4

Organizational error management culture and its measurement: Development of an improved questionnaire

In the research described in Chapters 2 and 3, survey data on organizational error management culture were gathered with a questionnaire that comprises adapted items of the Error Orientation Questionnaire (EOQ; Rybowiak, Garst, Frese & Batinic, 1999). The EOQ measures *individual* error orientation, that is, behavior and attitudes individuals display when confronted with errors. The EOQ comprises a total of 37 items organized in eight scales; Analysis, Learning, Correction, Communication, Anticipation, Risk taking, Strain (negative) and Covering up (negative). All items specifically refer to the individual's error orientation. The Error Management Culture Questionnaire (EMCQ) was based on the same 37 items as the EOQ. The EMCQ differs from the EOQ in two important ways: First, all items specifically refer to the error culture of the organization as a whole, rather than to an individual's error orientation. Second, larger dimensions are used: (1) *Mastery* comprising Analysis, Learning, Recovery and Communication, (2) *Awareness* comprising Anticipation and Risk taking, and (3) *Error Aversion* (negative) comprising Strain and Covering up (see also Chapters 2 and 3). Qualitative interviews with managers (see Chapter 3) confirmed the importance of the Mastery dimension, and revealed a moderate effect

for Error Aversion. The Awareness dimension was somewhat problematic: Lower intra-organizational consensus values were found in both survey and interview data (Chapter 3).

Because of its origin in individual error orientation (Rybowiak, et al., 1999) the questionnaire may have under-emphasized social aspects of error management culture. This is one of the lacunas the current studies attempt to resolve.

The current chapter describes two studies aimed at improving the questionnaire. In the first study interviews are used for the development of new items. Interviews are held with employees and managers in software and hardware design companies. This line of industry is chosen for its high degree of error-occurrence. Further, errors with consequences of the full range of magnitude are common. The first study is specifically aimed at identifying topics that the current questionnaire lacks, and the development of corresponding items. In the second study, all old and new developed items are tested in a large sample of students that hold positions in various companies. A calibration sub-sample is used to select items, develop scales and underlying dimensions with structural equation modeling. The remaining sub-sample is used for a confirmatory factor analysis. Further, additional organizational culture scales are administered for building a nomological net.

Study 1: Methods & results

Sample . Four IT-companies participated in the study. These companies had an average of around 100 employees working in the same office. Per company, five employees, all of which were active in software and/or hardware development,

participated. The average level of the participants (19 men, 1 female) was mid-management.

Procedure. In a course for which I served as a supervisor, a group of four students were made familiar with the topic of error management culture, the theory behind it and its measurement thus far. They were trained in conducting interviews.

Interviews. The face-to-face interviews were semi-structured, using the critical incident approach (Flanagan, 1954). Interviews lasted about 45 minutes and were audio-recorded and transcribed. Interviews were administered by four interviewers who worked in pairs.

Transcripts of the interviews comprised information on all eight scales of the EMCQ, as well as on topics the interviewees volunteered: Each of the interviews started with the interviewee providing an error that had occurred in the past. The interviewee was then asked to indicate how the error had been dealt with within the organization. Interviewers asked questions for clarification and elaboration purposes (e.g. “Can you be more specific?” or “What happened then?”) and established whether the example provided by the interviewee was typical (e.g. “Is this what is generally done in this organization?”). When about half of the time planned for the interview had passed, the interviewers checked whether all EMCQ scales were covered by the interviewee. If this was not the case, the interviewers specifically inquired about topics not yet covered (e.g. “Are errors ever covered up?”).

Coding of transcripts. Before the interviews were coded, I divided each of the transcripts into segments, containing one main question along with the interviewee's answer, clarification and elaboration questions, and subsequent answers. This resulted in 237 segments.

Two pairs of judges (the same as the interviewers, but now with the pairs mixed) then coded all transcript units: The two pairs of judges assessed (1) whether a transcript unit contained information with respect to one (or more) of the eight original EMCQ/EOQ scales (eight categories), and/or (2) whether a transcript unit contained information with respect to one (or more) of the eight original EMCQ/EOQ scales, where the interviewee's response was not specifically covered by any of the items of the original scale (eight categories), and/or (3) whether the interviewee's response provided information on the organizational error culture that was not covered by any of the original scales (one category, to be further analyzed). The coding scheme thus contained seventeen categories**.**

Two transcripts were randomly picked to train the judges with respect to the coding procedure. The remaining eighteen transcripts were independently coded by the two pairs of judges. In total 347 codes were assigned[1]. The coding agreement between the two pairs of judges (Cohen's Kappa) was .54. The pairs discussed codings on which there was disagreement. If necessary, the first author then made the final decision.

