	1.01	4.13	1.02
Electrical Equipment	4.29	0.90	3.82	0.92	4.48	0.94
Machinery	4.17	0.94	3.59	1.00	4.24	0.84
Food Products	4.36	0.96	3.90	1.01	4.42	0.86
Chemicals	4.18	0.91	3.40	0.79	4.35	0.80
1 = low to 7 = high; SD = Standard Deviation						

Table 54: Dimensions of Perceived Strategic Uncertainty in Dependence of Industry Sectors

Sector Characteristics		
	Perceived Strategic Uncertainty	
	Mean	SD
Transport Equipment	32.38	2.56
Electrical Equipment	36.48	2.47
Machinery	32.84	2.38
Food Products	36.48	2.47
Chemicals	32.95	1.97
1 = low to 7 = high; SD = Standard Deviation		

Table 55: Perceived Strategic Uncertainty in Dependence of Industry Sectors

An ANOVA[771] is applied to analyze possible differences between the answers given by managers working in different sectors of the manufacturing industry. For this, the values of complexity, rate of change and importance of the organizational environment are compared. The result of this test is that there does not exist a statistically significant difference between industry sectors for answers about the three dimensions of perceived strategic uncertainty. The same is true for values of overall perceived strategic uncertainty. A final t-test analyzes, if the answering behavior of managers in general depends on the sector of the organization. Apart from four indicators, each belonging to different constructs, executives' answers do not vary due to the influence of the sector. The overall result of these tests is that there is no need to differentiate between sectors for further analysis. Other criteria than the sector of the organization determine answering behavior.

[771] See Bortz and Döring (2003), p. 530f.

1.2 Empirical Assessment of Early Warning Behavior

1.2.1 Average Early Warning Behavior

Table 56 shows the average early warning behavior of a CEO in this sample and the corresponding standard deviation. The results are given on the original scale: 1 is low and 7 is high.

Early Warning Behavior		
	Mean	SD
Scanning		
Internal, Personal Sources	4.19	1.03
Internal, Impersonal Sources	3.87	1.60
External, Personal Sources	3.88	1.33
External, Impersonal Sources	4.68	1.16
All Impersonal Sources	4.27	0.98
All Personal Sources	4.03	0.98
All Internal Sources	4.27	0.98
All External Sources	4.27	1.00
Frequency	4.16	0.91
Scope	4.38	0.91
Delegation	3.71	0.97
Interpretation		
Diversity of Internal Models	5.24	0.97
Intensity	3.59	0.75
Tool Support	2.89	1.77
Fixity of Time for Interpretation	3.60	0.25
1 = low to 7 = high; SD = Standard Deviation		

Table 56: Average Early Warning Behavior of CEOs of the Sample

There are four alternative sources for managers to scan the environment. For the most part they use external, impersonal sources such as business journals (4.68) followed by internal, personal sources such as employees (4.19). The two other sources – internal, impersonal sources such as the management information system and external, personal sources such as clients or business peers – are both used to a lesser extent. These findings correspond to the ones of DAFT et al. They point out that personal, internal sources are used most frequently, followed by impersonal, external sources and personal external sources. The sources used the least are like in this study impersonal, internal sources.[772] By aggregating these four sources it can be observed that

[772] See Daft, Sormunen and Parks (1988), p. 131.

impersonal sources are preferred to personal ones. A possible explanation might be that the use of impersonal sources does not require a lot of time in comparison to communication. Also impersonal sources might be more accessible than personal ones.[773] There exists no difference between the use of internal and external sources. The interpretation of other values is hardly meaningful because they cannot be compared to reference values. Only one final observation has to be made: tool support (2.89) tends to be very low.

1.2.2 Early Warning Behavior in Dependence on Success

In the following it will be analyzed whether early warning behavior differs in successful and unsuccessful organizations.[774] For this purpose the sample is divided into three groups.[775] The decisive criterion for the division is success of early warning. Therefore, the first group contains organizations whose CEOs consider their early warning to be less successful than those in groups two and three.[776] The success of early warning is below 4.3 within the first group and higher than 5.4 within the third group. The t-test (LEVENE test) is applied in order to analyze whether a statistically significant difference between the early warning behavior of unsuccessful organizations (group 1) and successful organizations (group 3) exists.[777] Table 57 shows the result of this analysis.

	Unsuccessful Organizations	Successful Organizations	Significance
Scanning			
Internal, Personal Sources	4.16	4.41	ns
Internal, Impersonal Sources	3.84	4.14	*
External, Personal Sources	3.72	4.09	*
External, Impersonal Sources	4.51	4.78	ns
All Internal Sources	4.00	4.28	ns
All External Sources	4.11	4.44	ns
All Personal Sources	3.94	4.25	ns
All Impersonal Sources	4.18	4.46	ns
Frequency	4.06	4.36	ns
Scope	4.23	4.64	**
Delegation	3.79	3.43	*

773 See Smeltzer, Fann and Nikolaisen (1988), p. 57.

774 In this context a successful organization is an organization with a high degree of success of early warning. For further explanation see Yasai-Ardekani and Nystrom (1996), p. 194.

775 See Steiners (2005), p. 173 for a description of this procedure.

776 Each group contains the same number of cases (299). This approach allows for more general assumptions than by taking only extreme cases.

777 For a detailed description of the Levene test see Levene (1960) and Eckstein (1999), p. 161ff.

Interpretation			
Diversity of Internal Models	5.12	5.49	*
Intensity	3.45	3.86	**
Tool Support	2.79	2.93	ns
Fixity of Time for Interpretation	3.41	3.66	ns
*Levels of Significance of Mean Difference: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant;1 = low, 7 = high*			

Table 57: Early Warning Behavior in Dependence of Success of Early Warning

Before the start of the data analysis it needs to be stressed that a t-test does not allow to make assumptions about causal relationships because it compares the average values of two groups. Here the values of early warning behavior of unsuccessful organizations are compared with values of successful organizations. If the values of design variables of early warning behavior differ between unsuccessful and successful organizations, this does not automatically imply that this design variable influences success. The opposite can also be true. This means that the design variable can be influenced by success.

The analysis will begin with the four sources of scanning. The use of internal, personal sources and external, impersonal sources is the same for unsuccessful and successful organizations. This is not the case for internal, impersonal sources and external, personal ones. These two sources are used significantly more by successful organizations than by unsuccessful organizations.[778]

The fact that internal, impersonal sources are used significantly more by successful organizations than by unsuccessful ones, can be explained applying literature. It stresses the importance of sources such as internal information systems. These sources are considered to be essential to understand the market and its future development.[779] This corresponds to the findings of PRESCOTT and BHARDWAJ. They show that an internal report is perceived to be the most effective mode of disseminating data about future trends.[780]

The advantages of personal, external sources have been described above. In accordance, ALLEN shows that most idea-generating messages come from outside

[778] This is partially supported by the findings of Daft, Sormunen and Parks (1988), p. 133. They find that successful organizations use all personal sources more than unsuccessful organizations do.

[779] See Galbraith (1973), p. 30ff.

[780] See Prescott and Bhardwaj (1995), p. 11.

personal sources like vendors and customers.[781] Counselors provide "a quick sounding board for ideas [and] very useful advice."[782]

As seen above, an explanation assuming a reverse causal effect is also plausible. Successful organizations have the financial possibility to engage consultants and to implement executive information systems. Figure 27 summarizes the analysis and shows which of the four sources are used more often by successful than by unsuccessful organizations.

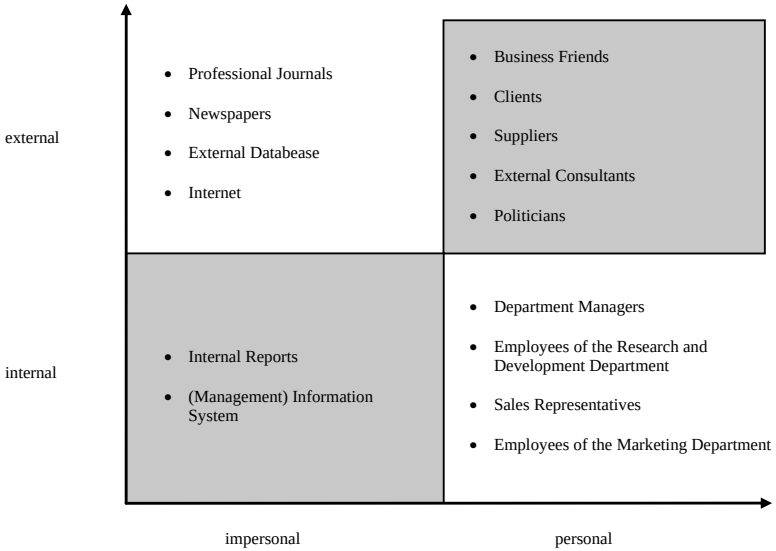

Figure 27: Sources Used by Successful and Unsuccessful Organizations

Now the composite measures of scanning sources are analyzed. Successful organizations do not use personal or impersonal sources more than unsuccessful ones. This finding is in line with the information richness theory. DAFT and LENGEL stress that successful organizations adapt their use of impersonal and personal sources to environmental uncertainty. Low uncertainty requires impersonal sources, high

781 See Allen (1977), p. 130.
782 Eisenhardt (1989), p. 561.

uncertainty personal ones.[783] Also the use of external and internal sources by CEOs of successful organizations is the same as the use by CEOs of unsuccessful organizations.

Completing the analysis of scanning sources this study will look at the overall scanning frequency. It does not differ between the two groups. This finding is considered in the context of literature. Although numerous studies analyze scanning frequency,[784] until now only one empirical study has examined the direct link between scanning frequency and success.[785] Analyzing eighty-two small organizations DOLLINGER finds a positive relationship between scanning frequency, measured by the number of contacts with outside sources such as customers, competitors or representatives of the government and the financial performance of a firm.[786] A weakness of this study lies in the fact that DOLLINGER does not analyze the relationship between scanning frequency and success of early warning. He only considers financial performance which is influenced by various other factors apart from scanning frequency. This research outlay might be the reason for the deviance of his study with the here shown findings. After the analysis of the sources of scanning and scanning frequency next the other design variables of early warning behavior will be considered.

First, the remaining two design variables of scanning are considered. Chief executives of successful organizations extend the scope of the scanned fields.[787] The degree of delegation is also different for successful and unsuccessful organizations. Managers of successful organizations tend to delegate the task of scanning less. These managers take this task so seriously that they perform it on their own. Therefore, they are not affected by the negative consequence of delegating which is analyzed by VAN DE VEN. “The prevailing approach for handling this complexity and interdependence is to divide the labor among specialists who are best qualified to perform unique tasks and then to integrate the specialized parts to recreate the whole. The objective, of course, is to develop synergy in managing complexity and interdependence within an organization where the whole is greater than the sum of its parts. However, the whole

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783 See Daft and Lengel (1984), p. 196ff. and Daft and Lengel (1986), p. 561.

784 See Aguilar (1967), Farh, Hoffmann and Hegarty (1984), Daft, Sormunen and Parks (1988), Sawyerr (1993), Auster and Choo (1993), Fisher (1996), Yasai-Ardekani and Nystrom (1996), Elenkov (1997), May, Stewart and Sweo (2000) and McGee and Sawyerr (2003).

785 Nevertheless, the optimal fit between scanning frequency and perceived strategic uncertainty is measured. See Yasai-Ardekani and Nystrom (1996), p. 196.

786 See Dollinger (1984), p. 359.

787 See Daft, Sormunen and Parks (1988), p. 136.

often turns out to be less than or a meaningless sum of the parts."[788] The reason is mainly the loss of information due to the communication between the person who delegates and who performs the task.[789] On the basis of the transaction cost theory CHOUDHURY and SAMPLER show that only very specific information search can be delegated efficiently.[790] Based on the finding here presented this is not the case for scanning.

Now this study will take a look at the design variables of interpretation. Managers of successful organizations interpret data, which are the result of scanning, together with other people than managers of unsuccessful organizations. This corresponds to findings in literature about management teams. When managers' "observations are pooled they collectively see more than any one of them alone would see."[791] This is even more the case for heterogeneous teams. Different cognitive structures will lead to diverse interpretation and to a better solution of problems.[792] It can also be argued that different internal models lead to a more creative interpretation because only heterogeneous teams will break with past patterns and practices.[793] Various studies have analyzed different types of heterogeneity of management teams and the effect on decision-making and interpreting potential risks and chances. PFEFFER shows that people with the same demographic characteristics will perceive an environment in a similar way.[794] The same is proven for functional backgrounds by DEARBORN and SIMON.[795] Backing this finding, WIERSEMA and BANTEL show that diversity of tenure, on the other hand, leads to questioning the status quo and the search for new opportunities.[796] GLICK et al. analyze teams consisting of members with different functional background, age, function, tenure within the team and tenure in the organization.[797] They point out that heterogeneous teams interpret future trends much better than homogenous ones. These above mentioned studies explain this finding about the diversity of internal models within the process of interpreting data about future trends.

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788 Van de Ven (1986), p. 598.
789 See Keegan (1974), p. 415 for problems of information flow within the organization and across hierarchies.
790 See Choudhury and Sampler (1997), p. 28ff.
791 Weick (1987), p. 116.
792 See Dutton and Duncan (1987), p. 282.
793 See Sutcliffe (1994), p. 1362f. and Wiersema and Bantel (1992), p. 91ff.
794 See Pfeffer (1983).
795 See Dearborn and Simon (1958).
796 See Wiersema and Bantel (1992).
797 See Glick, Miller and Huber (1993).

Additionally, managers of successful organizations interpret data about potential chances and risks for their organizations with higher intensity than managers of unsuccessful organizations. The former take interpretation very seriously and spend considerable time on it.

The degree of tool support for interpretation does not differ significantly between successful and unsuccessful organizations. This corresponds to literature that only names specific examples of successful prediction of future trends with the help of instruments. One example is the company SHELL that uses scenario analysis and was able to foresee the oil crisis in the 1970ies.[798] TESSUN also shows scenario analysis as a powerful tool to predict future events using DAIMLER-BENZ AEROSPACE as an example to analyze the airline industry.[799] Other examples of successful anticipation of future trends by means of scenario analysis are given within the worldwide energy market[800] or the Norwegian oil and gas market.[801] Generalising these successful examples, many researchers stress the positive impact of formalized scenario analysis.[802] Furthermore, literature presumes the same positive impact of neural networks.[803] Nevertheless, no study contradicts the here presented finding and shows that tools for interpretation of data about potential chances and risks are generally applied more often by successful organizations than by unsuccessful ones.

The same is true for time of interpretation. There is no difference between fixity of time for interpretation for successful and unsuccessful organizations. CEOs neither need to have a fixed point in time for interpretation[804] nor the obligation to interpret as part of their daily business.

The findings of the analysis here presented are summarized. Managers of successful organizations use internal, impersonal and external, personal sources more often than managers of unsuccessful ones. The former managers scan with a broader scope, delegate less, interpret with more different partners and with higher intensity. But no

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798 See Wack (1985) and Schoemaker and Van der Heijden (1992).
799 See Tessun (1997).
800 See Schipper and Meyers (1993).
801 See Stokke, Ralston, Boyce and Wilson (1990).
802 See for example Leemhuis (1985) and Mason (1994).
803 See Dierolf and Deiss (1989), Brockett, Cooper, Golden and Pitaktong (1994) and Gleißner and Füser (2000).
804 This is assumed by Kunze who postulates circles of early warning with a fixed point in time for interpretation. See Kunze (2000), p. 284ff.

difference can be observed for their frequency of scanning, tool support and fixity of time for interpretation.

1.2.3 Early Warning Behavior in Dependence on Organizational Size

Analog to the described analysis of early warning behavior in dependence on its success, the analysis of early warning behavior in dependence on organizational size follows. It refers to the number of people employed.[805] The sample consists of 597 organizations and is divided into three groups of 199 organizations. The first group contains organizations with a number of employees between 50 and 75, the second group contains organizations with a number of employees between 76 and 140; the third organizations with a number of employees between 141 and 249. Then, the difference of early warning behavior between group one and three is analyzed applying the t-test. Table 58 shows the result of this analysis.

	Small Organizations	Large Organizations	Significance
Scanning			
Internal, Personal Sources	4.44	4.18	ns
Internal, Impersonal Sources	4.15	3.85	ns
External, Personal Sources	4.06	3.80	ns
External, Impersonal Sources	4.65	4.69	ns
All Internal Sources	4.30	4.01	ns
All External Sources	4.36	4.24	ns
All Personal Sources	4.25	3.99	ns
All Impersonal Sources	4.40	4.27	ns
Frequency	4.33	4.13	ns
Scope	4.36	4.35	ns
Delegation	3.57	3.90	*
Interpretation			
Diversity of Internal Models	5.25	5.24	ns
Intensity	3.48	3.54	ns
Tool Support	2.63	3.15	**
Fixity of Time for Interpretation	3.54	3.73	ns
*Levels of Significance of Mean Difference: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant;1 = low, 7 = high*			

Table 58: Early Warning Behavior in Dependence of Organizational Size

Small and large organizations use sources to the same extent. According to O'REILLY that means that all sources have the same accessibility for small and large organizations.[806] The reasoning that CEOs of larger companies are more concerned

[805] See Yasai-Ardekani and Nystrom (1996), p. 195.
[806] See O'Reilly (1982), p. 763ff.

with strategy because of greater strategic freedom and less involved in day-to-day routines and therefore scan more[807] cannot be validated. However, a study made by YASAI-ARDEKANI and NYSTROM finds out that CEOs of larger organizations scan with a higher frequency than CEOs of smaller organizations.[808] This difference to this finding can be explained with the range of organizations analyzed by them. They ask CEOs of organizations with 50 to 200,000 employees. The range here used lies between 50 and 249 employees and is not large enough to arrive at significant differences for scanning frequency.

In literature there are assumptions about different use of personal and internal sources by smaller and larger organizations; therefore a more specific look at these sources is needed. Smaller organizations do not use personal sources more often than larger ones. This seems to contradict previous studies. They have shown that managers of smaller enterprises rely strongly on personal data sources.[809] MOHAN-NEILL explain this with a lack of resources for scanning,[810] others with the absence of an impersonal information system within the organization.[811] A sensible explanation of the deviance of the here presented findings with prior studies is that the difference in size between the two groups is not very important. In the context of the use of sources the sample can be regarded as one group. The same is true for internal sources. Various researchers argue that smaller companies rely more on internal sources than on external ones[812] because small organizations might not have the structure for external scanning and do not have an important number of external linkages.[813] This study does not provide any evidence that smaller organizations in this sample use internal sources more often than larger organizations of the sample. The variance of size within this sample might not be significantly large enough.

