



*Original Contribution*

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## OUTLINES OF AN IDIOGRAPHIC APPROACH TO AN EARLY WARNING SYSTEM IN ENTREPRENEURIAL CRISIS

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### ABSTRACT

Traditional methods for predicting an entrepreneurial crisis (e.g. Neuronal Nets) are usually based upon evaluating an enterprise's quantitative data - mainly derived from balance sheets. These methods disregard, however, the effects of psychological influences on the behaviour of the entrepreneur and the stakeholders. Thus they lack important parameters. This contribution will present an approach based upon economic and psychological data for analysing the perceived exposure of an enterprise to a crisis.

**Key words:** Entrepreneurial crisis, perceived efficiency, attitude, Data-Envelopment-Analysis

### INTRODUCTION

Economic models often are based upon the assumption of people's rational behaviour. It is a fact, however, that entrepreneurs – at least in Germany – often are responsible for entrepreneurial crisis for the following reason: approximately 90 % of the crises in enterprises had been caused endogenously (BUCHMANN 1996, p. 110). Reasons might be that impulsive actions and habitual behaviour dominate, while decisions based upon rational choice are conducted only occasionally (WISWEDE 2000, p.24). Humans, in taking decisions based on emotion, often commit thinking errors and sometimes act according to habits, automatisms, rituals and social standards that fall out of reason (WISWEDE 2000, p. 36). If they are in a high mood they hardly deal with arguments or a problem. If they are in a bad mood, they are more accessible for arguments (HOCH 2000, p. 87). Other psychological influences, like 'overconfidence' (CLASEN 1992, p. 9 and EISENFÜHR/WEBER 1999, p. 370) on one hand or 'learned helplessness' (FOERSTERLING 2001, p. 123) on the other may affect behaviour.

But it is not only the entrepreneurs that may act with bounded rationality. It can be

observed also in bank practice (KREITMAIR 2001, S. 72) where banks tend to intervene in a process of an entrepreneurial crisis comparatively late, though signs of it could have been recognised much earlier.

Because of all these influences – and much more than what had not been mentioned above – no criteria have yet been found that may undoubtedly identify an enterprise entering into the phase of a crisis. Economic indicators (hard facts, usually derived from balance sheets) on their own cannot be used as such criteria because they disregard cognitive, emotional and motivational processes that cause behaviour (CRANACH 2000, p. 152; BODMER 2005).

Besides psychological (soft facts), the current methods for predicting crisis in an enterprise, however, lack information about certain hard facts, like the amount of securities not yet used, being an indicator for the perceived (potential) liquidity.

These few examples should show that, besides economic hard facts, there are additional aspects (soft facts or psychological influences) to be considered if the threats of an entrepreneurial crisis should be discovered at an early stage of the process.

Therefore an approach (with a focus on the methodology – not the empirical survey) will be presented that takes into account both

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hard and soft facts for analysing the exposition of an enterprise to an entrepreneurial crisis. It is an idiographic approach. The analysis for practical purposes will have to take place on the single enterprise level, organized as a panel. Central elements of this approach are the recognition of perceived exposition to an entrepreneurial crisis by the “involved ones” (esp. the entrepreneur and also the family members, banks and other stakeholders), the evaluation of differences in the perception and the attributions to explain the reasons of an enterprise’s perceived exposition to a crisis (for the relevance of different views of “involved ones” compare HEDELIN 2000, p 163 ff.).

**OBJECTIVES AND METHODS**

A list of the various objectives of the research project will be given below in order to show the different aspects that have to be dealt with, if economical and psychological influences for the development of an entrepreneurial crisis are to be evaluated by an ‘integrated approach’. Objectives of the research are:

1. Analysis of the current scope of attributes used for predicting an enterprise’s crisis, because certain parameters seem to be missing.
2. Development of enhancements (based upon literature review and a qualitative oriented survey) concerning this scope of attributes.
3. Analysis of limits of the current approaches (based upon real world

- analysis like Discriminant Analysis or based upon model world analysis like System Dynamics) dealing with the prediction of an entrepreneurial crisis.
4. Analysis of various economic (e.g. new institutional theory) and psychological theories (e.g. theory of cognitive control) and methods (e.g. Data Envelopment Analysis – DEA) in order to detect analogies of the context of an entrepreneurial crisis to get information about the possibilities to adopt these methods to the situation of an enterprise’s crisis.
5. Development of a theory of the ‘perceived exposition to a crisis’.
6. Development of an integrated methodology, based upon hard and soft facts (esp. perceived exposition to a crisis and attribution), for predicting an entrepreneurial crisis at an early stage.