[1] The reason that the number of assigned codes exceeds the number of segments, is that some segments contained information on more than one topic.

Development of new items. Codings and interview quotes were used to validate the original eight scales and items, develop additional items for the existing scales, and develop new scales. Topics covered by items of the original eight scales were accounted for in the interviews. Further, topics related to original scales, but not covered by any of their items, and new topics were found in the transcripts. These were used to develop new items for existing scales and new items for development of new scales. Working in pairs, the students developed new items. After that, a meeting was held in which these new items were discussed by all parties (students and myself). In this meeting we discussed (too much) overlap between items developed by the two pairs, and phrasing of the items.

We developed 42 new items for existing scales. In 19 instances these concerned negative phrasings of the topic of the scale (e.g. "We can easily let go of negative feelings associated with errors", for the scale Strain). Twenty-three newly developed items specifically aimed at topics belonging to an existing scale, but not yet covered by it (e.g. "We try to organize our work in such a way that correction of errors will be as easy as possible", for the scale Correction). Nineteen items for four new topics were developed. These four topics are: helping each other (e.g. "A person that makes an error will be helped by others"), acceptance of errors (e.g. "In order to achieve long term success, errors in the short term have to be accepted"), error prevention (e.g. "Our aim is to work without errors") and attribution for failure (e.g. "When something goes wrong, people tend to look for circumstantial causes rather than question their own course of action" (negative)). In total 61 new items were developed. One of the original 37 items ("In this organization, people get upset and irritated if an error occurs") was rephrased into two separate items, using the same

wording, with "irritated" in the one, and "upset" in the other item. Thus, the initial version of the new questionnaire contains 99 items.

The goals of the second study in this chapter are (a) to select items and develop scales and underlying dimensions for the improved questionnaire, and (b) to place error culture dimensions in a nomological net with other, more general culture scales. For this purpose the 99 items developed in the first study, and two additional questionnaires based on Quinn's (1988) competing values model were administered in a large sample.

Quinn's (1988) model describes four organizational perspectives: Human relations, open systems, rational goal and internal process. Organizations with an human relations approach emphasize concern, commitment, morale, discussion, participation and openness. Organizations with an open systems approach emphasize insight, innovation, adaptation, external support, resource acquisition and growth. Organizations with a rational goal approach emphasize accomplishment, productivity, profit, goal clarification, direction and decisiveness. Organizations with an internal process approach emphasize measurement, documentation, information management, stability, control and continuity. The questionnaires used in Study 2 have separate scales for each of the four approaches of Quinn's model.

Study 2: Methods

Participants, Procedure and Measures. First year Psychology students (N=479, 73% women, 27% men, average age 25.4) participated in an obligatory survey in which numerous questionnaires had to be completed.

In the Netherlands it is common that students work (part-time) during their studies. Therefore we took this opportunity to ask about the error culture of their organization. Participants were instructed to keep in mind that organization they were most familiar with[2]. We asked for how long they had been working there, and for how many hours per week. Finally, we asked them how familiar they were (very familiar, familiar, reasonably familiar, poorly, not familiar) with the organization. Participants that had indicated that they were poorly or not familiar with the organization (N=59) were excluded from the sample. Average number of months of employment in the organization was 22.79 (SD=36.20), with on average 23.20 hours per week (SD=13.67). The sample includes over forty different lines of industry with a few students active in each of them. There were two often-mentioned lines of industry: Retail (N = 86) and catering (N = 100).

All participants were instructed to fill out the initial version of the ECQ (99 items). Further, about half of the sample (N = 176) also completed two additional organizational culture scales: The FOCUS questionnaire (Van Muijen, 1994; Van Muijen, Koopman & De Witte, 1996), and the climate perception questionnaire (Van Vianen & Kmieciak, 1998; Van Vianen, in press). Both questionnaires are based on the Competing Values Framework of Quinn (1988). The climate perception questionnaire comprises 13 scales (with 5 to 7 items per scale) organized in the four quadrants of Quinn's model: The human relations approach is covered by six scales:

---

[22] To work against the possibility that participants would indicate that they had never worked thereby seeking for a reason for skipping the questionnaire, we instructed them that if this were the case they had to fill in the questionnaire concerning the organization where one of the parents, their partner or friend worked. 20 students indicated that they had never worked, and were excluded from the analyses.