Also the scope of scanning does not differ between the two groups. Within this sample larger organizations do not engage in broader scanning.[814]

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807 See Diffenbach (1983), p. 110ff.
808 See Yasai-Ardekani and Nystrom (1996), p. 198.
809 See Brush (1992), p. 47 and Mohan-Neill (1995), p. 18.
810 See Mohan-Neill (1995), p. 18.
811 See Johnson and Kuehn (1987), p. 57 and Pearce, Chapman and David (1982), p. 30.
812 See for example Smeltzer, Fann and Nikolaisen (1988), p. 57.
813 See McGee and Sawyerr (2003), p. 387 and Churchill and Lewis (1983), p. 24.
814 Aguilar as well as Yasai-Ardekani and Nystrom come to opposite findings. Again, this can be explained by the difference of the sample. The range of organizations of these two studies was much broader. See Aguilar (1967), p. 52f. and Yasai-Ardekani and Nystrom (1996), p. 199.

The only design variable of scanning that differs for the two groups is the degree of delegation. From the fact that larger organizations are characterized by a higher degree of diversification and geographical dispersion[815] results the necessity to delegate decision-making and scanning. The managers of sub-units are specialized and have a deeper understanding of their business so that they are held responsible for scanning.[816] Therefore, "[i]n the large firm either a specialized department or the sales and public relations divisions conduct environmental scanning."[817]

Of the four design variables of interpretation only the degree of tool support differs. Larger organizations have more resources and can more easily support their interpretation with instruments.[818] It is surprising that no difference exists between the degree of fixity of time for interpretation within smaller and larger organizations. However, the idea that in larger organizations processes are more formalized, which has been validated for example by DIFFENBACH,[819] does not have to be false. Again, the range of organizations here analyzed is not wide enough that the two groups differ in this point.

In summary of this analysis, it can be stated that only delegation of scanning and degree of tool support for interpretation depend on organizational size.

2 Empirical Valuation of Hypotheses

2.1 Fundamental Aspects of the Valuation of Hypotheses

There are three types of hypotheses that need to be examined. In the following its different nature and the way to valuate each of them is presented.

1) Hypothesis 1 makes an assumption about the difference of perceived strategic uncertainty in the sectors of the task and the general environment. In this context, previous studies compared the average values per sector and analyzed whether the single sectors "determine statistically significant differences in strategic

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815 See Grinyer and Yasai-Ardekani (1981), p. 477ff.

816 In this context Quinn shows that a product-diversified company tends to decentralize monitoring activities whereas a non-diversified one is likely to centralize them. See Quinn (1985), p. 73f. See also Chenhall (2003), p. 148 and Child and Mansfield (1972), p. 371f.

817 Smeltzer, Fann and Nikolaisen (1988), p. 19. See also Churchill and Lewis (1983), p. 31.

818 See Chenhall (2003), p. 149 and Johnson and Kuehn (1987), p. 57.

819 See Diffenbach (1983). This was also supported by the findings of Jain (1984). See also Van de Ven (1986), p. 596 and Smeltzer, Fann and Nikolaisen (1988), p. 57.

uncertainty."[820] Therefore, this study follows DAFT et al. and ELENKOV who apply SCHEFFE's multiple range test.[821]

2) Most of the hypotheses to be valuated predict a relationship between contingency variables (perceived strategic uncertainty and managerial attitudes) and design variables of early warning behavior. The contingency variables are supposed to influence these design variables. Therefore, the former are modeled as exogenous variables, the latter as endogenous variables. Because latent, mostly formative constructs are dealt the PLS method to valuate these hypotheses is used.[822] The hypothesis about the relationship between success of early warning and economic success has the same characteristics. The latent construct success of early warning, the exogenous variable, is supposed to cause the other latent variable, economic success. This hypothesis can therefore be validated by the PLS method, too.

3) The last type of hypotheses comprises hypotheses about the alignment of perceived strategic uncertainty and design variables of early warning behavior for successful organizations. The methodology of YASAI-ARDEKANI and NYSTROM will be applied who analyze this alignment by means of a multiple regression.[823] For this, moderating effects have to be analyzed.[824] The multiplicative term (exogenous variable and moderating variable) is modeled as another exogenous variable.[825] Its influence allows the valuation of the alignment hypotheses.

The order of the design variables of early warning (scanning frequency, scope of scanning, degree of delegation, diversity of internal models, intensity of interpretation, tool support and fixity of time for interpretation) is maintained for the valuation of the hypotheses.

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820 Elenkov (1997), p. 296.

821 See Daft, Sormunen and Parks (1988), p. 132 and Elenkov (1997), p. 298.

822 See Götz and Liehr-Gobbers (2004), p. 721 and Bliemel, Eggert, Fassott and Henseler (2005), p. 10. In this context the coefficient of determination R^2 is of no interest as one single exogenous variable is not supposed to determine mainly one endogenous variable. The extent to which an exogenous variable explains an endogenous one is studied later on. In these analyses all contingency variables are considered together.

823 See Yasai-Ardekani and Nystrom (1996), p. 195ff.

824 This corresponds to the multiple regression analysis applied by Yasai-Ardekani and Nystrom (1996).

825 See part F 2.5.

2.2 Valuation of Hypotheses within the Context of the Classical Contingency Theory

2.2.1 Valuation of Hypothesis about the Degree of Uncertainty in Task and General Environment

Strategic uncertainty is perceived for all seven sectors of the environment. Table 59 shows the three dimensions of perceived strategic uncertainty per sector.

Sector Characteristics						
	Complexity		Rate of Change		Importance	
	Mean	SD	Mean	SD	Mean	SD
Task Environment						
Customers	5.20	1.58	4.30	1.71	6.15	1.22
Technologies	4.70	1.59	4.10	1.63	4.44	1.70
Competitors	4.55	1.60	4.19	1.56	4.95	1.37
Suppliers	3.76	1.66	3.37	1.47	4.14	1.62
General Environment						
Political/Legal Environment	4.14	1.84	3.36	1.67	3.62	1.71
Economic Environment	4.06	1.61	3.70	1.59	4.24	1.62
Socio-Cultural Environment	3.24	1.71	2.86	1.50	2.82	1.56
SD = Standard Deviation; 1 = low, 7 = high						

Table 59: Dimensions of Perceived Strategic Uncertainty in Dependence of Environmental Sectors

There exists no hypothesis about the single dimensions of perceived strategic uncertainty. Therefore, it only stresses one striking value and uses table 59 as the basis for further analysis. The value of importance of customers is relatively high. This means that the CEOs in this sample consider the success of their organization as mainly dependent on customers. In the following table 60 the aggregated values of perceived strategic uncertainty for every single sector are given.

Before the start of the analysis of the different sectors it needs to be considered whether each sector indicates a different level of perceived strategic uncertainty to the CEO. Table 61 shows the results of SCHEFFE's multiple range test at a 0.05 level of significance.[826]

[826] In this context Daft, Sormunen and Parks (1988) and Elenkov (1997) use the same method. See Daft, Sormunen and Parks (1988), p. 132 and Elenkov (1997), p. 298.

Sector Characteristics		
	PSU	
	Mean	SD
Task Environment		
Customers (1)	58.5	3.43
Technologies (3)	39.1	4.07
Competitors (2)	43.2	3.54
Suppliers (5)	29.5	3.90
General environment		
Political/Legal Environment (6)	27.1	4.49
Economic Environment (4)	32.9	3.90
Socio-Cultural Environment (7)	17.2	4.12
PSU = Perceived Strategic Uncertainty; SD = Standard Deviation		

Table 60: Perceived Strategic Uncertainty in Dependence of Environmental Sectors

Sector Characteristics								
Sector	PSU	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Customers			*	*	*	*	*	*
2. Technologies				*	*	*	*	*
3. Competitors					*	*	*	*
4. Suppliers						*	*	*
5. Political/Legal Environment							*	*
6. Economic Environment								*
7. Socio-Cultural Environment								
PSU = Perceived Strategic Uncertainty; Note: Asterisks denote significant difference between sectors at a 0.05 level based on SCHEFFE's multiple range test.								

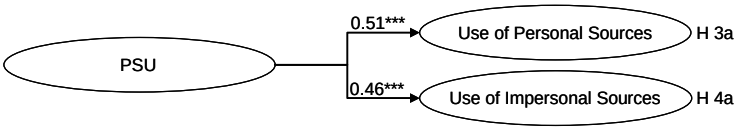
Table 61: Difference among Environmental Sectors for Perceived Strategic Uncertainty

Table 61 shows that all sectors are perceived to be strategically uncertain in a different way. Therefore, the analysis can be continued. Perceived strategic uncertainty is highest in the customer sector followed by the competitors and technologies sectors. These three sectors all belong to the task environment. Then, the next sector, the economic sector, which is part of the general environment, is perceived to be strategically most uncertain. The following sectors are suppliers and the political/legal conditions. Finally, the socio-cultural conditions are not perceived to be very strategically uncertain. Hypothesis 1 postulates that perceived strategic uncertainty in sectors of the task environment is higher than in sectors of the general environment. This is only supported in parts by here shown empirical results because perceived strategic uncertainty of the suppliers is lower than the same uncertainty of the economic sector. Therefore, a closer look at the suppliers has to be taken. Their importance for the participating organizations is relatively high (4.14) although not higher than economic conditions. The complexity and rate of change of the suppliers are relatively low (3.76 and 3.37) compared to the values for economic conditions. This means that most of the participating organizations consider their relationship with

their suppliers as stable and not complex. This judgment explains the relatively low degree of perceived strategic uncertainty for this sector. On the other hand, the high degree of perceived strategic uncertainty of the economic sector can be explained with weak general economic conditions in Germany and high governmental deficits on local and national level. Having experienced these negative factors for several years the executives in this sample might consider this sector to be relatively strategically uncertain. The high degree of perceived strategic uncertainty within the economic sector corresponds to the finding of DAFT et al.[827]

2.2.2 Valuation of Hypotheses about the Relationship between Environmental Uncertainty and Design Variables of Early Warning Behavior

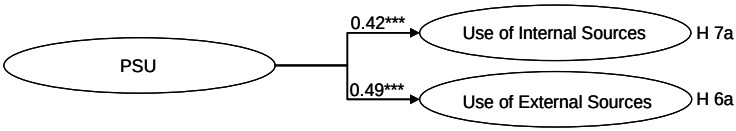
In this paragraph hypotheses about the relationship between environmental uncertainty, measured by perceived strategic uncertainty, and design variables of early warning behavior will be analyzed. It starts with hypotheses about the relationship between perceived strategic uncertainty and the use of sources. As scanning frequency is the composite measure of the four sources of scanning, these sources and scanning frequency have to be analyzed using distinct models. Figure 28 first shows the relationship of perceived strategic uncertainty with personal and impersonal sources, then figure 29 the relationship of perceived strategic uncertainty with internal and external sources.



with PSU: Perceived Strategic Uncertainty;
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 28: Results of the Valuation of Hypotheses about the Relationship between Perceived Strategic Uncertainty and Personal/Impersonal Sources

[827] See Daft, Sormunen and Parks (1988), p. 132.



with PSU: Perceived Strategic Uncertainty;
*Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 29: Results of the Valuation of Hypotheses about the Relationship between Perceived Strategic Uncertainty and Internal/External Sources

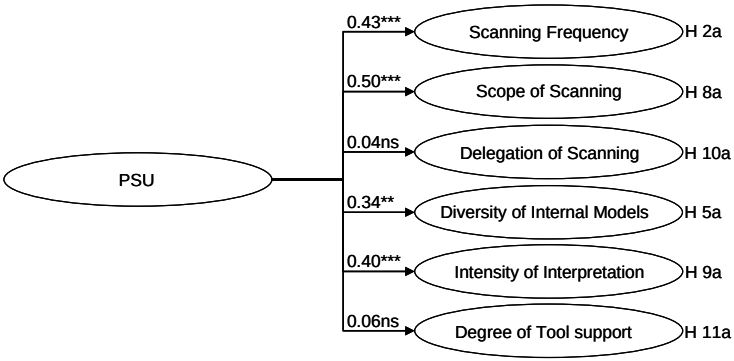
First, the use of personal and impersonal sources is considered. On the one hand, hypothesis 3a predicts a positive relationship between perceived strategic uncertainty and the use of personal sources. Such a positive relationship exists. On the other hand, hypothesis 4a predicts no relationship between perceived strategic uncertainty and the use of impersonal sources. This hypothesis is not validated. The use of impersonal sources augments with rising perceived strategic uncertainty. Although the use of personal sources rises more than the use of impersonal ones, still the use of both kinds of sources rises at a significance level of 1%. These findings do not correspond to the study of ELENKOV[828] and the information richness theory which demands that personal sources substitute impersonal sources in environments that are strategically more uncertain.[829] However, those findings correspond to the results of the studies of DAFT et al.[830] and SAWYERR.[831]

In a second step, the relationship between perceived strategic uncertainty and internal versus external sources is examined. Hypothesis 7a states no relationship between perceived strategic uncertainty and the use of internal sources. This is not the case in this sample. At a significance level of 1% the use of internal sources augments with rising perceived strategic uncertainty. So hypothesis 7a is not validated. Hypothesis 6a predicts a positive relationship between perceived strategic uncertainty and the use of external sources. This hypothesis is validated at a 1% significance level. Summarizing the results of the valuation of hypotheses 6a and 7a, it can be stated that with rising perceived strategic uncertainty external and internal sources are more frequently used;

828 See Elenkov (1997), p. 297.
829 See Daft and Lengel (1984), p. 199.
830 See Daft, Sormunen and Parks (1988), p. 132f.
831 See Sawyerr (1993), p. 239.

the use of external sources rises even more than the use of internal ones. These results correspond to the findings of DAFT et al.[832] but not to the studies of ELENKOV[833] and MCGEE and SAWYERR[834].

In the following section the hypotheses about the relationship between perceived strategic uncertainty and the other design variables of early warning behavior will be considered. Figure 30 shows the results.



with PSU: Perceived Strategic Uncertainty;
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ ($t\text{-Value} \geq 2.326$), **: $p < 0.05$ ($2.326 > t\text{-Value} \geq 1.645$), *: $p < 0.10$ ($1.645 > t\text{-Value} \geq 1.282$); ns: not significant*

Figure 30: Results of the Valuation of Hypotheses about the Relationship between Perceived Strategic Uncertainty and Design Variables of Early Warning Behavior

Hypothesis 2a predicts a positive relationship between perceived strategic uncertainty and scanning frequency. This hypothesis is validated at a significance level of 1%. With rising perceived strategic uncertainty managers scan more frequently. This has already been confirmed by numerous studies in the past.[835] Hypothesis 8a states that with rising perceived strategic uncertainty, the scope of scanning also increases. This is validated and corresponds to the analysis of YASAI-ARDEKANI and

832 See Daft, Sormunen and Parks (1988), p. 132f.
833 See Elenkov (1997), p. 298.
834 See McGee and Sawyerr (2003), p. 392.
835 See for example Daft, Sormunen and Parks (1988), p. 132, Sawyerr (1993), p. 293 and Auster and Choo (1993), p. 200.

NYSTROM.[836] The same is true for hypothesis 5a. It determines a positive relationship between perceived strategic uncertainty and diversity of internal models within the process of interpretation. It is validated at a significance level of 1%. The last hypothesis validated in this context is hypothesis 9a. A positive relationship of perceived strategic uncertainty with intensity of interpretation is assumed. This assumption is validated, too.

Hypotheses 10a and 11a, however, are not validated. Hypothesis 10a assumes a higher degree of delegation with rising perceived strategic uncertainty. This relationship is not shown to be significant for the executives of this sample. Other factors than perceived strategic uncertainty determine the degree of delegation. For example, executives of larger organizations tend to delegate more than executives of smaller organization, as seen before.[837] Additionally, in G 2.3.1 it can be seen whether attitudes of CEOs determine their degree of delegation. Hypothesis 11a predicts a positive relationship between perceived strategic uncertainty and tool support for interpretation. But this relationship cannot be validated. The use of tools to support interpretation depends also more on other factors such as size of the organization than on perceived strategic uncertainty.

The findings of the valuation described above are summarized in the table below.

		Sign		Significance
		Expected	Real	
Hypotheses about Perceived Strategic Uncertainty Perceived Strategic Uncertainty will have a Relationship with				
H 2a	Scanning Frequency	+	+	***
H 3a	Use of Personal Sources	+	+	***
H 4a	Use of Impersonal Sources	0	+	***
H 5a	Diversity of Internal Models	+	+	**
H 6a	Use of External Sources	+	+	***
H 7a	Use of Internal Sources	0	+	***
H 8a	Scope of Scanning	+	+	***
H 9a	Intensity of Interpretation	+	+	***
H 10a	Delegation of Scanning	+	0	ns
H 11a	Degree of Tool Support	+	0	ns
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant*				

Table 62: Summary of Results of the Valuation of Hypotheses about the Relationship between Perceived Strategic Uncertainty and Design Variables of Early Warning Behavior

[836] See Yasai-Ardekani and Nystrom (1996), p. 198f. See also Gordon and Narayanan (1984) and Gul and Chia (1994).

[837] See G 1.2.3.

2.2.3 Valuation of Hypotheses about the Alignment of Environmental Uncertainty with Design Variables of Early Warning Behavior

In the following section the alignment hypotheses are analyzed. Tables 63 and 64 serve as the basis. Table 63 considers sources of scanning, table 64 all other design variables of early warning behavior. The first line explains the relationship between the selected design variables of early warning and its success[838] analyzed by the PLS method.[839] The second line indicates the importance of each design variable for the explanation of success of early warning.[840] It is measured by the effect size f. The third line allows to validate the hypotheses about the alignment between perceived strategic uncertainty and early warning behavior. The influence of a moderating variable was exposed in part F 2.5.2. Here success of early warning is analyzed by considering the path coefficient of the relationship between the multiplicative term and the endogenous variable. Also t-values of the relationship between the moderating variable and the endogenous one are examined in order to examine the significance of this relationship. The resulting level of significance is written behind the value of the path coefficient.

	Personal Sources	Impersonal Sources	Internal Sources	External Sources
Success	0.119 (ns)	-0.036 (ns)	0.045 (ns)	0.042 (ns)
Effect Size of Design Variable	0.000 (ns)	0.000 (ns)	0.002 (ns)	0.000 (ns)
Path Coefficient of Moderating Variable	0.001 (ns)	0.002 (ns)	0.004 (ns)	0.000 (ns)
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant; Level of Significance of Effect Size f: °°°: Very Highly Significant ($f \geq 0.25$), °°: Highly Significant (0.25 > $f \geq 0.075$), °: Significant (0.075 > $f \geq 0.01$)*				

Table 63: Results of the Valuation of Alignment Hypotheses between Perceived Strategic Uncertainty and Sources of Scanning for Successful Organizations

838 In analogy with G 1.2.2 success in this context is success of early warning. See also Yasai-Ardekani and Nystrom (1996), p. 196.

839 Values for internal, external, personal and impersonal sources are obtained by analyzing the overall model in which frequency is replaced by internal and external or personal and impersonal sources.