The development of the proposed methodology primarily is based upon literature review, the development of small models and sample calculations to:

1. show the process of the proposed procedure to analyse an enterprise’s perceived exposition to a crisis and
2. demonstrate the results of applying the proposed methodology and
3. gain knowledge about needs for further developments concerning the methodology; an example for conducting an entrepreneurial analysis has been conducted.

**Table 1:** Procedure to determine the perceived exposition to an entrepreneurial crisis

| Step 1                                                                                                                                                                                                               | Step 2                   |                                                                 | Step 3                                                                                                                                                    | Step 4                                                                                                                                      | Step 5                                                                                    |                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Definition of the relevant input and output attributes by the “involved ones” (entrepreneur, family, bank etc.) (s=1..S) that may indicate in their opinion an enterprise’s crisis [s=1 indicates the entrepreneur]. | The entrepreneur defines | $X_{1,t}^{target}$<br>$X_{1,t}^{current}$<br>$X_{1,t}^{basics}$ | The “involved ones” (s=1..S) evaluate the input matrices giving the perceived exposition of the enterprise to a crisis concerning the various attributes. | $Y_{1,t}^{target}, \dots, Y_{S,t}^{target}$<br>$Y_{1,t}^{current}, \dots, Y_{S,t}^{current}$<br>$Y_{1,t}^{basics}, \dots, Y_{S,t}^{basics}$ | Determination of the perceived relative efficiency (exposition) to a crisis for every DMU | Determining the attributions why the enterprises situation is perceived in a certain way. |
| Procedure to be revolved periodically for the panel survey                                                                                                                                                           |                          |                                                                 |                                                                                                                                                           |                                                                                                                                             |                                                                                           |                                                                                           |
|                                                                                                                                                                                                                      |                          |                                                                 |                                                                                                                                                           |                                                                                                                                             | t ++                                                                                      |                                                                                           |

*Hint: A DMU (in the sense of the Data Envelopment Analysis) is the input-output-combination of an “involved one”  $s \in \{1,..S\}$  at a certain time  $t \in \{0,..T\}$  for a certain level (target, current, basics)*

**RESULTS**

Concerning the objectives mentioned above the focus will now be set only on the results of objective 6 (methodology), in order not to exceed the given page limits. **Table 1** shows the procedure of the determination of the perceived exposition to an entrepreneurial crisis:

**Step 1** has to be done preliminarily: All of the involved ones (=the entrepreneur, the family members, the bank(s) etc.) determine a set of those indicators for a crisis that they regard to be relevant, because they act (e.g. quit a credit contract) according to the indicators and limits defined by them ('Radical Constructivism' – e.g. WATZLAWICK 1977 p. 16):

1<sup>st</sup> category: Attributes for the traditional quantitative (ratio scaled) and qualitative (ordinal scaled) data for evaluating an enterprise's creditworthiness (as it is used e.g. for Basel II ratings)

2<sup>nd</sup> category: Attributes for newly used quantitative (ratio scaled) data (derived from literature review – e.g. free securities that serve as an indicator for perceived liquidity)

3<sup>rd</sup> category: Attributes for newly used qualitative (ordinal scaled) data (derived from evaluations of contracts, qualitative interviews like narrative interviews etc, and that are specific to a certain enterprise's economic situation – for an example see **Table 2**).