Peer cohesion (support from colleagues), open communication (differences of opinion are discussed in the group), positive feedback (high performance is acknowledged), friendship (friendly relations exist among colleagues), participation (participation in decision making), and development of human resources (opportunity to develop oneself). The open systems approach is covered by two scales: Image (pride of working for the organization), and innovation (willingness to take risks in order to innovate). The rational goal approach is covered by four scales: reward (positive relationship between performance and salary or bonuses), work pressure (high demands), competition (goal is to be better than your colleagues), and morale (putting much effort into one's work). The internal process approach is covered by one scale: regulation (fixed procedures). Cronbach's alpha's vary from .80 to .92. Scores on scales in the same approach were averaged. The FOCUS questionnaire has one scale for each approach. Scales have 6 to 8 items; Cronbach's alpha ranged from .80 to .93.

Results

Modeling strategy. The sample was randomly divided in two parts of equal size. One half was used to develop scales using structural equation modeling (calibration sample, $N = 199$). The other half was used for confirmatory factor analysis (confirmation sample, $N = 200$). All model tests were based on the covariance matrix and used maximum likelihood estimation as implemented in LISREL VIII (Jöreskog & Sörbom, 1996a; 1996b). No correlations were allowed between residuals.

Item selection. The calibration sample was used for selection of items. One by one, scales were formed. For each of the scales, all possible items (based on content,

varying from 5 to 11 items per scale) were entered, with the scale defined as the latent variable. Modification indices, residuals, standardized parameter estimates, explained variance by the latent variable and content of items were used as selection criteria. With respect to content, two considerations predominated: (1) redundancy; when two items were highly correlated, the best one was kept, and (2) overlap with other scales; some items addressed more than one topic (e.g. "In this organization, people think a lot about how an error could have been avoided." relating to both error analysis and error prevention). All of the items displaying such overlap were removed.

Satisfactory fit indices and alpha's (see Table 1a) were obtained for all but one scale: Attribution for failure. This scale was excluded from further analyses. The eleven newly developed scales contained either 4 or 5 items. Reassessment of the scales in the confirmation sample yielded similar fit indices and alpha's (see Table 1b). The Appendix at the end of this chapter shows the selected items with accompanying standardized parameter estimates and residuals. The full model with all eleven scales had a poor fit (GFI = .71). The research described in Chapters 2 and 3 already revealed that with error culture underlying dimensions were at work. Therefore, a model containing larger dimensions was built.

Table 1a

Scales developed in the callibration sample

	k	alpha	χ^2	df	P	RMSE	RMR	GFI	AGFI	CFI
Thinking	4	.81	6.99	2	.03	.11	.04	.98	.91	.98
Learning	4	.70	.39	2	.82	.000	.0085	1.00	1.00	1.00
Recovering	5	.82	6.52	3	.26	.04	.02	.99	.96	.99
Communication	5	.83	4.90	3	.43	.000	.02	.99	.97	1.00
Helping	4	.75	1.57	2	.46	.000	.02	1.00	.98	1.00
Anticipation	4	.65	4.61	2	.10	.08	.03	.99	.94	.97
Risk taking	4	.78	.22	2	.90	.000	.0075	1.00	1.00	1.00
Acceptance	4	.75	4.54	2	.10	.08	.03	.99	.94	.99
Strain	5	.74	4.18	5	.52	.000	.03	.99	.97	1.00
Covering up	4	.71	.32	2	.85	.000	.0099	1.00	1.00	1.00
Prevention	4	.70	.11	2	.95	.000	.0058	1.00	1.00	1.00