840 See also Yasai-Ardekani and Nystrom (1996), p. 196, for a similar procedure.

	Frequency	Scope	Delegation	Diversity Internal Models	Intensity	Tool-Support	Fixity of Time for Interpretation
Success	0.072 (ns)	0.223***	-0.155**	0.131**	0.206**	0.100 (ns)	0.073 (ns)
Effect Size of Design Variable	0.000 (ns)	0.055°	0.021°	0.025°	0.049°	0.012 (ns)	-0.001 (ns)
Path Coefficient of Moderating Variable	0.003 (ns)	0.708***	0.132(ns)	0.155*	0.560***	0.002 (ns)	0.003 (ns)
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant; Level of Significance of Effect Size f: °°°: Very Highly Significant ($f \geq 0.25$), °°: Highly Significant (0.25 > $f \geq 0.075$), °: Significant (0.075 > $f \geq 0.01$)*							

Table 64: Results of the Valuation of Alignment Hypotheses between Perceived Strategic Uncertainty and Design Variables of Early Warning Behavior for Successful Organizations not Regarding Sources

The first line in the tables above does not consider perceived strategic uncertainty as contingency variable. Instead, the general influence of design variables on the success of early warning is analyzed. There exists a positive relationship between scope of scanning, diversity of internal models, intensity of interpretation and success of early warning. But delegation of scanning has a negative effect on success of early warning. Frequency and the use of every type of sources, tool support and the fixity of time for interpretation have no significant relationship with this success. These results are also reflected by the effect size of the single design variables. The effect size of scanning frequency and of the four types of sources, of tool support and of fixity of time for interpretation is below 0.02. This means that none of these design variables have explanatory power of success of early warning. These results are in line with the t-test conducted before for successful and unsuccessful organizations and help the understanding of these findings.[841] Now, the next step in this analysis is to let perceived strategic uncertainty intervene. It is to analyze if organizations with successful early warning adapt their early warning behavior to perceived strategic uncertainty more than organizations with unsuccessful early warning. The last line shows the results of this analysis. Success of early warning is a moderating variable for scope of scanning, delegation of scanning, diversity of internal models and intensity of interpretation. Organizations with successful early warning adapt these design variables of early warning behavior more to the degree of perceived strategic uncertainty than organizations with unsuccessful early warning. With rising perceived strategic uncertainty managers of organizations with successful early warning scan

[841] See G 1.2.2.

with a broader scope, they interpret with more different persons and interpret with higher intensity. And they do this to a higher extent than executives of organizations with unsuccessful early warning. Hypotheses 5b, 8b and 9b are therefore confirmed. Organizations with successful early warning however, do not adapt their scanning frequency, the use of any source, the delegation of scanning, the tool support and the fixity of time for interpretation more to perceived strategic uncertainty than organizations with unsuccessful early warning. Therefore, hypotheses 2b, 3b, 4b, 6b, 7b, 10b and 11b cannot be validated. These findings are summarized below.

		Sign		Significance
		Expected	Real	
Hypotheses about the Alignment to Perceived Strategic Uncertainty The alignment between perceived strategic uncertainty and the following design variable will be … for organizations with successful early warning than for organizations with unsuccessful early warning.				
H 2b	Scanning Frequency	+	+	ns
H 3b	Use of Personal sources	+	+	ns
H 4b	Use of Impersonal Sources	0	+	ns
H 5b	Diversity of Internal Models	+	+	*
H 6b	Use of External Sources	+	+	ns
H 7b	Use of Internal Sources	0	+	ns
H 8b	Scope of Scanning	+	+	***
H 9b	Intensity of Interpretation	+	+	***
H 10b	Delegation of Scanning	-	-	ns
H 11b	Degree of Tool Support	+	+	ns
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ ($2.326 >$ t-Value ≥ 1.645), *: $p < 0.10$ ($1.645 >$ t-Value ≥ 1.282); ns: not significant*				

Table 65: Summary of Results of the Valuation of Hypotheses about the Alignment of Perceived Strategic Uncertainty and Design Variables of Early Warning Behavior for Successful Organizations

These findings are partially supported by the study of YASAI-ARDEKANI and NYSTROM[842] who apply scanning effectiveness as a moderating variable. In accordance with this study they find that managers with successful scanning adapt their scanning scope more to environmental uncertainty than managers with unsuccessful scanning. Additionally, they also do not find a difference in the degree of delegation. In contrast to the conducted study YASAI-ARDEKANI and NYSTROM show that managers with successful scanning align their scanning frequency more to perceived environmental uncertainty than managers with unsuccessful scanning.[843]

[842] See Yasai-Ardekani and Nystrom (1996).
[843] See Ibid., p. 198.

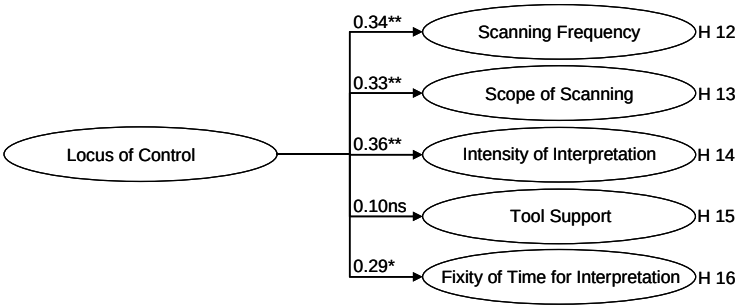
2.3 Valuation of Hypotheses within the Context of the Extended Contingency Theory

2.3.1 Valuation of Hypotheses about the Relationship between Attitudes and Design Variables of Early Warning Behavior

In the following part the hypotheses about the relationship between attitudes and design variables of early warning behavior are examined. Therefore, the corresponding structural models are calculated using PLS. The results of these calculations are the basis for the valuation of the hypotheses.

2.3.1.1 Locus of Control

Figure 31 shows the results of the structural model about the relationship between the attitude locus of control and design variables of early warning behavior. Locus of control is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.



with *Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ ($2.326 >$ t-Value ≥ 1.645), *: $p < 0.10$ ($1.645 >$ t-Value ≥ 1.282); ns: not significant*

Figure 31: Results of the Valuation of Hypotheses about the Relationship between Locus of Control and Design Variables of Early Warning Behavior

Locus of control has a positive relationship with scanning frequency, scope of scanning and intensity of interpretation. Hypotheses 12, 13 and 14 are all validated on a significance level of 5%. The underlying reason for this result is the difference in behavior between internals and externals in their data search. Internals look for more data about their environment. This has also been validated by TRICE and PRICE-

GREATHOUSE,[844] PLUMLY and OLIVER[845] and SRINIVASAN and TIKOO[846] in a general context and by MILLER et al.[847] and LEFCOURT[848] in a business context. Hypothesis 16 is also validated although only on a significance level of 10%. Locus of control has an impact on fixity of time for interpretation. Setting a specific date for interpretation is typical of internals because they like structuring processes.[849]

However, hypothesis 15 is not validated. Locus of Control does not have a significantly positive relationship with the degree of tool support for interpretation. Some internals might consider tools applied for the process of interpretation as limiting and preventing innovation[850] whereas others value their structuring function. Knowing this opposing motivation the non-significance of the relationship between locus of control and degree of tool support is understandable.

2.3.1.2 Tolerance for Ambiguity

Figure 32 shows the results of the structural model about the relationship between the attitude tolerance for ambiguity and design variables of early warning behavior. Tolerance for ambiguity is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.

Hypotheses 17, 18 and 20 are all validated. Hypothesis 20 is validated on a significance level of 5%, whereas the two others are only validated on a significance level of 10%. Individuals with high tolerance for ambiguity scan their environment with higher frequency, with a broader scope and interpret such data with higher intensity than individuals with low tolerance for ambiguity. The reason is that individuals with high tolerance for ambiguity are not afraid of additional, even ambiguous data.[851] The same is true within the context of diversity of internal models. Individuals with high tolerance for ambiguity look for diverse opinions.[852] Therefore,

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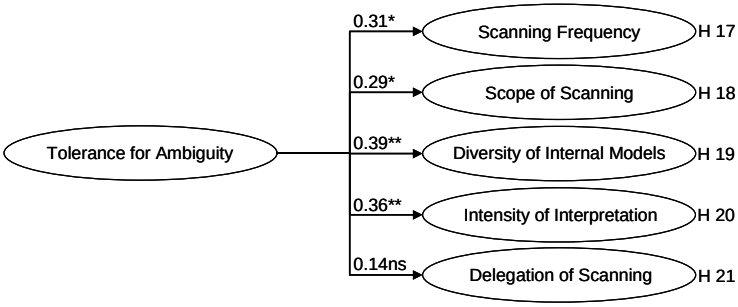
844 See Trice and Price-Greathouse (1987).
845 See Plumly and Oliver (1987).
846 See Srinivasan and Tikoo (1992).
847 See Miller, Kets de Vries and Toulouse (1986).
848 See Lefcourt (1982).
849 See Lewin and Stephens (1994), p. 195 and the empirical studies of Evans (1974) and Durand and Nord (1976).
850 In general internals are innovative and entrepreneurial. See Brockhaus (1975), Durand and Shea (1974), Shapero (1975), Miller and Dröge (1986) and Miller, Dröge and Toulouse (1988).
851 See Furnham and Ribchester (1995), p. 180 and Lewin and Stephens (1994), p. 196.
852 See Entrialgo, Fernández and Vázquez (2000), p. 198f.

they speak with a lot of different people during the process of interpretation. This is shown by the validation of hypothesis 19 on a significance level of 5%.



with *Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 32: *Results of the Valuation of Hypotheses about the Relationship between Tolerance for Ambiguity and Design Variables of Early Warning Behavior*

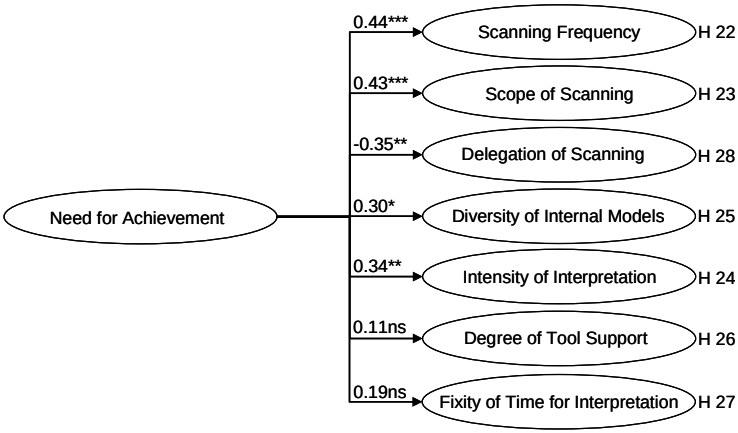
In contrast to the validation of hypotheses 17, 18, 19 and 20, hypothesis 21 is rejected. Although, the relationship between tolerance for ambiguity and delegation of scanning is positive, it is not significantly positive. Therefore, delegation of scanning cannot be considered to be typical of individuals with high tolerance for ambiguity. Nevertheless, LEWIN and STEPHENS reason that individuals with high tolerance for ambiguity tend to delegate tasks because they need not to be informed to a high degree about their employees activities.[853] This might still be valid because scanning is a specific task. Therefore, the fact that CEOs with high tolerance for ambiguity do not delegate scanning more than CEOs with low tolerance for ambiguity does not imply that CEOs with high tolerance for ambiguity do not generally delegate more than CEOs with low tolerance for ambiguity.

2.3.1.3 Need for Achievement

Figure 33 shows the results of the structural model about the relationship between the attitude need for achievement and design variables of early warning behavior. Need

[853] See Lewin and Stephens (1994), p. 196.

for achievement is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.



*with Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ ($t\text{-Value} \geq 2.326$), **: $p < 0.05$ ($2.326 > t\text{-Value} \geq 1.645$), *: $p < 0.10$ ($1.645 > t\text{-Value} \geq 1.282$); ns: not significant*

Figure 33: Results of the Valuation of Hypotheses about the Relationship between Need for Achievement and Design Variables of Early Warning Behavior

Hypotheses 22, 23 and 24 are all validated. The significance level of the validation is 1% for hypotheses 22 and 23 and 5% for hypothesis 24. These three hypotheses all confirm that individuals with high need for achievement are proactive and innovative and therefore analyze their environment constantly.[854] They also talk with a higher number of different people during the process of interpretation than individuals with low need for achievement. Therefore, hypothesis 25 is validated. As the level of significance is only 10%, this relationship is not very strong in comparison to the ones between need for achievement and scanning frequency, scope of scanning and intensity of interpretation. Hypothesis 28 is also validated; the relationship between need for achievement and delegation of scanning is negative on a significance level of 5%. Individuals with high need for achievement prefer doing things on their own and do not like to delegate tasks such as scanning.[855]

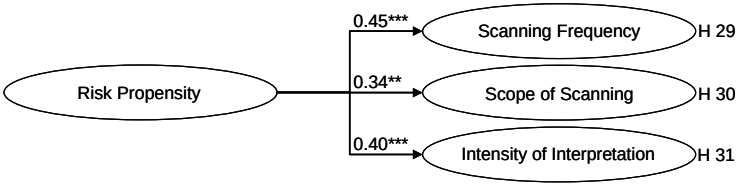
Hypotheses 26 and 27 are rejected. The relationship between need for achievement and degree of tool support as well as fixity of time for interpretation is not positive on

[854] See Miller and Dröge (1986), p. 1391 and Entrialgo, Fernández and Vázquez (2000), p. 191.
[855] See Miller and Toulouse (1986), p. 1402 and Miller, Dröge and Toulouse (1988), p. 541.

a significantly important level. Although, individuals with high need for achievement might prefer formalization in general[856] and formalized systems of strategic planning,[857] tool support for interpretation and fixity of time for interpretation are not influenced by their degree of need for achievement.

2.3.1.4 Risk Propensity

Figure 34 shows the results of the structural model about the relationship between the attitude risk propensity and design variables of early warning behavior. Risk propensity is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.



with *Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 34: *Results of the Valuation of Hypotheses about the Relationship between Risk Propensity and Design Variables of Early Warning Behavior*

Hypothesis 29 predicts a positive relationship between risk propensity and frequency of scanning, hypothesis 30 between risk propensity and scope of scanning, and hypothesis 31 finally between risk propensity and intensity of interpretation. They are all validated. Hypothesis 30 is validated on a 5% significance level; hypotheses 29 and 31 are even validated on a 1% level. LEWIN and STEPHENS state hypothetically that individuals with high risk propensity try to detect chances and risks for their organizations.[858] Therefore, these individuals scan more often, scan with a broader scope and interpret with higher intensity than individuals with low risk propensity.

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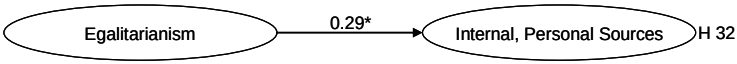
856 See Miller and Toulouse (1986), p. 1402 and Miller, Dröge and Toulouse (1988), p. 554.
857 See Lewin and Stephens (1994), p. 191.
858 See Ibid., p. 197.

2.3.1.5 Egalitarianism

Figure 35 shows the result of the structural model about the relationship between the attitude egalitarianism and the use of internal, personal sources. Egalitarianism is modeled as an exogenous variable, whereas use of internal, personal sources is modeled as an endogenous one.



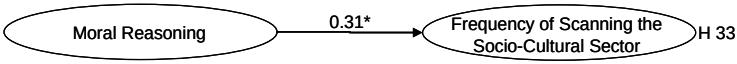
*with Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 35: Result of the Valuation of Hypothesis about the Relationship between Egalitarianism and Internal, Personal Sources

Hypothesis 32 predicts a positive relationship between egalitarianism and the use of internal, personal sources. This hypothesis is validated on a 10% significance level, which is relatively low and indicates that there have to be other contingency variables to explain the use of internal, personal sources far better than egalitarianism. Nevertheless, the relationship between individuals with high egalitarianism and the use of internal, personal sources exists and can be explained by the attitude these individuals have towards others.[859]

2.3.1.6 Moral Reasoning

Figure 36 shows the result of the structural model about the relationship between the attitude moral reasoning and the frequency of scanning the socio-cultural sector. Egalitarianism is modeled as an exogenous variable, whereas the frequency of scanning the socio-cultural sector is modeled as an endogenous variable.



*with Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

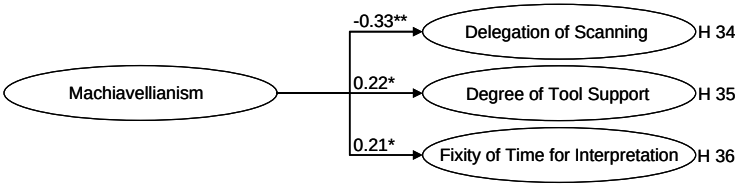
Figure 36: Result of the Valuation of Hypothesis about the Relationship between Moral Reasoning and the Frequency of Scanning the Socio-Cultural Sector

[859] See Ibid., p. 197.

Hypothesis 33 predicts a positive relationship of moral reasoning with the frequency of scanning the socio-cultural sector. The hypothesis is validated on a 10% significance level. This weak level of significance indicates that other contingency variables than moral reasoning determine frequency of scanning the socio-cultural sector to a far higher extent. Regardless of this fact, individuals with high moral reasoning, and therefore an assumed highly ethical behavior, tend to scan this sector more than individuals with a low degree of moral reasoning.

2.3.1.7 Machiavellianism

Figure 37 shows the results of the structural model about the relationship between the attitude Machiavellianism and design variables of early warning behavior. Machiavellianism is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.



*with Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ ($2.326 >$ t-Value ≥ 1.645), *: $p < 0.10$ ($1.645 >$ t-Value ≥ 1.282); ns: not significant*

Figure 37: Results of the Valuation of Hypotheses about the Relationship between Machiavellianism and Design Variables of Early Warning Behavior

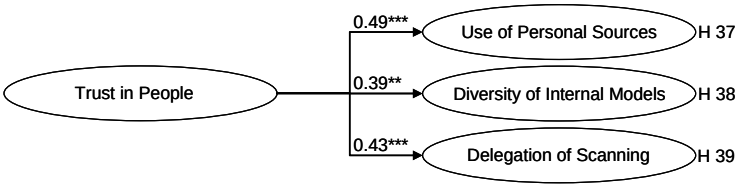
Hypothesis 34 predicts a negative relationship between Machiavellianism and delegation of scanning. This hypothesis is validated on a significance level of 5%. An individual with a high degree of Machiavellianism is not willing to grant people freedom in their work. So a Machiavellian CEO who considers others only as a mean and not as an end[860] does not tend to delegate tasks such as scanning. Hypotheses 35 and 36 state a positive relationship between Machiavellianism and degree of tool support as well as fixity of time for interpretation. They are both validated but only on a 10% significance level. Here, the relationship between Machiavellianism and

[860] See Durkin (1970), p. 261ff.

willingness to structure is shown. This is in accordance with the studies of DURKIN[861] and LAMDAN and LORR[862].