**Table 2:** Example of attributes and questions derived form a credit contract

|                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Clauses of a certain credit contract</b>                                                                                                                                                                        | Necessary steps to be done:                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>In chapter II of the land charge register (cadastre) of the enterprise XYZ in ...a subordination of the demands of the parents H. and A. ...behind the land charge of the XY-Bank in chapter III is stated.</i> | I. Deriving attributes from the text (e.g. subordination, ...)<br>II. Discovering problems of misunderstanding the contract by the entrepreneur and the family members concerning the meaning of the various clauses of the contract.<br>III. Identification of input attributes – e.g.:<br>1. Amount of income during the old-age period of the parents<br>2. Value of given collateral etc.<br>IV. Identification of output attributes: Attitude towards III. 1., ... |

Example of three questions that have been derived from the excerpt of the contract above:

| Please answer the questions listed below concerning the influence of attributes being relevant for a crisis:                                                               | very low                 | low                      | middle                   | high                     | very high                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                                                                                                                                                            | 5                        | 4                        | 3                        | 2                        | 1                        |
| Q1 The impact of the regulations of the financial covenants mentioned above on the financial means of the former (retired) entrepreneur (father, mother) is ...            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q2 The impact of the regulations of the financial covenants mentioned above on the possibility to have access to credits (perceived liquidity) is ...                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                                                                                                                                                            | cause no worries         | cause little worries     | cause some worries       | cause big worries        | cause very big worries   |
| Please indicate at the following statement(s), how the entrepreneur (and the family) are affected in your opinion:                                                         | 5                        | 4                        | 3                        | 2                        | 1                        |
| Q3 The limitations on the securities given to the parents concerning a satisfying old-age income for them by the regulation of the financial covenants mentioned above ... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The output-matrix Y comprises those attributes where the “involved ones” indicate their perceived exposition of the enterprise to a crisis (ordinal scaled data) – see example on **Table 2**.

**Step 2:** Periodically revolving (t=0..T) the entrepreneur has to:

1. transfer the relevant data from the balance sheet evaluation into the corresponding

attribute-cells of the input-matrix  $X_{1,t}^{current}$  (e.g. dynamic debt service ratio),

2. define a target matrix  $X_{1,t}^{target}$  of the target situation of the enterprise,
3. define at least one “basic level” matrix  $X_{1,t}^{basics}$  defining the perceived border to a crisis.

The definition of the “basic level” is

necessary, because a comparison of the attribute values of the current situation and those of the target situation alone will not allow an interpretation, if the current situation is little or far off the target.

**Step 3:** Periodically revolving ( $t=0,..T$ ) the “involved ones” evaluate the input matrices and indicate their perceived exposition of the enterprise to a crisis within their corresponding output-matrix Y.

**Step 4:** Periodically revolving ( $t=0..T$ ) an overall perceived exposition to a crisis for every DMU is determined. A DMU (in the sense of the Data Envelopment Analysis) is

the input-output-combination of an “involved one”  $s \in \{1,..S\}$  at a certain time  $t \in \{0,..T\}$  for a certain level (target, current, basics). The aim of applying Data-Envelopment-Analysis is not the estimation of a production function as it is usually used for, but the determination of the perceived efficiency of the enterprise by every single DMU.

An abbreviated listing of the results of the Data-Envelopment-Analysis is shown on **Table 3** (The description of the underlying data can be found in BODMER 1998 and 2005).

**Table 3:** Simplified example of an output of the Data-Envelopment-Analysis (calculated with CCR-Model) (Step 4 in table 2) for an example situation (two periods:  $t=0$  and  $t=1$ ) of an enterprise

| Column 1          | Column 2     | Column 3                      | Column 4                      |
|-------------------|--------------|-------------------------------|-------------------------------|
| Situation         | Involved one | Perceived efficiency at $t=0$ | Perceived efficiency at $t=1$ |
| Current situation | Entrepreneur | 1,000                         | 0,992                         |
|                   | Bank         | 1,000                         | 0,757                         |
|                   | Consultant   | 1,000                         | 0,757                         |
| Target situation  | Entrepreneur | 1,000                         | 1,000                         |
|                   | Bank         | 1,000                         | 1,000                         |
|                   | Consultant   | 1,000                         | 1,000                         |
| Basics situation  | Entrepreneur | 1,000                         | 1,000                         |
|                   | Bank         | 0,731                         | 0,889                         |
|                   | Consultant   | 0,731                         | 0,889                         |

(Source: Bodmer 2005, p. III-12); hint: The relative efficiency in the columns 3 and 4 may run from 0 (relatively inefficient) to 1 (relatively efficient).