N = 199

Table 1b

Scales validated in confirmation sample

	k	alpha	χ^2	df	P	RMSE	RMR	GFI	AGFI	CFI
Thinking	4	.81	2.07	2	.35	.01	.02	.99	.97	1.00
Learning	4	.68	2.12	2	.35	.02	.02	.99	.97	1.00
Recovering	5	.12	8.11	5	.15	.06	.03	.98	.95	.99
Communication	5	.77	8.50	5	.13	.06	.03	.98	.95	.99
Helping	4	.65	.61	2	.74	.000	.01	1.00	.99	1.00
Anticipation	4	.63	3.38	2	.18	.06	.03	.99	.96	.98
Risk taking	4	.76	2.06	2	.36	.01	.02	.99	.97	1.00
Acceptance	4	.73	8.15	2	.02	.12	.05	.98	.90	.97
Strain	5	.76	7.80	5	.17	.05	.03	.98	.95	.99
Covering up	4	.72	2.88	2	.24	.05	.03	.99	.96	.99
Prevention	4	.62	1.64	2	.44	.000	.02	1.00	.98	1.00

$N = 200$

Table 2

Correlations between error culture scales

	1	2	3	4	5	6	7	8	9	10
1. Analysis										
2. Learning	.47**									
3. Correction	.35**	.23**								
4. Helping	.51**	.43**	.66**							
5. Communication	.73**	.46**	.46**	.58**						
6. Anticipation	.14*	.46**	.40**	.46**	.30**					
7. Risk taking	.13#	.35**	.10	.23**	.21**	.47**				
8. Acceptance	.11	.47**	.18*	.42**	.25**	.59**	.70**			
9. Strain	.05	-.18*	-.13#	-.25**	-.08	-.26**	-.37**	-.55**		
10.Covering up	-.21**	-.22**	-.32**	-.36**	-.35**	-.33**	-.23**	-.34**	.48**	
10.Error prevention	.07	-.11	.17*	-.00	-.00	-.19**	-.31**	-.41**	.41**	.21**

Larger dimensions. Based on the eleven scales, larger dimensions were formed. In order to do this I analyzed correlations among scales (see Table 2), but primarily based development of larger dimensions on theoretical grounds. Similar to the approach used for forming the eleven scales, possible scales to be combined in a larger dimension, were entered with the dimension defined as the latent variable.

Table 3a

Full model developed in the callibration sample

	χ^2	df	P	RMSEA	RMR	GFI	AGFI	CFI
Full Model (8 scales, 4 factors)	58.00	14	.000	.13	.05	.93	.82	.92
Full Model (11 scales, 4 factors)	212.88	38	.000	.15	.07	.84	.72	.80
3-factor model	76.58	17	.000	.13	.05	.91	.81	.90
2-factor model	87.64	19	.000	.14	.06	.90	.81	.88
1-factor model	287.43	20	.000	.26	.09	.73	.52	.59

N = 199

Table 3b

Full model validated in the confirmation sample

	χ^2	df	P	RMSEA	RMR	GFI	AGFI	CFI
Full Model (8 scales, 4 factors)	74.86	14	.000	.15	.05	.91	.78	.89
Full Model (11 scales, 4 factors)	214.54	38	.000	.15	.06	.84	.72	.80
3-factor model	89.64	17	.000	.15	.05	.90	.78	.88
2-factor model	93.99	19	.000	.14	.06	.80	.80	.86
1-factor model	222.48	20	.000	.23	.07	.78	.61	.62

N = 200

Initially, four dimensions were developed in the callibration sample (see Table 3a) and validated in the confirmation sample (see Table 3b). These were (1) Mastery containing the analysis, correction and learning scales, (2) Social containing the helping and communication scales (3) Awareness, containing the anticipation, risk taking and acceptance scales, and (4) Error Aversion containing the strain, covering up, and error prevention scales. This initial model yielded poor fit indices (see Table 3a). Modification indices, residuals, standardized parameter estimates, explained variance by the latent variable and content of items were used as further selection criteria. With respect to content, considerations of redundancy and overlap with other dimensions were used. Three scales were removed: Analysis, anticipation and covering up. The resulting eight scale, four dimension model yielded reasonable fit indices (see Table 3a). The testing of the same models in the confirmation sample yields similar results (see Table 3b). A Chi-square difference test revealed that the eight scales, four dimension model had an significant improvement over the twelve scales four dimensions model ($\chi^2\Delta = 154.88$, $df\Delta = 24$, $p < .001$ in callibration sample, $\chi^2\Delta = 139.68$, $df\Delta = 24$, $p < .001$ in confirmation sample). Additionally, the eight scales, four dimensions model was tested against a one-factor model and was found to be superior ($\chi^2\Delta = 229.43$, $df\Delta = 6$, $p < .001$ in callibration sample, $\chi^2\Delta = 147.62$, $df\Delta = 6$, $p < .001$ in confirmation sample).