2.3.1.8 Trust in People

Figure 38 shows the results of the structural model about the relationship between the attitude trust in people and design variables of early warning behavior. Trust in people is modeled as an exogenous variable, whereas the design variables are modeled as endogenous ones.



*with Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 38: Results of the Valuation of Hypotheses about the Relationship between Trust in People and Design Variables of Early Warning Behavior

Hypothesis 37 predicts a positive relationship between trust in people and the use of personal sources; hypothesis 38 between trust in people and diversity of internal models and finally, hypothesis 39 between trust in people and delegation of scanning. All of theses hypotheses are validated. Hypotheses 37 and 39 are validated on a significance level of 1%, hypothesis 38 on a significance level of 5%. The attitude trust in people explains executives' behavior towards other individuals. So executives characterized by high trust in people use personal sources more often than those with low trust in people. The same is true for degree of delegation and diversity of internal models within the process of interpretation.

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861 See Ibid.
862 See Lamdan and Lorr (1975).

2.3.2 Overview of the Valuation of Hypotheses within the Context of the Extended Contingency Theory

Table 66 summarizes the valuation of the hypotheses in the context of the extended contingency theory.

		Sign		Significance
		Expected	Real	
Hypotheses about Locus of Control Locus of Control will have a relationship with				
H 12	Scanning Frequency	+	+	**
H 13	Scope of Scanning	+	+	**
H 14	Intensity of Interpretation	+	+	**
H 15	Degree of Tool Support	+	+	ns
H 16	Fixity of Time for Interpretation	+	+	*
Hypotheses about Tolerance for Ambiguity Tolerance of Ambiguity will have a relationship with				
H 17	Scanning Frequency	+	+	*
H 18	Scope of Scanning	+	+	*
H 19	Diversity of Internal Models	+	+	**
H 20	Intensity of Interpretation	+	+	**
H 21	Delegation of Scanning	+	+	ns
Hypotheses about Need for Achievement Need for Achievement will have a relationship with				
H 22	Scanning Frequency	+	+	***
H 23	Scope of Scanning	+	+	***
H 24	Intensity of Interpretation	+	+	**
H 25	Diversity of Internal Models	+	+	*
H 26	Degree of Tool Support	+	+	ns
H 27	Fixity of Time for Interpretation	+	+	ns
H 28	Delegation of Scanning	-	-	**
Hypotheses about Risk Propensity Risk Propensity will have a relationship with				
H 29	Scanning Frequency	+	+	***
H 30	Scope of Scanning	+	+	**
H 31	Intensity of Interpretation	+	+	***
Hypothesis about Egalitarianism Egalitarianism will have a relationship with				
H 32	Use of Internal, Personal Sources	+	+	*

		Sign		Significance
		Expected	Real	
Hypothesis about Moral Reasoning Moral Reasoning will have a relationship with				
H 33	Frequency of Scanning the Socio-Cultural Sector	+	+	*
Hypotheses about Machiavellianism Machiavellianism will have a relationship with				
H 34	Delegation of Scanning	-	-	**
H 35	Degree of Tool Support	+	+	*
H 36	Fixity of time for Interpretation	+	+	*
Hypotheses about Trust in People Trust in People will have a relationship with				
H 37	Use of Personal Sources	+	+	***
H 38	Diversity of Internal Models	+	+	**
H 39	Delegation of Scanning	+	+	***
*Levels of Significance of Standardized Path Coefficients: ***: $p < 0.01$ (t-Value ≥ 2.326),* ***: $p < 0.05$ (2.326 > t-Value ≥ 1.645), *: $p < 0.10$ (1.645 > t-Value ≥ 1.282); ns: not significant*				

Table 66: Summary of the Results of the Valuation of Hypotheses about the Relationship between Attitudes and Design Variables of Early Warning Behavior

2.3.3 Attitudes and their Explanatory Contribution for Design Variables of Early Warning Behavior

The relationship was analyzed between the eight attitudes, proposed by LEWIN and STEPHENS,[863] and the design variables of early warning behavior. Most of the hypotheses derived based on their framework are validated on a high significance level. This validation explains the importance of these attitudes for the design variables of early warning behavior. But although single attitudes have relationships with design variables on a statistically significant level this does not automatically imply that one attitude alone explains a design variable. For this reason, in the following analysis will examine the degree to which each attitude explains the design variables of early warning behavior. As seen in F 2.4.2, the explanatory importance of an exogenous variable on an endogenous one has to be analyzed by its effect size. Therefore, the model of structural equations for the relationships between the attitudes and every single design variable is applied to get the explained variance R^2 for this model. In terms of formula 7 this leads to R_{incl}. In a second step the attitude to be analyzed is eliminated and the explained variance for this new model is obtained. In terms of formula 7 this leads to R_{excl}. These two values allow the calculation of the effect size f. Three classes of influence are differentiated: significant influence (0.01 to 0.075), highly significant influence (0.75 to 0.25) and very highly significant

[863] See Lewin and Stephens (1994).

influence for f values over 0.25.[864] Frequency is the composite measure of the examined sources. Therefore, these sources have to be analyzed in separate models. So first, the influence of the attitudes on sources is analyzed. For clarity reasons table 67 only shows schematically the influence of the attitudes on sources for scanning. Appendix 2 contains the numerical values of this analysis.

	Personal Sources	Impersonal Sources	Internal Sources	External Sources
Locus of Control	°	°	°	°
Tolerance for Ambiguity	°	°	°	
Need for Achievement	°		°	°
Risk Propensity	°	°	°	°
Egalitarianism				
Moral Reasoning				
Machiavellianism				
Trust in People	°			°
Level of Significance of Effect Size f: °°°: Very Highly Significant ($f \geq 0.25$), °°: Highly Significant ($0.25 > f \geq 0.075$), °: Significant ($0.075 > f \geq 0.01$)				

Table 67: Schematic Presentation of the Explanatory Contribution of Attitudes for Scanning Sources

The analysis of the influence of the attitudes on the use of the different sources shows that four attitudes are the most important. Locus of control, tolerance for ambiguity, need for achievement and risk propensity explain the use of sources significantly.[865] This influence can be explained by their causal relation with scanning frequency. It is reflected by the validation of hypothesis 12 (positive relationship between locus of control and scanning frequency), hypothesis 17 (positive relationship between tolerance for ambiguity and scanning frequency), hypothesis 22 (positive relationship between need for achievement and scanning frequency) and finally hypothesis 29, which predicts a positive relationship between risk propensity and scanning frequency. As table 67 shows, trust in people has significantly explanatory influence on personal and external sources. The influence of trust in people on use of personal sources has already been shown by the validated hypothesis 37. However, the significantly explanatory power of trust in people for use of external sources is unexpected. It can be explained by the fact that individuals who trust people in general also trust sources from outside the organizations more than individuals who do not have this attitude. Another reason for this explanatory power is the fact that external sources also

[864] See Cohen (1988), p. 123, Chin, Marcolin and Newsted (2003), p. 211 and Götz and Liehr-Gobbers (2004), p. 731.

[865] Nevertheless, need for achievement has slightly less explanatory power for scanning sources as it does not have explanatory influence on impersonal sources.

comprise external personal sources. On the other hand, egalitarianism, moral reasoning and Machiavellianism do not have any explanatory influence on the use of sources for scanning the environment.[866] After the analysis of the explanatory power of the eight attitudes for the use of sources the explanatory power of these attitudes for all design variables of early warning is examined. Table 68 provides an overview.

	Frequency	Scope	Delegation	Diversity Internal Models	Intensity	Tool-Support	Fixity of Time for Interpretation
Locus of Control	°	°			°		
Tolerance for Ambiguity	°			°°	°		
Need for Achievement	°	°			°		
Risk Propensity	°	°°			°°		
Egalitarianism							
Moral Reasoning							
Machiavellianism			°°			°	°
Trust in People			°°	°°			
Level of Significance of Effect Size f: °°°: Very Highly Significant (f ≥ 0.25), °°: Highly Significant (0.25 > f ≥ 0.075), °: Significant (0.075 > f ≥ 0.01)							

Table 68: Schematic Presentation of Explanatory Contribution of Attitudes for Design Variables of Early Warning Behavior not Regarding Scanning Sources

As seen, scanning frequency is explained significantly by the following four attitudes: locus of control, tolerance for ambiguity, need for achievement and risk propensity. Trust in people does not have any explanatory power for scanning frequency although it has significantly explanatory influence on personal and external sources. Locus of control, need for achievement and risk propensity are the only attitudes to explain scope of scanning. This result becomes evident if the validated hypotheses about the relationship between the three attitudes locus of control (hypothesis 13), need for achievement (hypothesis 23), risk propensity (hypothesis 30) and scope of scanning are considered. No additional attitude explains this design variable of early warning behavior. This is especially remarkable for the attitude tolerance for ambiguity. Although a positive relationship between tolerance for ambiguity and scope of scanning has been shown,[867] this attitude does not provide additional explanatory power for scope of scanning. Delegation is explained with two attitudes. Machiavellianism and trust in people explain this design variable of scanning highly significantly. This corresponds to the validated hypothesis 34, which predicts a

[866] It is important to take a closer look at egalitarianism. Hypothesis 32 preditcts a positive relationship between egalitarianism and personal, internal sources. This influence is not so strong that egalitarianism has explanatory influence on personal or internal sources in the aggregated form. And the influence of the attitudes on the four single sources presented in C 4.2.2 is not analyzed because all hypotheses with exception of hypothesis 32 concern internal versus external or personal versus impersonal sources.

[867] See validated hypothesis 18.

negative relationship between Machiavellianism and degree of delegation as well as to the validated hypothesis 39, which predicts a positive relationship between trust in people and degree of delegation. All other attitudes do not have any explanatory influence on degree of delegation. It is not an expected result for the attitude need for achievement because of the validated hypothesis 28, which predicts a negative relationship between need for achievement and delegation.

Now, it is the point to deal with the design variables of interpretation. Diversity of internal models is explained with two attitudes: tolerance for ambiguity and trust in people. This corresponds to the following validated hypotheses. Hypothesis 19 predicts a positive relationship between tolerance for ambiguity and diversity of internal models, and hypothesis 38 a positive relationship between trust in people and diversity of internal models. Although there exists a positive relationship between need for achievement and diversity of internal models,[868] this attitude does not have any additional explanatory power for diversity of internal models. Intensity of interpretation is explained by the same four attitudes which explain frequency of scanning: locus of control, tolerance for ambiguity, need for achievement and risk propensity. There is a correspondence to the validation of hypothesis 14 (positive relationship between locus of control and intensity of interpretation), hypothesis 20 (positive relationship between tolerance for ambiguity and intensity of interpretation), hypothesis 24 (positive relationship between need for achievement and intensity of interpretation) and hypothesis 31 (positive relationship between risk propensity and intensity of interpretation). Tool support for interpretation is only explained with the attitude Machiavellianism. This can be explained by the fact that all hypotheses about the relationship between attitudes and degree of tool support have not been validated,[869] apart from hypothesis 35 which predicts a positive relationship between Machiavellianism and degree of tool support. Also fixity of time for interpretation is only explained by Machiavellianism. This is in line with the validated hypothesis 36 which predicts a positive relationship between Machiavellianism and fixity of time for interpretation. No other attitude explains the variance of this design variable. Even locus of control does not provide additional explanatory power although a positive

[868] See validated hypothesis 25.
[869] Hypotheses 15 and 26 have not been validated.

relationship between locus of control and degree of fixity of time for interpretation has been shown.[870]

In summarizing these findings the following three statements can be made: 1) Six of the eight analyzed attitudes at least significantly explain design variables of early warning, 2) egalitarianism and degree of moral reasoning do not have any explanatory power within this context and 3) the analysis of the explanatory power is in line with most of the valuated hypotheses about the relationship between attitudes and design variables of early warning.

2.4 Concluding Analysis

2.4.1 Synthetic Valuation of the Classical Contingency Theory and its Extension

The explanatory power of the attitudes for the design variables of early warning behavior was just considered in order to valuate the extension of the contingency theory proposed by LEWIN and STEPHENS.[871] But now this extension needs to be combined with the classical contingency theory. With the help of structural models and the method described above the influence of both, of perceived strategic uncertainty and of the attitudes, on the design variables of early warning behavior is analyzed. Table 69 shows the effect sizes of the contingency variables in the context of their explanatory contribution for the use of scanning sources.

	Personal Sources	Impersonal Sources	Internal Sources	External Sources
PSU	°°	°°	°°	°°
Locus of Control	°	°	°	°
Tolerance for Ambiguity	°	°	°	
Need for Achievement	°		°	
Risk Propensity	°	°		
Egalitarianism				
Moral Reasoning				
Machiavellianism				
Trust in People	°			°
Level of Significance of Effect Size f: °°°: Very Highly Significant (f ≥ 0.25), °°: Highly Significant (0.25 > f ≥ 0.075), °: Significant (0.075 > f ≥ 0.01)				

Table 69: Schematic Presentation of the Explanatory Contribution of all Contingency Variables for Scanning Sources

Perceived strategic uncertainty explains the use of all sources highly significantly. This can be understood by considering hypotheses 3a, 4a, 6a and 7a. The validation of these

[870] See validated hypothesis 36.
[871] See Lewin and Stephens (1994).

four hypotheses shows that perceived strategic uncertainty has a positive influence on the use of all four classes of sources. Also, the attitudes still have explanatory power. Only the explanatory power of the attitudes need for achievement and risk propensity has decreased. The attitude need for achievement no longer explains significantly the use of external sources and the attitude risk propensity no longer explains the use of internal and external sources. This is the result of the explanatory influence of perceived strategic uncertainty on scanning sources. It is so high that in comparison to perceived strategic uncertainty need for achievement and risk propensity no longer explain significantly the use of the above mentioned sources.

After the analysis of the explanatory power of all contingency variables for scanning sources, table 70 shows their explanatory influence for all other design variables of early warning behavior apart from scanning sources.

	Frequency	Scope	Delegation	Diversity Internal Models	Intensity	Tool-Support	Fixity of Time for Interpretation
PSU	°°	°°		°	°°		
Locus of Control	°	°			°		
Tolerance for Ambiguity	°			°°	°		
Need for Achievement	°	°			°		
Risk Propensity	°	°°					
Egalitarianism							
Moral Reasoning							
Machiavellianism			°			°	°
Trust in People			°°	°°			

Level of Significance of Effect Size f: °°°: Very Highly Significant (f ≥ 0.25), °°: Highly Significant (0.25 > f ≥ 0.075), °: Significant (0.075 > f ≥ 0.01)

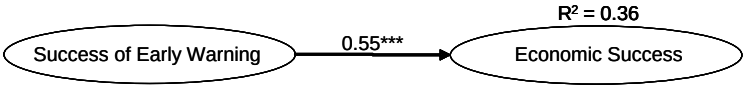
Table 70: Schematic Presentation of the Explanatory Contribution of all Contingency Variables for Early Warning Behavior not Regarding Scanning Sources

Perceived strategic uncertainty has important explanatory power. In accordance with the validated hypothesis 2a it explains highly significant scanning frequency. It also explains highly significant scope of scanning, which is reflected by the validated hypothesis 8a. Additionally, to a significant degree, it explains the diversity of internal models. This corresponds to the validated hypothesis 5a. The highly explanatory power of perceived strategic uncertainty for intensity of interpretation is reflected in the validated hypothesis 9a. The explanatory influence of the attitudes is still very high although slightly alleviated. Risk propensity no longer explains intensity of interpretation and the degree of explanatory influence of Machiavellianism is reduced from highly significant to significant.

These findings can be summarized in the statement that both types of contingency variables – perceived strategic uncertainty as well as six attitudes – have explanatory power for design variables of early warning.

2.4.2 Valuation of the Hypothesis about the Relationship between Success of Early Warning and Economic Success

Figure 39 shows the relationship between the success of early warning and economic success.



*with Levels of Significance of Standardized Path Coefficients: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant*

Figure 39: Result of the Valuation of Hypothesis about the Relationship between Success of Early Warning and Economic Success

Hypothesis 40 predicts a positive relationship between the success of early warning and the economic success of an organization. This hypothesis is validated on a significance level of 1%. The value of R^2 (0.36) is very high and shows the importance of early warning for the economic success of an organization. This corresponds to the findings of MILLER and FRIESEN,[872] SUBRAMANIAN et al.[873] and SUBRAMANIAN et al.[874].

2.4.3 Clusters of CEOs Doing Early Warning

In accordance with the attitudes relevant to the context of early warning the CEOs are clustered now.[875] "[E]ach CEO embodies a cluster of them [attitudes], and the multivariate cluster – or archetype – is what drives his or her organization-design preferences."[876] LEWIN and STEPHENS propose four clusters of personalities: 'Achieving-Utilitarian', 'Achieving-Principled', 'Autocratic-Controlling' and 'Ineffectual'.[877] The reasons not to take these clusters are threefold: First, these clusters are

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872 See Miller and Friesen (1977).
873 See Subramanian, Fernandes and Harper (1993).
874 See Subramanian, Kumar and Yauger (1994).
875 See F 4.
876 Lewin and Stephens (1994), p. 199.
877 See Ibid., p. 199ff.

only derived theoretically by them and cluster analysis is an explorative procedure.[878] Second, it has been empirically shown that these clusters cannot be found in this sample. Third, LEWIN and STEPHENS base their model on eight attitudes. Yet G 2.3.3 has shown that only six of them have explanatory power for the design variables of early warning: locus of control, tolerance for ambiguity, need for achievement, risk propensity, Machiavellianism and trust in people. The CEOs are clustered based on these attitudes.

The values of the attributes, in this case the values of the attitudes, are all interval scaled. Therefore, the MINKOWSKI metrics is used.[879] The attitudes are all measured on a 7-point-Likert scale. So, the values of the attributes do not have to be standardized and to be converted to z-scores.[880] As fusion algorithms the single-linkage and then the ward algorithm are applied. The single-linkage identifies outliers that are eliminated for further analysis. In the here presented case no object had to be eliminated. Then, the ward method was applied. Finally, to determine the number of clusters the sums of squared measurement errors were calculated for each amount of groups. Figure 40 shows that the sum of errors increases in a disproportionate way at the value of four groups. Therefore, the optimal amount of clusters is four.

878 See Backhaus, Erichson, Plinke and Weiber (2005), p. 497ff. and Bortz and Döring (2003), p. 382f.
879 See Everitt, Landau and Leese (2001), p. 90.
880 See Borg and Groenen (2005), p. 122.