Perceived relative efficiency values on **Table 3** less than ‘1’ concerning the ‘current situation’ in **Column 4** indicate a perceived deviation from the target. So the investment done at time  $t=0$  (column 3) did not prove to be as efficient as it had been expected before. Threat by a crisis are perceived, if the perceived efficiency values for the current situation in column 4 of an involved one are below the corresponding perceived efficiency value of the basics situation of the same (or other) involved one(s). On **Table 3** at time  $t=1$  the three involved ones perceive that the current situation’s relative efficiency is worse than it would be acceptable at a basic level (minimum required standard of living etc.). This indicates a crisis being perceived.

Additional information about a threat of a crisis perceived might be gained from the analysis of a time-series of results: A declining efficiency concerning the basics situation of the entrepreneur is an indicator that he reduces his demands. These adjustments show that he adapts to a perceived crisis.

**Step 5:** According to attribution theory people develop theories in order to explain certain situations (what are the reasons for

certain results of behaviour etc.). These theories will be gained by qualitative methods like narrative interviews in order to determine the decisive aspects for managing the crisis (aspects for improving the enterprise’s stability), e.g. by means of “attributional retraining” (WATZLAWICK 1977, p. 96) and mediation.

## DISCUSSION

It is assumed that the perceived exposition to a crisis depends on the individual target(s) and the willingness of the entrepreneur and the family to accept deviations from the target level(s) that are better than an individually defined basic level(s). Additionally it is assumed that it depends on the assumption of the other “involved ones” that the entrepreneur and the family are able to cope with deviation from the target(s).

Pessimistic people will perceive a crisis already if data-values of certain single attributes of the current-level are below the corresponding data-values of the basics-level. Optimistic people may especially take into consideration those attributes that indicate that the enterprise is efficient (comparatively low

input and comparatively high corresponding output). Therefore perceived exposition to a crisis (step 4 on **Table1**) has to be calculated in different ways. The Data-Envelopment-Analysis in the example mentioned above the optimistic view had been taken. Methods to determine the perceived importance of the various attributes – maybe even Conjoint Analysis – will still have to be integrated. Other topics for improvements are the used DEA-model, the development of testable hypothesis, empirical test of the hypothesis, the identification of economic-psychological types of a crisis etc.

The greatest obstacle both for research and for practical application of the proposed approach, however, might be that the involved ones may be reluctant to tell their perceptions frankly, because they might fear that being frank (with negative information about their economic situation) might have negative effects upon their credit-worthiness. The result will be opportunistic behaviour in ‘designing’ the input- and output-matrices X and Y by them. Therefore it is essential that the determination of the creditworthiness is independent of an economic-psychological determination of a perceived exposition to a crisis. The latter should be organised by consultants only for the purpose of consultation. For strictly agricultural enterprises with a publicly financed extension service the following procedure might be applicable: if governmental subsidies are granted for an investment, a consultant has to be engaged by the entrepreneur that organises the data collection and data-evaluation for the determination of the perceived exposition of the enterprise to a crisis. It has to be ensured that the results will not be handed out to other involved ones but the entrepreneur. And it has to be ensured that in case an investment fails, the investment subsidies won’t have to be paid back. The data and the results of the analysis will only be used for consultancy

## CONCLUSIONS

Integrating economic and psychological aspects for evaluating the perceived between the consultant and the entrepreneur.

exposition of an enterprise to a crisis is obviously a new paradigm that might offer new dimensions both for research on scientific level and for enhancing the service of consultants on the practical level.

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