Table 4

Correlations between error culture dimensions and the four competing values

		1	2	3	4
1. Master					
2. Social		.67**			
3. Awareness		.37**	.34**		
4. Aversion		-.10*	-.11*	-.52**	
5. Human Relations	(Climate Perception)	.36**	.59**	.32**	-.33**
	(FOCUS)	.27**	.51**	.29**	-.38**
6. Open Systems	(Climate Perception	.27**	.41**	.23**	-.16*
	(FOCUS)	.37**	.56**	.27--	-.33**
7. Rational Goals	(Climate Perception)	.06	-.01	-.09	.27**
	(FOCUS)	.31**	.26**	-.15*	.17*
8. Internal Process	(Climate Perception)	.41**	.51**	.06	-.12
	(FOCUS)	.31**	.25**	-.22**	.19*

$N = 399$ for error culture dimensions; $N = 176$ for 'competing values'; * $p < .05$; ** $p < .01$. All tests are two-tailed.

Low, medium sized and high correlations are found among the four dimensions. A high positive correlation was found between the Mastery and Social dimensions. A high negative correlation was found between the Aversion and Awareness dimension (see Table 4). For this reason, two additional models were tested against the eight scales, four dimensions model. First, a three dimension model, in which the correction, learning, communication and helping scales are combined in one dimension. A Chi-square difference test shows that this model is inferior ($\chi^2\Delta = 18.58$, $df\Delta = 3$, $p < .001$ in callibration sample, $\chi^2\Delta = 14.78$, $df\Delta = 3$, $p < .01$ in confirmation sample). Second, a two-factor model in which the correction, learning, communication and helping scales are combined in one dimension, and the risk

taking, acceptance, strain and error prevention scales are combined in another dimension. A Chi-square difference test shows that this model is inferior ($\chi^2\Delta$ = 29.64, dfΔ = 5, $p < .001$ in callibration sample, $\chi^2\Delta$ = 19.13, dfΔ = 5, $p < .01$ in confirmation sample). Cronbach's alpha's of the four dimensions are satisfactory (Mastery, k =9, alpha = .75; Social, k = 9, alpha = .82; Awareness, k = 8, alpha = .85; Error Aversion, k = 9, alpha = .76).

Nomological net. Correlations of the four error culture dimensions (Mastery, Social, Awareness and Error Aversion) with the scales based on Quinn's (1988) competing values model were calculated (see Table 4). The Mastery dimension is moderately correlated with all four approaches. The Social dimension is particularly highly correlated with the human relations and open systems approaches. The Awareness dimension is moderately correlated with the human relations and open systems approaches. The Error Aversion dimension is moderately negatively correlated with the human relations and open systems approaches.

Discussion

The interviews in the first study of this chapter resulted in the development of a total of 62 new items for existing and new scales. In the second study of this chapter eleven scales were initially developed and validated. These scales did not yield acceptable fit indices in the full model. Therefore, underlying dimensions were investigated. A full model with four dimensions, based on eight scales was developed and validated: The Mastery dimension comprised correction and learning, the Social

dimension comprised helping and communication, the Awareness dimension comprised risk taking and acceptance, and the Error Aversion dimension comprised strain and error prevention. This model was tested against alternative models, and each case found to be significantly superior. Thus, although fit indices of the newly developed model are not extremely high, the model is superior to alternative models.

The four dimensions are differently associated with the four approaches of Quinn's (1988) competing values model: The Mastery dimension is moderately related to all four approaches, the human relations approach with its emphasis on concern, commitment, morale, discussion, participation and openness, the open systems approach with its emphasis on insight, innovation, adaptation, external support, resource acquisition and growth, the rational goal approach with its emphasis on accomplishment, productivity, profit, goal clarification, direction and decisiveness, and finally, the internal process approach with its emphasis on measurement, documentation, information management, stability, control and continuity. The Social dimension is highly correlated with the human relations and open systems approaches, and less strongly correlated with the rational goal and internal process approaches. The Awareness dimension is moderately positive related to the human relations and open systems approaches. The Error Aversion dimension is moderately and negatively related to the human relations and open systems approaches.