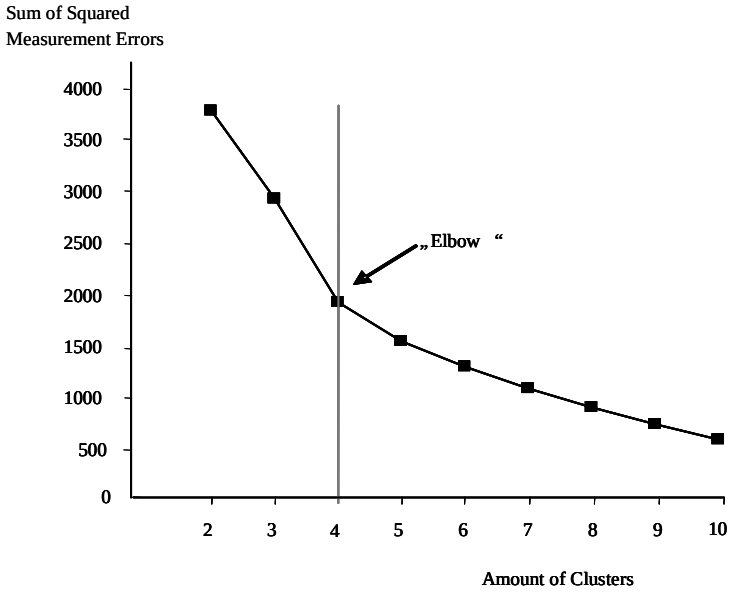

Figure 40: Determination of Optimal Amount of Clusters

The resulting four clusters are distributed as follows:

	Absolute Numbers	Percentage
Cluster 1	205	34.3%
Cluster 2	204	34.2%
Cluster 3	151	25.3%
Cluster 4	37	6.2%

Table 71: Distribution of Clusters of Personalities Relevant to Early Warning Behavior

Table 72 presents the four clusters and, within each cluster, the typical attitudes of the CEOs. The values of these attitudes are all standardized and can therefore be compared. For illustrative purpose the clusters were labelled so that each cluster stands for a specific type of personality doing early warning.

	Cluster 1 (Courageous Achiever)	Cluster 2 (Cautious Achiever)	Cluster 3 (Autocratic Controller)	Cluster 4 (The Ineffective)	Mean of Sample
Locus of Control	6.11	6.13	5.74	3.65	5.88
Tolerance for Ambiguity	5.29	2.96	3.04	3.43	3.82
Need for Achievement	6.02	5.81	5.59	3.02	5.71
Risk Propensity	4.01	2.03	3.19	1.86	2.98
Machiavellianism	2.12	2.16	4.11	1.79	2.63
Trust in People	4.71	4.79	2.45	3.11	4.08
SD = Standard Deviation; 1 = low; 7 = high					

Table 72: Attitudes within Clusters of Personalities Relevant to Early Warning Behavior

At the start of this analysis the quality of the division is examined. For this the values of the attitudes within a cluster are compared to the values of the other clusters by means of a t-test for independent samples.

	Difference between Clusters					
Attitude	1 and 2	1 and 3	1 and 4	2 and 3	2 and 4	3 and 4
Locus of Control	ns	*	***	*	***	***
Tolerance for Ambiguity	***	***	***	ns	**	*
Need for Achievement	ns	**	***	ns	***	***
Risk Propensity	***	***	***	***	ns	***
Machiavellianism	ns	***	*	***	*	***
Trust in People	ns	***	***	***	***	***
Levels of Significance of Mean Difference: ***: $p < 0.01$ (t-Value ≥ 2.326), **: $p < 0.05$ ($2.326 >$ t-Value ≥ 1.645), *: $p < 0.10$ ($1.645 >$ t-Value ≥ 1.282); ns: not significant						

Table 73: Comparison of Attitudes between Clusters

Table 73 shows that the means of the attitudes differ significantly most of the times from cluster to cluster. This indicates a good dissimilarity of the four clusters. This result is again examined using the KRUSKAL-WALIS test. It compares the means of more than two independent samples.[881] This test was applied and the significance level for each attitude was 1 %. Both tests have shown that the clusters are dissimilar and are now described.

A CEO belonging to the first cluster is labelled ‘Courageous Achiever’. He has high values of locus of control and need for achievement. Additionally, his values of tolerance for ambiguity and risk propensity are also high. Machiavellianism and trust in people are similar to the mean.

[881] See Weerahandi (2003), p. 92ff. and Klugh (1986), p. 382.

The second cluster and its members are called ‘Cautious Achiever’. As the ‘Courageous Achiever’ he has high values of locus of control and need for achievement. In contrast to the ‘Courageous Achiever’ his values of tolerance for ambiguity and risk propensity are relatively low. Values of Machiavellianism and trust in people are also near to the mean.

The third cluster termed ‘Autocratic Controller’ is characterized by high values of Machiavellianism and a low degree of trust in people. His values of locus of control and need for achievement are lower than those of the achievers.

The final cluster is labelled ‘Ineffective’. A CEO within this cluster is characterized by low values for every attitude.

Three striking bundles of attitudes within the clusters occur.[882] First, there is a strong connection between locus of control and need for achievement. This correlation is supported by numerous psychological studies.[883] “Individuals who develop with little expectation that life’s satisfaction and misfortunes can be determined by personal efforts have been less apt to exert themselves or to persist over lengthy time intervals in the pursuit of distant goals; and, as if oftentimes has been contended, such exertion and persistence are the sine qua non of achievement activity.”[884] Second, the correlation between risk propensity and tolerance for ambiguity is evident. For both attitudes the values of ‘Cautious Achiever’ are low whereas the ‘Courageous Achiever’ has high values for both of them. Taking risks means to be able to cope with uncertainty at the same time. Third, there is a strong negative correlation between low Machiavellianism and a high degree of trust in people. CEOs who regard others as means cannot be expected to have high trust in people and vice versa.

The four clusters differ in the context of early warning behavior.

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882 The following analysis is the result of a correlation analysis and the consideration of table 72.

883 See Crandall, Katkovsky and Preston (1962), Franklin (1963), Crandall, Katkovsky and Crandall (1965), McGhee and Crandall (1968), Harrison (1968), Lessing (1969).

884 Lefcourt (1982), p. 77.

	Cluster 1 (Courageous Achiever)	Cluster 2 (Cautious Achiever)	Cluster 3 (Autocratic Controller)	Cluster 4 (The Ineffective)	Mean of Sample
Scanning					
Internal, Personal Sources	4.46	4.37	3.89	2.87	4.19
Internal, Impersonal Sources	3.91	3.81	4.14	2.84	3.87
External, Personal Sources	4.05	4.01	3.72	2.85	3.88
External, Impersonal Sources	4.81	4.67	4.94	2.88	4.68
All Internal Sources	4.19	4.09	4.02	2.86	4.27
All External Sources	4.43	4.34	4.33	2.87	4.27
All Personal Sources	4.26	4.19	3.81	2.86	4.27
All Impersonal Sources	4.36	4.24	4.54	2.86	4.03
Frequency	4.31	4.21	4.17	2.86	4.16
Scope	4.52	4.37	4.55	2.97	4.38
Delegation	3.89	3.90	3.35	3.14	3.71
Interpretation					
Diversity of Internal Models	5.80	5.21	5.04	3.05	5.24
Intensity	3.67	3.63	3.67	2.64	3.59
Tool Support	2.86	2.88	3.17	2.06	2.89
Fixity of Time for Interpretation	3.57	3.58	4.03	1.95	3.60
Success					
Success of Early Warning	4.53	4.46	4.58	2.25	
Financial Success	5.14	4.78	4.77	1.89	
SD = Standard Deviation; 1 = low; 7 = high					

Table 74: Clusters of CEOs and their Early Warning Behavior

In analogy with table 73, the following table analyzes the differences between the clusters regarding early warning behavior.

	Difference between Clusters					
	1 and 2	1 and 3	1 and 4	2 and 3	2 and 4	3 and 4
Scanning						
Internal, Personal Sources	ns	***	***	**	***	***
Internal, Impersonal Sources	ns	ns	***	*	***	***
External, Personal Sources	ns	*	***	ns	***	***
External, Impersonal Sources	ns	ns	***	ns	***	***
All Internal Sources	ns	ns	***	ns	***	***
All External Sources	ns	ns	***	ns	***	***
All Personal Sources	ns	**	***	*	***	***
All Impersonal Sources	ns	ns	***	*	***	***
Frequency	ns	ns	***	ns	***	***
Scope	ns	ns	***	ns	***	***
Delegation	ns	***	***	***	***	

Interpretation						
Diversity of Internal Models	***	***	***	ns	***	***
Intensity	ns	ns	***	ns	***	***
Tool Support	ns	*	***	ns	***	***
Fixity of Time for Interpretation	ns	**	***	**	***	***
Success						
Success of Early Warning	ns	ns	***	ns	***	***
Financial Success	*	*	***	ns	***	***
Levels of Significance of Mean Difference: ***: p < 0.01 (t-Value ≥ 2.326), **: p < 0.05 (2.326 > t-Value ≥ 1.645), *: p < 0.10 (1.645 > t-Value ≥ 1.282); ns: not significant						

Table 75: Comparison of Early Warning Behavior between Clusters

The most striking types of early warning behavior presented in table 75 are chosen in order to characterize the early warning behavior of the CEOs of the four clusters.[885]

The 'Courageous Achiever' has very high values of scanning frequency[886] and scope of scanning[887]. Compared to the 'Autocratic Controller' and the 'Ineffective' he tends to delegate.[888] He is the CEO who involves the most people in the interpretation process compared to the other types.

The 'Cautious Achiever' is very similar to the 'Courageous Achiever'. He also has very high values of scanning frequency, scope of scanning and delegation.[889] The only significant difference to the 'Courageous Achiever' is a lower value of diversity of internal models.[890]

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885 If two clusters are compared, the t-test is applied. If one cluster is compared to two or three an ANOVA is applied.

886 See hypotheses 12 (validated hypothesis about a positive relationship between locus of control and scanning frequency), 17 (validated hypothesis about a positive relationship between tolerance for ambiguity and scanning frequency), 22 (validated hypothesis about a positive relationship between need for achievement and scanning frequency) and 29 (validated hypothesis about a positive relationship between risk propensity and scanning frequency).

887 See hypotheses 13 (validated hypothesis about a positive relationship between locus of control and scope of scanning), 18 (validated hypothesis about a positive relationship between tolerance for ambiguity and scope of scanning), 23 (validated hypothesis about a positive relationship between need for achievement and scope of scanning) and 30 (validated hypothesis about a positive relationship between risk propensity and scope of scanning).

888 This can be explained by the strong tendency of these other clusters not to delegate. See hypotheses 34 (validated hypothesis about a negative relationship between Machiavellianism and delegation of scanning) and 39 (validated hypothesis about a positive relationship between trust in people and delegation of scanning).

889 The difference between these values of the 'Cautious Achiever' and the 'Courageous Achiever' is not significant.

890 The 'Cautious Achiever' has a low value of tolerance for ambiguity and therefore tends to involve less people in the process of interpretation. See hypothesis 19 (validated hypothesis about a positive relationship between tolerance for ambiguity and diversity of internal models).

The ‘Autocratic Controller’ is characterized by low use of personal sources,[891] a low degree of delegation,[892] a low degree of internal models involved in the process of interpretation,[893] a high degree of tool support[894] and finally by a high fixity of time for interpretation[895].

The last cluster to be considered is the ‘Ineffective’. He scans with very low frequency, with narrow scope and does not delegate as much as the others. He also differs in all four aspects of interpretation. Compared to the three other types he involves less people in the interpretation process, interprets with lower intensity, has lower tool support and does not have a fixed time for interpretation compared to the other three types.[896]

Finally, the success measures are examined. The first three types all have comparable success of early warning. The ‘Ineffective’ has very low success of early warning which seems to be evident when taken his scanning and interpretation behavior into consideration. Surprisingly, the first type, the ‘Courageous Achiever’, has significantly more economic success than all the other types. His combination of attitudes leads to more economic success than those of the other types. The ‘Ineffective’ almost does not have any economic success at all. There are two explanation of this misfortune: 1) His lack of success of early warning directly influences his economic success and 2) as he is confronted with financial losses or even the danger of insolvency the ‘Ineffective’ does not have time to concentrate on early warning. These two thoughts taken together represent a self strengthening process.

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891 See hypothesis 37 (validated hypothesis about a positive relationship between trust in people and use of personal sources).

892 See hypotheses 34 and 39.

893 See hypothesis 38 (validated hypothesis about a positive relationship between trust in people and diversity of internal models).

894 See hypothesis 35 (validated hypothesis about a positive relationship between Machiavellianism and tool support for interpretation).

895 See hypothesis 36 (validated hypothesis about a positive relationship between Machiavellianism and fixity of time for interpretation).

896 As all attitudes of the ‘Ineffective’ differ from the attitudes of the CEOs of the other clusters, a further analysis would not make sense. It would oversimplify the relationship between the ‘Ineffective’ and his scanning and interpretation behavior.

H Final Thoughts and Outlook

1 Summary and Discussion of the Results

The starting point of this analysis was the importance of early warning, i.e. scanning and interpretation, for organizations. The anticipation of future trends is an important asset to survive. Based on literature and the resulting gap of research four research questions were deduced:

1) *How do CEOs of medium-sized companies design their early warning behavior?*

2) *Do contingency variables influence the early warning behavior of CEOs of medium-sized companies?*

3) *What is the relationship between the early warning behavior of CEOs of medium-sized companies and the success of early warning of medium-sized companies?*

4) *What is the relationship between the success of early warning of medium-sized companies and their overall economic success?*

To answer these research questions an empirical analysis was conducted across the five most important sectors of the German manufacturing industry. Based on the definition of the European Union of ‘Mittelstand’, organizations with a size of 50 to 249 employees were chosen as objects for analysis. For these organizations early warning is already relevant and they are influenced by their CEOs to a high degree. A questionnaire was sent to 4,500 CEOs of German medium-sized companies. From the responses 597 questionnaires could be used for the empirical analysis which corresponds to a return rate of 13.3%. To analyze the relationships between the latent variables of the research model, the PLS method was applied. This method of structural equation modeling was applied for the first time in this context and allowed the analysis of the measurement quality of the single constructs as well as of the structural equations. The simplification of multiple regression analysis that was

applied by other researchers such as DAFT et al.,[897] ELENKOV[898] or MCGEE and SAWYERR[899] in this field can be overcome.[900]

To answer the research questions the most important results will be summarized and discussed.

1) *How do CEOs of medium-sized companies design their early warning behavior?*

The processes of scanning and interpretation presented in DAFT's and WEICK's model was adopted to describe early warning behavior.[901] The process of interpretation has not yet been analyzed in this context although literature has stressed its importance[902] and analyzed the interpretation behavior of managers using case studies.[903]

For both steps of early warning design variables were derived; three for scanning (scanning frequency/sources, scope of scanning and delegation of scanning) and four for interpretation (diversity of internal models, intensity of interpretation, degree of tool support and fixity of time for interpretation).

From the four alternative sources of scanning managers use impersonal, external sources such as newspapers and external databases the most, followed by personal, internal sources such as employees. The two other sources – impersonal, internal sources such as the management information system and personal, external sources such as clients – are less frequently used. This finding is in line to the one by DAFT et al. who shows the same order of use.[904] It is especially remarkable that impersonal, internal sources are used less in order to get information about future chances and risks for the organizations because the information value of this source has been stressed by literature.[905] A possible explanation of this deviance might be the costs of this source. In addition, impersonal sources are used more often than personal ones. This

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897 See Daft, Sormunen and Parks (1988).
898 See Elenkov (1997).
899 See McGee and Sawyerr (2003).
900 The major methodological weakness of these studies is the index formation of constructs. For the advantages of PLS in this context see F 2.2 and F 2.6.
901 See Daft and Weick (1984).
902 See F 2.
903 See Banerjee (2001).
904 See Daft, Sormunen and Parks (1988), p. 131.
905 See Galbraith (1973), p. 30ff. and Prescott and Bhardwaj (1995), p. 11.

corresponds to the study of KEEGAN which shows that the use of impersonal, internal sources is relatively low compared to other sources.[906] Additionally, this study finds that no difference exists between the use of external and internal sources.

For the first time this work has analyzed the second step of early warning, the interpretation, using a large sample. Therefore, its findings within this context cannot be compared to other findings in literature. It can only be stated that CEOs of medium-sized companies tend to use instruments to support interpretation to a low degree. The costs of introducing and applying such instruments might explain the fact that the CEOs of the sample do not use them very much.

2) *Do contingency variables influence the early warning behavior of CEOs of medium-sized companies?*

It needs to be understood which factors determine early warning behavior. The contingency theory explains how organizational design is influenced by contextual variables. As seen above, early warning is part of organizational design and the contingency theory is therefore appropriate to answer this research question.

Following the assumptions of the classical contingency theory the relationship between environmental uncertainty and scanning was analyzed. Indeed, environmental uncertainty, measured by perceived strategic uncertainty, has a positive relationship with all sources of scanning. With rising perceived strategic uncertainty the use of personal sources and even more that of impersonal sources increases. The same is true for internal and external sources. This is in accordance with the studies of DAFT et al.[907] and SAWYERR[908] who found that all sources were used more often with rising perceived strategic uncertainty. Yet, the finding of this study do not correspond to the findings of ELENKOV[909] and the information richness theory which predicts that with rising uncertainty personal sources are more adequate and should be used more.[910] This tendency is partially reflected in the tendency that with rising perceived strategic uncertainty the use of personal sources is augmented to a greater extend than the use of impersonal sources. This study also shows that scanning frequency as the composite measure of the scanning sources correlates with perceived strategic uncertainty. This

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906 See Keegan (1974), p. 417f.
907 See Daft, Sormunen and Parks (1988), p. 132f.
908 See Sawyerr (1993), p. 239.
909 See Elenkov (1997), p. 297.
910 See Daft and Lengel (1984), p. 199.

corresponds to the findings of DAFT et al.,[911] SAWYERR[912] and AUSTER and CHOO[913]. In accordance with the study of YASAI-ARDEKANI and NYSTROM[914] the scope of scanning rises with perceived strategic uncertainty. A positive correlation was also found for the relationship of perceived strategic uncertainty with diversity of internal models within the process of interpretation as well as with intensity of interpretation. In contrast, no correlation was found between perceived strategic uncertainty and the degree of delegation. So the study of YASAI-ARDEKANI and NYSTROM, who found that the degree of delegation is not influenced by environmental uncertainty, is confirmed.[915] This can be explained by the fact that other contingency variables such as the CEO's attitudes explain the degree of delegation. The same is true for tool support for interpretation.

According to the extended contingency theory early warning is influenced additionally by the CEO's personality. This work is the first that has tested the thesis of the extended contingency theory in the context of early warning. In order to understand this additional influence, LEWIN and STEPHENS provide a framework of relevant attitudes of CEOs. They derived the following eight attitudes: locus of control, tolerance for ambiguity, need for achievement, risk propensity, egalitarianism, moral reasoning, Machiavellianism and trust in people. For every attitude at least one hypothesis about a relationship with a design variable of early warning could be validated. In a second step the explanatory power of these attitudes for the single design variables was analyzed. The result was that only six of these attitudes have significant explanatory influence on the design variables. Egalitarianism and degree of moral reasoning do not have any explanatory power within this context. These results correspond to former psychological research which showed the importance of these attitudes for explaining human behavior.[916]

This work does not only analyze the influence of attitudes on early warning behavior but also compares the explanatory power of the attitudes with the one of perceived strategic uncertainty. By this new approach the influence of both contingency factors – the traditional one and the personal attitudes – can be compared. The resulting

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911 See Daft, Sormunen and Parks (1988), p. 132.
912 See Sawyerr (1993), p. 293.
913 See Auster and Choo (1993), p. 200.
914 See Yasai-Ardekani and Nystrom (1996), p. 198f. See also Gordon and Narayanan (1984) and Gul and Chia (1994).
915 See Yasai-Ardekani and Nystrom (1996), p. 198.
916 See D 2.

extended model, which contains perceived strategic uncertainty and all attitudes as contingency variables, shows that perceived strategic uncertainty explains mostly the design variables of early warning. Nevertheless, the influence of the above mentioned six attitudes still remains although their explanatory influence decreases slightly in the extended model.

On the basis of those results, it is the conclusion that, first, the classical contingency theory can be confirmed because perceived strategic uncertainty has a major impact on the design variables of early warning. As BURNS and STALKER,[917] LAWRENCE and LORSCH,[918] BOURGEOIS et al.[919] and ARGOTE[920] showed before, the dependency between environmental uncertainty and organizational structure can be confirmed. Additionally, the CEO's personality, reflected by his attitudes, also has significant impact on early warning behavior. Therefore, the extension of the contingency theory can also be confirmed. This extension is based on CHILD who was the first to consider the influence of managerial personality as a major contingency variable and argued that the design of an organization is not given but the result of managers' choice.[921] Although he did not confirm the influence of the single individual but of the management team, he agreed with the general possibility of individuals influencing the organizational design. The following empirical studies made by MILLER and DRÖGE[922] and MILLER, KETS DE VRIES[923] focused on single attitudes and showed their influence on organizational design. In the context of early warning, FISHER analyzed the influence of locus of control on scanning.[924] She found that the perceived usefulness of information in situations of uncertainty varies according to the locus of control of the individual. These first findings in the context of scanning also exist for the second step of early warning, interpretation. For example SCRIBNER and HANDLER showed that the way individuals interpret their environment depends on their personality.[925] But until now no model of managerial personality has been applied in order to understand the impact of the executive's personality on his early warning behavior. Here LEWIN and STEPHENS's model was

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917 See Burns and Stalker (1961).
918 See Lawrence and Lorsch (1967).
919 See Bourgeois, McAllister and Mitchel (1978).
920 See Argote (1982).
921 See Child (1972), p. 7.
922 See Miller and Dröger (1986).
923 See Miller and Kets de Vries (1982).
924 See Fisher (1996).
925 See Scribner and Handler (1987).

applied that comprises a broad range of personal attitudes relevant in the context of executives. It was possible to confirm the general assumption of LEWIN and STEPHENS that the personality of the CEO also influences organizational design (i.e. the extension of the classical contingency theory)[926] within the context of early warning. Nevertheless, it is the conclusion that not all of the eight attitudes proposed by LEWIN and STEPHENS are relevant to early warning. Egalitarianism and degree of moral reasoning do not have any explanatory power for the design variables of early warning. Numerous studies show the relationship between these six attitudes and behavior relevant to the business context. For example MILLER et al. show the importance of locus of control,[927] VANDENBOSCH and HUFF of tolerance of ambiguity[928] and DURAND and SHEA[929] as well as ENTRIALGO et al.[930] of need for achievement for information search behavior. Only two out eight attitudes do not have any explanatory influence compared to the others.

These findings also correspond to psychological research that focuses on attitudes and considers them as enduring individual psychological properties which form together his personality[931] and influence behavior.[932] This work combines this psychological research and the traditional contingency perspective. It confirms the research of MAGNUSSON[933] and KENRICK and DANTCHIK who argue that situational factors as well as the personality of the individual have to be considered to predict behavior.[934] These findings have important consequences for further research. First, no longer should empirical research concentrate on classical contingency variables but should also consider the personality of the individual. This was done in the past. For example the studies of FLAHERTY and PAPPAS[935] and BAKAN et al.[936] analyze which traditional contingency variables influence attitudes of employees towards their job and do not consider the personality of the individual. The same shortcoming is evident in the studies of HARDGRAVE et al.[937] and WEILL and OLSON[938] who aim to

926 See Lewin and Stephens (1994), p. 183f.
927 See Miller, Kets de Vries and Toulouse (1986).
928 Vandenbosch and Huff (1997), p. 85.
929 See Durand and Shea (1974).
930 See Entrialgo, Fernández and Vázquez (2000).
931 See Rokeach (1968), p. 82ff.
932 See Bass, Barnett and Brown (1989), p. 184.
933 See Magnusson (1981).
934 See Kenrick and Dantchik (1983).
935 See Flaherty and Pappas (2002).
936 See Bakan, Suseno, Pinningon and Money (2004).
937 See Hardgrave, Wilson and Eastman (1999).

understand the design of information systems by situational factors, and to the study of KUKALIS[939] who tries to find the determinants of an optimal strategic planning system in large organization only considering traditional situational variables. The same is true for the study of FISHER[940] and REJC[941]. They try to apply the traditional contingency theory to management control systems and performance measurement systems. Second, research about a personality's influence on behavior has to analyze additionally the influence of traditional contingency variables. Examples of studies that not yet consider this additional influence are the studies by GUL[942] and WALLY and BAUM[943]; both analyze the influence of the personality on decision behavior. In addition, the studies by MCGEE et al.[944] and GUPTA[945] analyze the influence of the personality on information processing behavior. Especially research about the personality of the entrepreneur has to consider the findings of the conducted study. The behavior of the entrepreneur shall no longer only be analyzed dependent on personality but also other contingency variables. This shortcoming – only considering the personality of the entrepreneur in order to explain his behavior – characterizes studies as the ones of BRANDSTÄTTER,[946] RAUCH and FRESE[947] or LANG von WINS[948].

Finally, the attitudes and identified four clusters of personalities of CEOs were grouped into the 'Courageous Achiever', the 'Cautious Achiever', the 'Autocratic Controller' and the 'Ineffective'. The 'Courageous Achiever' has high values of locus of control, need for achievement, risk propensity and tolerance for ambiguity. He has the highest values of scanning frequency and scope of scanning. He tends to delegate and is the type of CEO who involves the highest number of people in the interpretation process. The 'Cautious Achiever' is similar to the 'Courageous Achiever' apart from his values of tolerance for ambiguity and risk propensity which are relatively low. The main difference between the early warning behavior of CEOs in the two clusters is the fact that the 'Cautious Achiever' has a lower value of diversity of internal models than

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938 See Weill and Olson (1989).
939 See Kukalis (1991).
940 See Fisher (1998).
941 See Rejc (2004).
942 See Gul (1984).
943 See Wally and Baum (1994).
944 See McGee, Shields and Birnberg (1978).
945 See Gupta (1984).
946 See Brandstätter (1997).
947 See Rauch and Frese (2000).
948 See Lang von Wins (2004).

the ‘Courageous Achiever’. The third type is the ‘Autocratic Controller’ who has high values of Machiavellianism and low values of trust in people. His early warning behavior is characterized by low use of personal sources, a low degree of delegation and of internal models; finally, by a high degree of tool support and fixity of time for interpretation. The last type is the ‘Ineffective’ with low values for all attitudes and low degree of early warning behavior. The success of early warning of the CEOs within each cluster will be described in the answer to the following research question.

3) *What is the relationship between the early warning behavior of CEOs of medium-sized companies and the success of early warning of medium-sized companies?*

First, the early warning behavior of managers with high success of early warning was compared to the behavior of managers with low success of early warning. The successful managers differ in their use of sources from those with low success. They use internal, impersonal and external, personal sources more than managers of organizations with low success of early warning. The managers with effective early warning behavior scan with a broader scope, delegate less, interpret with more different partners and more intensively. But no difference can be observed for their frequency of scanning, tool support and fixity of time for interpretation.

Second, the alignment of early warning behavior with perceived strategic uncertainty was analyzed in relationship to success. CEOs of organizations with success of early warning align scope of scanning, diversity of internal models and intensity of interpretation to the degree of perceived strategic uncertainty. However, they do not align their scanning frequency, their degree of delegation of scanning and of tool support and the fixity of time for interpretation to a higher extent to perceived strategic uncertainty than CEOs of organizations with unsuccessful early warning. Up till now only one study has tested the classical contingency theory in the context of scanning.[949] YASAI-ARDEKANI and NYSTROM treat scanning effectiveness as a moderating variable. In an analogous study they analyze whether managers with successful early warning behavior adapt their behavior more to perceived environmental uncertainty than managers with unsuccessful early warning behavior. Two of the here presented findings are reinforced by this study. YASAI-ARDEKANI and NYSTROM also found that effective managers adapt their scope of scanning more to perceived strategic

[949] See Yasai-Ardekani and Nystrom (1996).

uncertainty than managers with ineffective scanning behavior; and that there is no difference in the degree of delegation. The studies differ in regard to scanning frequency. In this study, it is observed that CEOs with effective scanning behavior do not adapt their scanning frequency more to perceived strategic uncertainty than managers with ineffective scanning behavior. YASAI-ARDEKANI and NYSTROM reach the opposite conclusion.[950] The findings of DAFT et al. go in the same direction. They do not take scanning effectiveness as a moderating variable but compare only the correlation coefficient between perceived environmental uncertainty and scanning frequency for organizations with successful and unsuccessful scanning.[951] It is their finding that this correlation coefficient is higher for successful organizations. To explain this deviance it can be assumed that scanning frequency is influenced more by managerial attitudes than by perceived strategic uncertainty. Therefore, this study has to assess critically the findings of BURNS and STALKER who were the first to treat the environment and its uncertainty as the most influential contingency variable.[952] They found that there exists an optimal organizational design which depends on the degree of environmental uncertainty. But this study shows that this is not true for all organizational design variables. In the context of scanning this is only true for its scope; in the context of interpretation only for diversity of internal models and intensity of interpretation.

Finally, the success of early warning of the four clusters was analyzed. The 'Courageous Achiever', the 'Cautious Achiever', the 'Autocratic Controller' all have similar success of early warning. Only the 'Ineffective' does not have an effective early warning behavior. These clusters are the result of an explorative method which cannot be compared to literature.

4) *What is the relationship between the success of early warning of medium-sized companies and their overall economic success?*

The economic success of an organization is highly influenced by success of early warning. 36% of the variance of economic success can be explained by the success of early warning.

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950 See Ibid., p. 198.
951 See Daft, Sormunen and Parks (1988), p. 133.
952 See Burns and Stalker (1961).

Taken the importance of early warning into consideration, it has to be discussed whether early warning can be considered as a resource in the sense of the resource based view. This theory defines "that resources and capabilities may be heterogeneously distributed across firms and [… that] these differences may be long lasting [… and explain] why some firms can consistently outperform others."[953] This work has shown in G 1.2.2 that the capability to efficiently do early warning is heterogeneously distributed across the organizations in the sample. But on the contrary, because this work examined the success of early warning and its behavior at one point in time it cannot be concluded that the capability of doing early warning successfully is long lasting. It is therefore not possible to classify this skill as a resource.[954]

This last reasoning is part of the general critique addressing research about success factors.[955] MARCH and SUTTON argue that the identification of success factors and the expansion of its knowledge make these success factors obsolete.[956] Again, success factors refer to a particular point in time and explain the behavior of successful organizations at this point. It is not shown that these success factors will last for a long period of time. But this does not imply that these factors do not explain the current success of the organizations for the basic population analyzed. Additionally, the research methodology about success factors is subject of criticism. These points are valid and the following part discusses possibilities to overcome these weaknesses. Finally, the critics state in this context that research about success factors does not reach similar results. Metaanalysis of these studies suppose the opposite.[957] Especially in the context of the contingency theory this is not valid as numerous studies reached similar results.[958]

Although the 'Courageous Achiever', the 'Cautious Achiever' and the 'Autocratic Controller' have similar success of early warning, the 'Courageous Achiever' has significantly more economic success than all other types. In addition, the 'Ineffective' has very low economic success.

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953 Barney (2001), p. 644 and see Barney (1991), p. 99ff.
954 See Dierickx and Cool (1989), p. 1504ff.
955 See March and Sutton (1997) and Starbuck (1993).
956 See March and Sutton (1997), p. 699. See also Nicolai and Kieser (2002), p. 585.
957 See Homburg and Krohmer (2004), p. 627.
958 See the studies about the optimal degree of formalization depending on environmental uncertainty. See Burns and Stalker (1961), Lawrence and Lorsch (1967), Bourgeois, McAllister and Mitchel (1978) and Argote (1982).

After this summary and discussion of the results of this work the findings are critically assessed and further research necessity is explained.

2 Critical Assessment and Further Research Possibilities

This work has tested the assumptions of the classical contingency theory and its extension in the context of early warning. The developed research model has methodological limitations. Further research can overcome these limitations and also apply the here used research model. These possibilities are presented first. Then, other applications of this research model are proposed.

The study concentrates on German medium-sized companies in the manufacturing industry. The five most important sectors, transport equipment, electrical equipment, machinery, food products and chemicals, are analyzed. The study's findings cannot be generalized for other sectors or industries. Further research should also analyze other industries or the service sector.

This study focuses on German CEOs. In a first step this limitation was necessary to let the influence of cultural influences aside. In a second step it will be interesting to analyze cultural differences. Do managers from other cultures differ in their scanning and interpretation behavior? It would be interesting to conduct a study comparing the influence of perceived strategic uncertainty and the personality of CEOs on early warning behavior in China and in the United States of America.

This analysis is based on perceptive measures. CEOs had to indicate their perception of environmental uncertainty, their personality, their early warning behavior and its success. In order to reduce this element of subjectivity certain variables could be obtained from employees or other members of the board. Additionally, intersubjective data such as the performance of the organization could be considered.

A further limitation of this study is that the participation of successful organizations is more likely than of those with no success of early warning or no economic success. The sample might therefore contain a higher number of organizations with success of early warning and economic success than the basic population. Therefore, the percentage of organizations that adapt their early warning behavior to perceived strategic uncertainty might be not representative for the basic population. Further

research should aim to figure out the distribution of successful and unsuccessful organizations in advance and analyze a sample accordingly.

In the context of the here conducted empirical study various measures had to be developed. Examples are scope of scanning, intensity of interpretation or success of early warning. These measures have to be valuated by further empirical research. This is necessary to enhance the quality of these measures and to show if these measures can be applied in a general context. Other measures applied in this study were developed by other researchers and tested before. The fit criteria showed that the overall fit was good, although single indicators had to be eliminated. This shows that these tested measures, too can be improved further still.

The partial least square method uses linear regressions to analyze the relationship between latent variables. This method analyzes only the relationships predicted by theory. Strictly speaking, it can only be stated that the analyzed relationships and the predictions coincide. Based on this, it can only be stated that the hypotheses cannot be rejected.[959] But it is also possible that the relationship between the analyzed latent variables is vice versa or mutual.[960] Additionally, linear regression assumes a linear relationship. Non-linear relationships or linear-relationships which are only valid for certain intervals cannot be analyzed by it. This can for example be analyzed using case studies.[961]

Case studies have also other advantages for further research. They allow an in-depth understanding of complex issues. Especially in the context of personality, case studies might lead to assertions, which are even more precise. It is therefore a reasonable supplement to the here presented research.

This study was conducted in summer 2005. Therefore the analysis was conduct at one particular point in time. However, studying the development over time is also very interesting. Early warning behavior does not directly lead to success of early warning. Its effects can be measured better after several years. It would therefore be interesting to analyze organizations with especially successful or unsuccessful early warning behavior over time.

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959 See Nachtigall, Kroehne, Funke and Steyer (2003), p. 5.
960 See Chong and Chong (1997), p. 274.
961 See Baines and Langfield-Smith (2003), p. 694.

Until now further research necessity was mainly deduced from methodological limitations. Additionally, there are two points of further research to be deduced from a conceptual view.

The here used research model concentrates on one of the classical contingency variables: environmental uncertainty. Others such as size were kept constant. It would be very interesting to analyze other contingency variables such as size[962] or technology[963] as well.

This study follows the extension of the contingency approach and believes that the CEO's personality influences organizational design, too. In this context LEWIN and STEPHENS developed a concept of attitudes to explain this influence. Psychological literature presents other ways to describe personality. One important fundamental work was the one by JUNG, who classified personalities into four dichotomies.[964] KIERSEY and BATES as well as BRIGGS and MYERS BRIGGS et al. developed this concept and made it possible to measure these dichotomies within their personality tests, i.e. KIERSEY TEMPERAMENT SORTER[965] and MYERS-BRIGGS TYPE INDICATOR[966]. The MYERS-BRIGGS TYPE INDICATOR is well accepted in practice and used by over three million people a year.[967] Such a general test could also be applied to early warning. The relationships between the analysed attitudes of BRIGGS and MYERS BRIGGS et al. and the design variables of early warning behavior is interesting and in a second step helps managers who learn about the result of the BRIGGS and MYERS BRIGGS et al. test to understand their tendency to design their early warning behavior.

After these critical annotations and further research possibilities, implications for the practice are presented.

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962 See Pugh, Hickson, Hinings and Turner (1969), Hickson, Pugh and Pheysey (1969), Blau (1970), Child and Mansfield (1972) and Child (1975).

963 See Hickson, Pugh and Pheysey (1969), Child and Mansfield (1972) and Woodward (1975).

964 See Jung (1921). For a detailed discussion see McKee (1991).

965 See Kiersey and Bates (1978).

966 See Myers Briggs, Kirby and Myers (1993).

967 See Gardner and Martinko (1996), p. 45. It was also subject of a lot of scientific research. See for example Carlyn (1977).

3 Implications for the Practice

The success of early warning is of essential importance for organizations. It is directly related to economic success. Therefore, organizations should try to increase their success of early warning and consider the information about early warning for strategic management. To elevate the success of early warning executives should consider the following three points.

Organizations should try to align their early warning behavior with perceived strategic uncertainty and should not ignore environmental uncertainty. They should adapt their scope of scanning, diversity of internal models and intensity of interpretation to the uncertainty of their environment. For this, executives need to know what scope of scanning, diversity of internal models and intensity of interpretation means in the context of early warning and how they can align it to perceived strategic uncertainty. Workshops to explain design variables of early warning behavior are a reasonable means to enhance this understanding.