References

Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin*, *51*, 327-358.

Jöreskog, K. G., & Sörbom, D. (1996a). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago, IL: Scientific Software International.

Jöreskog, K. G., & Sörbom, D. (1996b). *LISREL 8: User's reference guide*. Chicago, IL: Scientific Software International.

Quinn, R. E. (1988). *Beyond rational management*. San Fransisco, CA: Jossey-Bass.

Rybowiak, V., Garst, H., Frese, M., & Batinic, B. (1999). Error orientation questionnaire (E.O.Q.): Reliability, validity, and different language equivalence. *Journal of Organizational Behavior*, *20*, 527, 547.

Sitkin, S. B. (1996).Learning through failure: The strategy of small losses. In M. D. Cohen & U. S. Sproull (Eds.), *Organizational Learning*. Thousand Oaks: Sage Publications.

Van Muijen, J. J. (1994). *Organisatiecultuur en organisatieklimaat [Organization culture and climate]*. Dissertation Free University, Amsterdam, The Netherlands.

Van Muijen, J. J., Koopman, P. L.,& Witte, de, K. B .J .J. M. (1996). *Focus op organisatiecultuur. Het concurrerende-waardenmodel en het meten en veranderen van organisatiecultuur.* Schoonhoven: Academic Service.

Van Vianen, A. E. M., & Kmieciak, Y. M. (1998). The match between recruiters' perceptions of organizational climate and personality of the ideal applicant for a management position. *International Journal of Selection and Assessment, 6,* 153-163.

Van Vianen, A. E. M. (in press) Person- Organization Fit: The match between newcomers' and recruiters' preferences for organizational cultures. *Personnel Psychology*.

Appendix

Items organizational error management culture and subjective organizational performance

Item	Original scaling	Final scaling	Residuals cal/conf[1]	SPE[(2)] cal/conf[1]	Underlying dimension
Although we make mistakes, we don't let go of the final goal.	Correction	Correction	.59/.56	.63/.54	Mastery
In this organization, people think a lot about how an error could have been avoided.	Analyzing	–	–	–	–
After an error, people think through how to correct it.	Analyzing	–	–	–	–
After an error has occurred, it is analyzed thoroughly	Analyzing	Analyzing	.69/.46	.90/.95	–
If something went wrong, people take the time to think it through.	Analyzing	Analyzing	.52/.63	.79/.65	–
After making a mistake, people try to analyze what caused it.	Analyzing	Analyzing	.71/.74	.74/.66	–
In this organization we think that it is useful to analyze errors.	–	Analyzing	.56/.47	.81/.85	–
For us, errors are very useful for improving the work process.	Learning	–	–	–	–
An error provides important information for the continuation of the work.	Learning	Learning	.99/.90	.35/.39	Mastery
Our errors point us to what we can improve.	Learning	Learning	.56/.64	.74/.62	Mastery
In mastering a task, people can learn a lot from their mistakes.	Learning	Learning	.33/.42	.82/.86	Mastery
For getting better at what we do, errors provide a good source for learning.	–	Learning	.61/.39	.82/.86	Mastery
When an error has occurred, we usually know how to rectify it.	Correction	–	–	–	–
When an error is made, it is corrected right away.	Correction	Correction	.36/.42	.68/.64	Mastery

Item	Original scaling	Final scaling	Residuals cal/conf[1]	SPE[(2)] cal/conf[1]	Underlying dimension
Although we make mistakes, we don't let go of the final goal.	Correction	Correction	.59/.56	.63/.54	Mastery
We try to organize our work in such a way that correction of errors will be as easy as possible.	–	Correction	.46/.49	.69/.54	Mastery
Quick and adequate correction of errors has high priority.	–	Correction	.51/.40	.50/.59	Mastery
A person that makes an error will be helped by others.	–	Helping	.46/.56	.60/.50	Social
When people are unable to correct an error by themselves, they turn to their colleagues.	Communication	Helping	.24/.24	.57/.54	Social
If people are unable to continue their work after an error, they can rely on others.	Communication	Helping	.34/.37	.66/.64	Social
When people make an error they can ask others for advice on how to continue.	Communication	Helping	.79/.86	.51/.33	Social
When someone makes an error, (s)he shares it with others so that they won't make the same mistake.	Communication	Communication	.71/.88	.70/.56	Social
In general, people warn each other about errors that might come up.	–	Communication	.67/.73	.38/.28	Social
Since errors and their solutions provide important information for our work, we discuss them.	–	Communication	.59/.49	.85/.83	Social
Errors are discussed amongst colleagues.	–	Communication	.26/.42	.99/.85	Social
Errors are discussed openly.	–	Communication	.43/.52	.85/.81	Social
In this organization, people are often surprised by their mistakes.	Anticipation	–	–	–	–
It is very likely that people will make errors in the process of mastering their task.	Anticipation	Anticipation	.72/.81	.50/.48	–