Organizations should learn from organizations with high success of early warning. First, they should try to use external, personal as well as internal, impersonal sources more to get data about future trends. They should also try to scan with broader scope, delegate less, interpret with a high number of different partners and with high intensity. On the other hand, they should notice frequency of scanning, tool support and fixity of time for interpretation do not differ between organizations with high and low success of early warning. Therefore, resources should be saved and scanning frequency reconsidered. The implementation of tools for interpretation is not a prerequisite for success of early warning and it does not make sense to have "a large repertoire of structures and systems which discourage innovation while encourage tinkering."[968] Formalized systems such as the one proposed by THOMAS do not lead to more success.[969]

Scanning and interpretation depends on personality. The influence of the attitudes shown by CEOs was described. This study has shown that CEOs with high success of early warning scan with a broader scope, have higher values of diversity of internal models within the process of interpretation and of intensity of interpretation than CEOs with low success of early warning. Knowing what successful CEOs do better

[968] Van de Ven (1986), p. 596.
[969] See Thomas (1974), 29ff.

than unsuccessful CEOs in the context of early warning, a CEO can adapt his scanning and interpretation behavior according to his personality. For this, he has to know his personal attitudes. Helped by constructs applied in this work he can learn about the dimensions of his personality and the way he tends to scan and interpret. From there, he can adapt his early warning behavior.

Appendix

1 Measuring of Composite Constructs

Personal Sources

Information about the Indicators of the Construct „Personal Sources"		
Description of Indicators	*Weight*	*VIF*
1. Kunden (Internal, Personal Sources)	0.32	1.70
2. Technologien (Internal, Personal Sources)	0.34	1.86
3. Wettbewerber (Internal, Personal Sources)	0.36	1.74
4. Rohstoffe/Zulieferer (Internal, Personal Sources)	0.39	1.93
5. Politisch/rechtlicher Bereich (Internal, Personal Sources)	0.38	2.49
6. Wirtschaftliche Rahmenbedingungen (Internal, Personal Sources)	0.34	2.69
7. Soziokultureller Bereich (Internal, Personal Sources)	0.41	2.45
8. Kunden (External, Personal Sources)	0.65	2.09
9. Technologien (External, Personal Sources)	0.37	2.49
10. Wettbewerber (External, Personal Sources)	0,63	2.26
11. Rohstoffe/Zulieferer (External, Personal Sources)	0,63	2.46
12. Politisch/rechtlicher Bereich (External, Personal Sources)	0.49	2.52
13. Wirtschaftliche Rahmenbedingungen (External, Personal Sources)	0,21	3.01
14. Soziokultureller Bereich (External, Personal Sources)	0,39	2.68
VIF: Variance Inflation Factor		

Table 76: Information about the Construct 'Personal Sources'

Impersonal Sources

Information about the Indicators of the Construct „Impersonal Sources"		
Description of Indicators	*Weight*	*VIF*
1. Kunden (Internal, Impersonal Sources)	0.39	1.57
2. Technologien (Internal, Impersonal Sources)	0.22	1.68
3. Wettbewerber (Internal, Impersonal Sources)	0.11	1.64
4. Rohstoffe/Zulieferer (Internal, Impersonal Sources)	0.44	1.88
5. Politisch/rechtlicher Bereich (Internal, Impersonal Sources)	0.14	3.08
6. Wirtschaftliche Rahmenbedingungen (Internal, Impersonal Sources)	0.16	2.88
7. Soziokultureller Bereich (Internal, Impersonal Sources)	0.15	2.43
8. Kunden (External, Impersonal Sources)	0.52	1.58
9. Technologien (External, Impersonal Sources)	0.31	1.59
10. Wettbewerber (External, Impersonal Sources)	0.46	1.49
11. Rohstoffe/Zulieferer (External, Impersonal Sources)	0.19	1.94
12. Politisch/rechtlicher Bereich (External, Impersonal Sources)	0.39	3.45
13. Wirtschaftliche Rahmenbedingungen (External, Impersonal Sources)	0.37	3.35
14. Soziokultureller Bereich (External, Impersonal Sources)	0.22	2.61
VIF: Variance Inflation Factor		

Table 77: Information about the Construct 'Impersonal Sources'

Internal Sources

Information about the Indicators of the Construct „Internal Sources"		
Description of Indicators	*Weight*	*VIF*
1. Kunden (Internal, Personal Sources)	0.33	1.89
2. Technologien (Internal, Personal Sources)	0.35	1.75
3. Wettbewerber (Internal, Personal Sources)	0.41	2.19
4. Rohstoffe/Zulieferer (Internal, Personal Sources)	0.37	2.22
5. Politisch/rechtlicher Bereich (Internal, Personal Sources)	0.32	2.73
6. Wirtschaftliche Rahmenbedingungen (Internal, Personal Sources)	0.33	2.81
7. Soziokultureller Bereich (Internal, Personal Sources)	0.40	2.54
8. Kunden (Internal, Impersonal Sources)	0.40	1.77
9. Technologien (Internal, Impersonal Sources)	0.30	1.92
10. Wettbewerber (Internal, Impersonal Sources)	0.13	2.30
11. Rohstoffe/Zulieferer (Internal, Impersonal Sources)	0.49	2.56
12. Politisch/rechtlicher Bereich (Internal, Impersonal Sources)	0.19	3.66
13. Wirtschaftliche Rahmenbedingungen (Internal, Impersonal Sources)	0.22	3.62
14. Soziokultureller Bereich (Internal, Impersonal Sources)	0.16	2.95
VIF: Variance Inflation Factor		

Table 78: Information about the Construct 'Internal Sources'

External Sources

Information about the Indicators of the Construct „External Sources"		
Description of Indicators	*Weight*	*VIF*
1. Kunden (Exernal, Personal Sources)	0.62	1.98
2. Technologien (Exernal, Personal Sources)	0.38	2.09
3. Wettbewerber (Exernal, Personal Sources)	0.59	1.99
4. Rohstoffe/Zulieferer (Exernal, Personal Sources)	0.54	2.13
5. Politisch/rechtlicher Bereich (Exernal, Personal Sources)	0.48	2.45
6. Wirtschaftliche Rahmenbedingungen (Exernal, Personal Sources)	0.23	2.65
7. Soziokultureller Bereich (Exernal, Personal Sources)	0.34	2.42
8. Kunden (External, Impersonal Sources)	0.54	1.52
9. Technologien (External, Impersonal Sources)	0.33	1.63
10. Wettbewerber (External, Impersonal Sources)	0.59	1.56
11. Rohstoffe/Zulieferer (External, Impersonal Sources)	0.21	1.87
12. Politisch/rechtlicher Bereich (External, Impersonal Sources)	0.43	3.59
13. Wirtschaftliche Rahmenbedingungen (External, Impersonal Sources)	0.49	3.61
14. Soziokultureller Bereich (External, Impersonal Sources)	0.21	2.75
VIF: Variance Inflation Factor		

Table 79: Information about the Construct 'External Sources'

Scanning Frequency

Information about the Indicators of the Construct „Scanning Frequency"		
Description of Indicators	*Weight*	*VIF*
1. Kunden (Internal, Personal Sources)	0.32	2.07
2. Technologien (Internal, Personal Sources)	0.40	2.11
3. Wettbewerber (Internal, Personal Sources)	0.33	2.46
4. Rohstoffe/Zulieferer (Internal, Personal Sources)	0.37	2.57
5. Politisch/rechtlicher Bereich (Internal, Personal Sources)	0.39	3.14
6. Wirtschaftliche Rahmenbedingungen (Internal, Personal Sources)	0.31	3.31
7. Soziokultureller Bereich (Internal, Personal Sources)	0.32	3.08
8. Kunden (Internal, Impersonal Sources)	0.38	2.07
9. Technologien (Internal, Impersonal Sources)	0.19	2.11
10. Wettbewerber (Internal, Impersonal Sources)	0.44	2.46
11. Rohstoffe/Zulieferer (Internal, Impersonal Sources)	0.11	2.57
12. Politisch/rechtlicher Bereich (Internal, Impersonal Sources)	0.22	3.14
13. Wirtschaftliche Rahmenbedingungen (Internal, Impersonal Sources)	0.18	3.31
14. Soziokultureller Bereich (Internal, Impersonal Sources)	0.64	3.08
15. Kunden (Exernal, Personal Sources)	0.34	2.38
16. Technologien (Exernal, Personal Sources)	0.70	2.77
17. Wettbewerber (Exernal, Personal Sources)	0.49	2.46
18. Rohstoffe/Zulieferer (Exernal, Personal Sources)	0.53	3.00
19. Politisch/rechtlicher Bereich (Exernal, Personal Sources)	0.49	2.81
20. Wirtschaftliche Rahmenbedingungen (Exernal, Personal Sources)	0.19	3.71
21. Soziokultureller Bereich (Exernal, Personal Sources)	0.26	3.47
22. Kunden (External, Impersonal Sources)	0.51	1.64
23. Technologien (External, Impersonal Sources)	0.31	1.70

Information about the Indicators of the Construct „Scanning Frequency"		
Description of Indicators	*Weight*	*VIF*
24. Wettbewerber (External, Impersonal Sources)	0.43	1.61
25. Rohstoffe/Zulieferer (External, Impersonal Sources)	0.30	2.18
26. Politisch/rechtlicher Bereich (External, Impersonal Sources)	0.49	4.11
27. Wirtschaftliche Rahmenbedingungen (External, Impersonal Sources)	0.51	3.87
28. Soziokultureller Bereich (External, Impersonal Sources)	0.32	3.05
VIF: Variance Inflation Factor		

Table 80: Information about the Construct 'Scanning Frequency'

2 Explanatory Contribution of Attitudes for Design Variables of Early Warning Behavior

	Personal Sources	Impersonal Sources	Internal Sources	External Sources
Locus of Control	0.019	0.071	0.017	0.045
Tolerance for Ambiguity	0.047	0.062	0.023	0.013
Need for Achievement	0.028	0.012	0.019	0.016
Risk Propensity	0.036	0.022	0.019	0.027
Egalitarianism	0.001	0.001	0.002	0.006
Moral Reasoning	0.012	0.003	0.004	0.001
Machiavellianism	0.012	0.013	0.008	0.006
Trust in People	0.039	0.009	0.008	0.029

Table 81: Numeric, Explanatory Contribution of Attitudes for Scanning Sources

	Frequency	Scope	Delegation	Diversity Internal Models	Intensity	Tool-Support	Fixity of Time for Interpretation
Locus of Control	0.059	0.025	0.000	0.011	0.037	0.004	0.013
Tolerance for Ambiguity	0.044	0.014	0.001	0.094	0.027	0.002	0.000
Need for Achievement	0.019	0.026	0.009	0.013	0.061	0.001	0.011
Risk Propensity	0.036	0.107	0.009	0.003	0.213	0.000	0.000
Egalitarianism	0.000	0.011	0.006	0.004	0.002	0.000	0.001
Moral Reasoning	0.007	0.007	0.004	0.003	0.001	0.003	0.001
Machiavellianism	0.012	0.014	0.082	0.002	0.000	0.048	0.249
Trust in People	0.009	0.000	0.097	0.089	0.000	0.002	0.000

Table 82: Numeric, Explanatory Contribution of Attitudes for Design Variables of Early Warning Behavior not Regarding Scanning Sources

3 Explanatory Contribution of all Contingency Variables for Design Variables of Early Warning Behavior

	Personal Sources	Impersonal Sources	Internal Sources	External Sources
PSU	0.081	0.120	0.134	0.088
Locus of Control	0.024	0.041	0.027	0.063
Tolerance for Ambiguity	0.032	0.073	0.017	0.002
Need for Achievement	0.017	0.005	0.024	0.012
Risk Propensity	0.029	0.036	0.002	0.012
Egalitarianism	0.003	0.002	0.001	0.003
Moral Reasoning	0.006	0.002	0.004	0.001
Machiavellianism	0.008	0.010	0.013	0.005
Trust in People	0.014	0.006	0.009	0.039
PSU: Perceived Strategic Uncertainty				

Table 83: Numeric, Explanatory Contribution of all Contingency Variables for Scanning Sources

	Frequency	Scope	Delegation	Diversity Internal Models	Intensity	Tool-Support	Fixity of Time for Interpretation
PSU	0.123	0.096	0.005	0.021	0.083	0.002	0.001
Locus of Control	0.054	0.029	0.001	0.011	0.019	0.009	0.012
Tolerance for Ambiguity	0.031	0.012	0.003	0.081	0.032	0.007	0.001
Need for Achievement	0.022	0.015	0.009	0.011	0.095	0.002	0.009
Risk Propensity	0.033	0.103	0.012	0.004	0.094	0.000	0.000
Egalitarianism	0.001	0.008	0.005	0.003	0.002	0.000	0.001
Moral Reasoning	0.004	0.007	0.002	0.001	0.001	0.002	0.003
Machiavellianism	0.009	0.011	0.029	0.001	0.000	0.035	0.057
Trust in People	0.006	0.000	0.089	0.082	0.000	0.001	0.000
PSU: Perceived Strategic Uncertainty							

Table 84: Numeric, Explanatory Contribution of all Contingency Variables for Design Variables of Early Warning Behavior not Regarding Scanning Sources

4 Questionnaire

Erfolgreiche Früherkennung im Mittelstand

Eine empirische Untersuchung über die Erfolgsfaktoren von Früherkennung durch Geschäftsführer und Vorstände in mittelständischen Unternehmen

European Business School

Lehrstuhl für Controlling
Univ.-Prof. Dr. Utz Schäffer
Schloß Reichartshausen

65375 Oestrich-Winkel

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Wir bitten um 20 Minuten Ihrer Zeit. Dafür bieten wir Ihnen

- eine individuelle Auswertung der Untersuchungsergebnisse als **unternehmensspezifischen Benchmarking-Bericht**. Er vergleicht die Früherkennung Ihres Unternehmens mit der Früherkennung anderer mittelständischer Unternehmen.
- die **kostenlose Teilnahme am Workshop „Erfolgreiche Früherkennung im Mittelstand“** mit Vorträgen von Prof. Dr. Utz Schäffer, anderen Wissenschaftlern und Praktikern. Die Untersuchungsergebnisse, neue Resultate der Früherkennungsforschung sowie Best Practices der Früherkennung in der Unternehmenspraxis werden vorgestellt. Zudem besteht die Möglichkeit zum **Erfahrungsaustausch** mit anderen Geschäftsführern und Vorständen aus dem Mittelstand.
- die Teilnahme an einer Verlosung von **20 mal 3 Flaschen Riesling Kabinett des Rheingauer Weingutes Robert Weil**, ausgezeichnet von Robert Parker's The Wine Advocate mit der höchsten Gesamtbewertung.

Bitte beachten Sie bei der Beantwortung der Fragen folgende Hinweise:

- Unserem Verstandnis nach umfasst **Früherkennung** die Beschaffung und Interpretation von Informationen uber zukünftige Chancen und Risiken für Unternehmen. Sie erfolgt in einem so frühen Stadium, dass noch ausreichend Zeit für die Durchführung geeigneter Strategien und Maßnahmen verbleibt.
- Dieser Fragebogen dient rein wissenschaftlichen Zwecken. Wir sichern ausdrücklich zu, dass alle Angaben **streng vertraulich** behandelt werden.
- Im Verlauf des Fragebogens werden verschiedene Sachverhalte durch **ähnliche Fragestellungen** erfasst. Wir bitten Sie hierfür um Verständnis, da dies aus statistischen Gründen erforderlich ist.
- Die **Vollständigkeit Ihrer Antworten** ist für uns von **großer Bedeutung**. Bitte beantworten Sie alle Fragen, auch wenn Sie bei einigen Fragen nur annährend eine Antwort geben können.
- Bitte füllen Sie den Fragebogen bis zum **10.06.2005** aus.

Vielen Dank für Ihre Zeit und Mitarbeit!

Rückfragen beantwortet Ihnen gerne

Dipl.-Kfm. **Andreas Kirschkamp** unter **0163/749-1053 (Andreas.Kirschkamp@ebs.de)**

Angaben zu Ihrer Unternehmensumwelt

Wir möchten Sie zunächst um einige Angaben zum Umfeld Ihres Unternehmens bitten. Falls Sie in mehreren Märkten oder Branchen tätig sind, beziehen Sie sich bitte nur auf den Markt oder die Branche, den/die Sie als Kern Ihres Geschäfts ansehen.

Wie dynamisch sind Ihres Erachtens folgende Bereiche der Unternehmensumwelt für Ihr Unternehmen? Unter dynamisch verstehen wir die Häufigkeit und Änderungsgeschwindigkeit von Trends und Entwicklungen im jeweiligen Bereich.	geringe Dynamik ○ ○ ○ ○ ○ ○ ○ hohe Dynamik
1. Kunden (Individuen oder Firmen, die Ihre Produkte kaufen, Kundentrends, Nachfrage nach Ihren Produkten, typischer Kunde bezüglich Einkommen und Alter)	
2. Technologien (Allgemeine Technologien, Produktionstechnologien)	
3. Wettbewerber (Wettbewerb innerhalb Ihrer Industrie, beispielsweise Preiswettkampf, Eintritt und Austritt von Wettbewerbern)	
4. Rohstoffe/Zulieferer	
5. Politisch/rechtlicher Bereich (Politische Bedingungen auf Bundes-, Landes- und kommunaler Ebene, Gesetzgebung, z.B. Steuergesetzgebung, Umweltauflagen)	
6. Wirtschaftliche Rahmenbedingungen (Allgemeine wirtschaftliche Bedingungen, z.B. Inflation, Zinsniveau, Wechselkurs, Bundes-, Landes- und Kommunalausgaben, wirtschaftliche Produktivität, Wirtschaftswachstum)	
7. Soziokultureller Bereich (Gesellschaftliche Werte, Normen und Einstellungen, Moralvorstellungen, Geschmack bezüglich Lifestyle)	
Wie komplex sind Ihres Erachtens folgende Bereiche der Unternehmensumwelt für Ihr Unternehmen? Unter komplex verstehen wir die Anzahl und Unterschiedlichkeit von Ereignissen im jeweiligen Bereich.	wenig komplex ○ ○ ○ ○ ○ ○ ○ sehr komplex
1. Kunden	
2. Technologien	
3. Wettbewerber	
4. Rohstoffe/Zulieferer	
5. Politisch/rechtlicher Bereich	
6. Wirtschaftliche Rahmenbedingungen	
7. Soziokultureller Bereich	
Wie stark ist Ihres Erachtens die wirtschaftliche Situation Ihres Unternehmens von Ereignissen im jeweiligen Bereich abhängig?	wenig abhängig ○ ○ ○ ○ ○ ○ ○ sehr abhängig
1. Kunden	
2. Technologien	
3. Wettbewerber	
4. Rohstoffe/Zulieferer	
5. Politisch/rechtlicher Bereich	
6. Wirtschaftliche Rahmenbedingungen	
7. Soziokultureller Bereich	

Früherkennungsverhalten - Informationsbeschaffung

Es geht nun darum, wie Sie in Ihrem Unternehmen Früherkennung betreiben. Unserem Verständnis nach umfasst Früherkennung die Beschaffung und Interpretation von Informationen über zukünftige Chancen und Risiken für Unternehmen. Sie erfolgt in einem so frühen Stadium, dass noch ausreichend Zeit für die Durchführung geeigneter Strategien und Maßnahmen verbleibt.

Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen von Mitarbeitern, z.B. von Abteilungsleitern, Forschern, Mitarbeitern aus dem Vertrieb und dem Marketing bezüglich folgender Bereiche?	nie	jährlich	halb-jährlich	viertel-jährlich	monat-lich	wöchent-lich	täglich
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen aus unternehmensinternen Berichten oder aus Ihrem (Management-)Informationssystem bezüglich folgender Bereiche?	nie	jährlich	halb-jährlich	viertel-jährlich	monat-lich	wöchent-lich	täglich
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen von Geschäftsfreunden, Kunden, Zulieferern, externen Beratern, Politikern bezüglich folgender Bereiche?	nie	jährlich	halb-jährlich	viertel-jährlich	monat-lich	wöchent-lich	täglich
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○
Wie häufig erhalten und sammeln Sie für die Früherkennung relevante Informationen aus Fachzeitschriften, Zeitungen, externen Datenbanken und dem Internet bezüglich folgender Bereiche?	nie	jährlich	halb-jährlich	viertel-jährlich	monat-lich	wöchent-lich	täglich
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○

Wie nützlich sind Ihres Erachtens folgende Informationen für die Früherkennung?	überhaupt nützlich						sehr nützlich
1. Informationen, die sich auf mögliche zukünftige Ereignisse beziehen (Falls historische Daten für Ihre Zwecke am besten geeignet sind, kreuzen Sie bitte die Skala am linken Ende an)	○	○	○	○	○	○	○
2. Wahrscheinlichkeitsschätzungen des Auftretens zukünftiger Ereignissen	○	○	○	○	○	○	○
3. Einstellungen von Arbeitnehmern, Beziehungen zwischen Arbeitnehmern und Arbeitgebern, Haltungen von Regierung und Verbraucherschutzgemeinschaften	○	○	○	○	○	○	○
4. Informationen bezüglich allgemeiner Faktoren außerhalb Ihres Unternehmens wie wirtschaftliche Rahmenbedingungen, Bevölkerungswachstum, technologische Entwicklungen, …	○	○	○	○	○	○	○
5. Produktionsinformationen wie Ausstoßrate, Ausschussrate, Maschineneffizienz, Krankheitsstand, …	○	○	○	○	○	○	○
6. Marktinformationen wie Marktgröße, Wachstumsrate, …	○	○	○	○	○	○	○
Wie nützlich sind Ihres Erachtens folgende Informationen für die Früherkennung?	überhaupt nützlich						sehr nützlich
1. Informationen über das Verhalten potenzieller Kunden	○	○	○	○	○	○	○
2. Informationen über allgemeine technologische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	○	○	○	○	○	○	○
3. Informationen über potenzielle Wettbewerber	○	○	○	○	○	○	○
4. Informationen über potenzielle Zulieferer	○	○	○	○	○	○	○
5. Informationen über allgemeine politische und gesetzgeberische Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	○	○	○	○	○	○	○
6. Informationen über allgemeine wirtschaftliche Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	○	○	○	○	○	○	○
7. Informationen über allgemeine soziokulturelle Entwicklungen, die Ihr Unternehmen nicht direkt betreffen	○	○	○	○	○	○	○
Welche Bereiche der Informationsbeschaffung erledigen Sie persönlich; welche haben sie delegiert?	vollständig persönlich						vollständig delegiert
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○

Früherkennungsverhalten - Interpretation

Inwieweit stimmen sie folgenden Aussagen zu? **Bei der Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen diskutiere ich mit …**	stimme gar nicht zu						stimme voll zu
1. Mitarbeitern	○	○	○	○	○	○	○
2. Kunden	○	○	○	○	○	○	○
3. Zulieferern	○	○	○	○	○	○	○
4. Geschäftsführern oder Vorständen	○	○	○	○	○	○	○
5. Unternehmensberatern	○	○	○	○	○	○	○
6. Anwälten/Steuerberatern	○	○	○	○	○	○	○
7. Freunden und Familienangehörigen	○	○	○	○	○	○	○
8. Anderen Personen	○	○	○	○	○	○	○
Inwieweit stimmen Sie folgender Aussage zu?	stimme gar nicht zu						stimme voll zu
Insgesamt gesehen diskutiere ich im Rahmen der Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen mit Personen, die unterschiedliche Denkweisen haben.	○	○	○	○	○	○	○

Inwieweit stimmen sie folgender Aussage zu? **Die Interpretation von Informationen über mögliche Chancen und Risiken wird in meinem Unternehmen …**	stimme gar nicht zu						stimme voll zu
… von Instrumenten wie der Szenarioanalyse unterstützt.	○	○	○	○	○	○	○
Wie konkret werden die Auswirkungen von möglichen Chancen und Risiken auf folgende Unternehmensbereiche abgeschätzt?	nicht konkret						sehr konkret
1. Einkauf	○	○	○	○	○	○	○
2. Forschung- und Entwicklung	○	○	○	○	○	○	○
3. Produktion	○	○	○	○	○	○	○
4. Marketing/Vertrieb	○	○	○	○	○	○	○
5. Verwaltung	○	○	○	○	○	○	○
Inwieweit stimmen sie folgenden Aussagen zu?	stimme gar nicht zu						stimme voll zu
1. Ich interpretiere Informationen über mögliche Chancen und Risiken mit hoher Intensität.	○	○	○	○	○	○	○
2. Die Interpretation von Informationen über mögliche Chancen und Risiken für mein Unternehmen erachte ich als sehr wichtig.	○	○	○	○	○	○	○
Inwieweit stimmen Sie folgender Aussage zu?	stimme gar nicht zu						stimme voll zu
Informationen über mögliche Chancen und Risiken für mein Unternehmen interpretiere ich außerhalb meines normalen Tagesgeschäftes.	○	○	○	○	○	○	○

Welcher Aussage stimmen Sie zu?	nie	jährlich	halb-jährlich	viertel-jährlich	monat-lich	wöchent-lich	täglich
Informationen über mögliche Chancen und Risiken für mein Unternehmen interpretiere ich …	○	○	○	○	○	○	○

Erfolg und Effizienz der Früherkennung

Inwieweit treffen die folgenden Aussagen auf Ihr Unternehmen zu? **Rechtzeitig erkennt Ihr Unternehmen relevante Chancen und Risiken in folgenden Bereichen**	trifft nicht zu						trifft voll zu
1. Kunden	○	○	○	○	○	○	○
2. Technologien	○	○	○	○	○	○	○
3. Wettbewerber	○	○	○	○	○	○	○
4. Rohstoffe/Zulieferer	○	○	○	○	○	○	○
5. Politisch/rechtlicher Bereich	○	○	○	○	○	○	○
6. Wirtschaftliche Rahmenbedingungen	○	○	○	○	○	○	○
7. Soziokultureller Bereich	○	○	○	○	○	○	○
Inwieweit trifft die folgende Aussage auf Ihr Unternehmen zu?	trifft nicht zu						trifft voll zu
Insgesamt gesehen erkennt Ihr Unternehmen relevante Chancen und Risiken rechtzeitig.	○	○	○	○	○	○	○
Im Zusammenhang mit der Früherkennung sehe ich einen großen Verbesserungsbedarf im Rahmen der …	geringer Bedarf						großer Bedarf
1. Informationsbeschaffung	○	○	○	○	○	○	○
2. Interpretation der Informationen	○	○	○	○	○	○	○
3. Reaktion auf erkannte Chancen und Risiken	○	○	○	○	○	○	○

Inwieweit treffen die folgenden Aussagen auf Ihr Unternehmen zu?	trifft nicht zu						trifft voll zu
1. Doppelarbeit wird in meinem Unternehmen im Rahmen der Früherkennung vermieden.	○	○	○	○	○	○	○
2. Im Rahmen der Früherkennung werden diejenigen eingesetzt, die die Aufgaben am besten lösen können	○	○	○	○	○	○	○
3. Ressourcen werden in meinem Unternehmen im Früherkennungsprozess gut eingesetzt.	○	○	○	○	○	○	○
4. Die Früherkennung meines Unternehmens ist nicht aufwendig.	○	○	○	○	○	○	○
5. Früherkennung ist in meinem Unternehmen kosteneffizient.	○	○	○	○	○	○	○
Inwieweit trifft die folgende Aussage auf Ihr Unternehmen zu?	trifft nicht zu						trifft voll zu
Insgesamt gesehen verursacht die Früherkennung einen angemessenen Aufwand.	○	○	○	○	○	○	○

Ihre Arbeitsweise

Die folgenden Fragen beziehen sich auf Ihre Arbeitsweise. Es gibt keine „richtigen" oder „falschen" Antworten. Bitte überlegen Sie nicht zu lange bei den Antworten. Ihre erste Reaktion ist wichtig.

Inwieweit stimmen Sie folgenden Aussagen zu?	stimme gar nicht zu						stimme voll zu
1. Ich halte es für wichtig, mehr zu leisten als andere.	○	○	○	○	○	○	○
2. Mir scheint es erstrebenswert, in der Gesellschaft weiter zu kommen.	○	○	○	○	○	○	○
3. Ich stelle große Anforderungen an meine Arbeit.	○	○	○	○	○	○	○
4. Andere finden, dass ich hart arbeite.	○	○	○	○	○	○	○
5. Meistens habe ich viel zu tun.	○	○	○	○	○	○	○
6. Nachdem ich eine schwierige Arbeit begonnen habe, fällt es mir schwer, diese zu unterbrechen.	○	○	○	○	○	○	○
7. Wenn ich ein selbst gestecktes Ziel nicht erreicht habe, setze ich alles daran, es doch noch zu schaffen.	○	○	○	○	○	○	○
8. Durchhaltevermögen ist eine wichtige Eigenschaft.	○	○	○	○	○	○	○
1. Ich übernehme gerne Verantwortung.	○	○	○	○	○	○	○
2. Es hat sich für mich als gut erwiesen, selbst Entscheidungen zu treffen, anstatt mich auf das Schicksal zu verlassen.	○	○	○	○	○	○	○
3. Bei Problemen und Widerständen finde ich in der Regel Mittel und Wege, um mich durchzusetzen.	○	○	○	○	○	○	○
4. Erfolg ist oft mehr von Leistung, als von Glück abhängig.	○	○	○	○	○	○	○
5. Ich habe häufig das Gefühl, dass ich viel Einfluss darauf habe, was mit mir geschieht.	○	○	○	○	○	○	○
6. Bei wichtigen Entscheidungen orientiere ich mich selten am Verhalten anderer.	○	○	○	○	○	○	○
1. Ich mag es, wenn Überraschungen auftreten.	○	○	○	○	○	○	○
2. Ich beschäftige mich gerne mit scheinbar unlösbaren Aufgaben.	○	○	○	○	○	○	○
3. Ich probiere gerne Dinge aus, auch wenn nicht immer etwas dabei herauskommt.	○	○	○	○	○	○	○
4. Ich lasse die Dinge gerne auf mich zukommen.	○	○	○	○	○	○	○
5. Ich habe es nicht gerne, wenn die Arbeit gleichmäßig verläuft.	○	○	○	○	○	○	○
6. Ich warte geradezu darauf, dass etwas Aufregendes passiert.	○	○	○	○	○	○	○
7. Wenn um mich herum alles drunter und drüber geht, fühle ich mich so richtig wohl.	○	○	○	○	○	○	○
8. Ich muss nicht wissen, was auf mich zukommt.	○	○	○	○	○	○	○
1. Manchmal riskiere ich etwas, nur um Spaß zu haben.	○	○	○	○	○	○	○
2. Hin und wieder setzte ich mich Risiken aus, um mich herauszufordern.	○	○	○	○	○	○	○
3. Ich finde es manchmal aufregend, Sachen zu machen, für die ich Schwierigkeiten bekommen könnte.	○	○	○	○	○	○	○
4. Aufregung und Abenteuer sind für mich wichtiger als Sicherheit.	○	○	○	○	○	○	○

Unternehmereinstellungen

In diesem Teil geht es um einige persönliche Einstellungen, die in der Geschäftswelt verbreitet sind. Es gibt keine „richtigen" oder „falschen" Antworten. Bitte überlegen Sie nicht zu lange bei den Antworten. Ihre erste Reaktion ist wichtig.

Inwieweit stimmen Sie folgenden Aussagen zu?	stimme gar nicht zu						stimme voll zu
1. Man kann nicht vorsichtig genug sein im Umgang mit anderen Menschen.	○	○	○	○	○	○	○
2. Die meisten Leute streben eher nach ihrem eigenen Vorteil.	○	○	○	○	○	○	○
3. Wenn man nicht Acht gibt, werden andere Leute einen ausnutzen.	○	○	○	○	○	○	○
4. Niemand kümmert sich um einen, wenn es einem schlecht geht.	○	○	○	○	○	○	○
5. Menschen sind grundsätzlich unkooperativ.	○	○	○	○	○	○	○
1. Man sollte nur dann den wahren Grund seiner Handlungen sagen, wenn es einem nutzt.	○	○	○	○	○	○	○
2. Am sichersten fährt man mit der Annahme, dass alle Menschen auch einen bösartigen Zug haben.	○	○	○	○	○	○	○
3. Mit Aufrichtigkeit kommt man nicht immer weiter.	○	○	○	○	○	○	○
4. Bedeutend und unredlich zu sein, ist alles in allem besser als unbedeutend und ehrlich zu sein.	○	○	○	○	○	○	○
5. Man soll seine Bekanntschaften auch unter dem Gesichtspunkt auswählen, ob sie einem nützen können.	○	○	○	○	○	○	○
6. Meistens ist es günstiger, seine wahren Absichten für sich zu behalten.	○	○	○	○	○	○	○
7. Wenn man jemanden um etwas bittet, kann man falsche Gründe vorschieben, von denen man sich Erfolg verspricht.	○	○	○	○	○	○	○
8. Ein weit gestecktes Ziel kann man nur erreichen, wenn man sich auch etwas außerhalb des Erlaubten bewegt.	○	○	○	○	○	○	○
1. Es ist gerecht, dass nicht alle Menschen gleich viel verdienen und ein gleich hohes Vermögen besitzen.	○	○	○	○	○	○	○
2. Bei Chancengleichheit ist es gerecht, dass einige Menschen bei höherer Leistung mehr Einkommen erzielen.	○	○	○	○	○	○	○
3. Es ist gerecht, dass man das, was man sich durch Arbeit verdient hat, behält, auch wenn das heißt, dass einige Menschen vermögender sind als andere.	○	○	○	○	○	○	○
4. Es ist gerecht, dass Menschen, die viel leisten, mehr verdienen als andere.	○	○	○	○	○	○	○
5. Es ist gerecht, dass Eltern ihr Vermögen an ihre Kinder weitergeben.	○	○	○	○	○	○	○
6. Einige Menschen sind begabter und intelligenter als andere. Es ist gerecht, dass es dadurch für sie einfacher ist, ein höheres Einkommen zu erzielen.	○	○	○	○	○	○	○
Wie wichtig sind folgende Sachverhalte für Sie?	überhaupt nicht wichtig						sehr wichtig
1. Versprechen gegenüber einem Freund halten	○	○	○	○	○	○	○
2. Versprechen gegenüber jemandem einhalten, den man kaum kennt	○	○	○	○	○	○	○
3. Die Wahrheit sagen	○	○	○	○	○	○	○
4. Einem Fremden das Leben retten	○	○	○	○	○	○	○
5. Einem Freund das Leben retten	○	○	○	○	○	○	○
6. Dinge, die anderen gehören, nicht wegnehmen	○	○	○	○	○	○	○
7. Sich an Gesetze halten	○	○	○	○	○	○	○
8. Bestrafung bei Gesetzesbruch	○	○	○	○	○	○	○

Einige persönliche Angaben

Inwieweit stimmen Sie folgender Aussage zu?				stimme gar nicht zu ○ ○ ○ ○ ○ ○ ○ stimme voll zu
Ich kenne die Branche meines Unternehmens sehr gut.				
Wie viele Jahre arbeiten Sie schon in dieser Branche?				
○ bis 1	○ 1 - 5	○ 5 - 10	○ über 10	
Wie viele Jahre arbeiten Sie schon als Führungskraft (Geschäftsführer oder vergleichbar)?				
○ bis 1	○ 1 - 5	○ 5 - 10	○ über 10	
Welches ist Ihr höchster Bildungsabschluss?				
○ Hauptschule	○ Realschule	○ Abitur	○ BA-Studium	○ FH-Studium
○ Universität	○ Promotion	○ _____		

Ergänzende Angaben zu Ihrem Unternehmen

Abschließend möchten wir Sie noch um einige Angaben zu Ihrem Unternehmen bitten. Beziehen Sie Ihre Angaben bitte auf das **letzte Geschäftsjahr**.

Wie hoch war der Umsatz Ihres Unternehmens im letzten Geschäftsjahr ungefähr (in Mio. EUR)?			
○ bis 5	○ 5 – 10	○ 10 – 25	○ 25 – 50
○ 50 – 100	○ 100 – 200	○ 200 – 500	○ über 500

Wie viele Mitarbeiter sind in Ihrem Unternehmen beschäftigt?					
○ bis 100	○ 100 – 200	○ 200 – 300	○ 300 – 400	○ 400-500	○ über 500

Wie schätzen Sie den Erfolg Ihres Unternehmens im Wettbewerbsvergleich bezüglich folgender Aspekte ein?	erheblich schlechter ○ ○ ○ ○ ○ ○ ○ erheblich besser
1. Erzielung von Kundenzufriedenheit	
2. Schaffung von Kundennutzen	
3. Umsatzsteigerung	
4. Steigerung des Marktanteils	
5. Erfolgreiche Neuprodukteinführung	
6. Halten bestehender Kunden	
7. Gewinnung neuer Kunden	
8. Produktivität der Leistungserstellung	
9. Motivation und Bindung der Mitarbeiter	
10. Anpassung der Produkte/Dienstleistungen an neue Kundenbedürfnisse	
11. Schnelle Reaktion auf neue Entwicklungen am Markt	
12. Schnelle Nutzung neuer Marktchancen	
13. Anpassungsfähigkeit/Flexibilität des Unternehmens	
14. Effizienz der internen Prozesse	
15. Steigerung des Unternehmenswertes	
16. Umsatzrendite (Betriebsergebnis vor Steuern/Umsatz)	

	sehr unzufrieden ○ ○ ○ ○ ○ ○ ○
Wie zufrieden waren Sie mit dem finanziellen Ergebnis Ihres Unternehmens in den letzten drei Geschäftsjahren?	

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