Item	Original scaling	Final scaling	Residuals cal/conf[1]	SPE[(2)] cal/conf[1]	Underlying dimension
When people start to work on something, they are aware that errors can occur. In this organization we take the occurrence of errors into	Anticipation	Anticipation	.43/.35	.58/.48	–
In this organization we take the occurrence of errors into account.	Anticipation	Anticipation	.79/.64	.51/.57	–
In this organization, we take into account that errors will be made from time to time.	Anticipation	Anticipation	.54/.65	.55/.53	–
We would rather make mistakes than do nothing.	Risk taking	–	–	–	–
For an organization to achieve something, it has to risk the occurrence of errors.	Risk taking	Risk taking	.50/.47	.85/.84	Awareness
It's fine to risk an error every once in a while.	Risk taking	Risk taking	.51/.77	.83/.73	Awareness
To get better in what we do, we don't mind that something can go wrong in the process.	Risk taking	Risk taking	.75/.52	.66/.66	Awareness
Taking calculated risks is encouraged in this organization.	–	Risk taking	.83/.88	.72/.63	Awareness
Errors are accepted in this organization.	–	Acceptance	.40/.66	.85/.75	–
It is okay to make an error.	–	Acceptance	.61/.41	.84/.93	Awareness
It is impossible to work without making errors.	–	Acceptance	.88/1.01	.65/.53	Awareness
In order to achieve long term success, we must accept errors in the short term.	–	Acceptance	.87/.73	.58/.65	Awareness
In this organization, people feel stressed when making mistakes.	Error strain	–	–	–	–
In general, people in this organization feel embarrassed after making a mistake.	Error strain	–	–	–	–
People in this organization are often afraid of making errors.	Error strain	Error strain	.79/.67	.64/.72	Error Aversio

Item	Original scaling	Final scaling	Residuals cal/conf[1]	SPE[(2)] cal/conf[1]	Underlying dimension
In this organization, people get upset if an error occurs.	Error strain	Error strain	.65/.64	.66/.65	Error Aversion
In this organization, people get irritated if an error occurs.	Error strain	Error strain	.71/.54	.71/.74	Error Aversion
During their work, people are often concerned that errors might occur.	Error strain	Error strain	.78/.83	.61/.48	Error Aversion
People in this organization are often relieved if someone other than they themselves, makes an error.	–	Error strain	.86/.74	.68/.71	Error Aversion
Our motto is; "Why admit an error when no one will find out?"	Covering up	–	–	–	–
There is no point in discussing errors with others.	Covering up	–	–	–	–
There are advantages in covering up one's errors.	Covering up	Covering up	1.03/.85	.48/.54	–
People prefer to keep their errors to themselves.	Covering up	Covering up	.67/.62	.59/.61	–
Employees that admit their errors are asking for trouble.	Covering up	Covering up	.41/.55	.79/.81	–
It can be harmful to make your errors known to others.	Covering up	Covering up	.56/.62	.76/.67	–
Our goal is to work without errors.	–	Prevention	.87/.85	.56/.54	–
We can work without errors, if we put effort in it.	–	Prevention	.83/.83	.78/.64	Error Aversion
Making errors is unnecessary.	–	Prevention	.70/.69	.61/.63	Error Aversion
For an organization to survive, it is essential to work without errors.	–	Prevention	.74/.92	.74/.51	Error Aversion

1. Cal/conf: parameters corresponding with calibration resp. confirmation sample.

2. SPE: Standadized Parameter Estimates.