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# Management conceptions and employee perceptions of error management culture in small businesses

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## Introduction

Every organization is confronted with errors. Errors are often costly and it is difficult to draw positive consequences from them. However, van Dyck et al. (2005) present an error management model which shows ways, through which organizations can even benefit from handling errors constructively. Errors, according to this model, lead to positive consequences such as learning and creativity. However, both learning and creativity may occur on multiple levels of an organization. Organizational creativity, for example, is „the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system“ (Woodman et al.,1993, p.293) and therefore combines individual and organizational processes. Similarly, organizational learning is a composite of individual single loop learning, and double loop learning when errors are shared and governing variables within organizations are changed (Argyris, 1999). A multilevel model of error management and its mediators may provide insight into distinct processes on both the individual and the organizational level.

### Error Management:

- Communicating about errors
- Sharing error knowledge
- Helping in error situations
- Quick error detection and damage control
- Analyzing errors
- Coordinating error handling
- Effective error handling

### Mediators:

- Learning**
- Reduced or contained negative error consequences
- Secondary error prevention
- Improved quality of products, services, and work processes
- Creativity**
- Exploration, experimentation, and initiative

### Results:

- Firm goal achievement
- Firm survivability
- Return on assets

## Methods

For this research, to capture both management conceptions and employee reactions, we used a mixed, qualitative and quantitative approach (Creswell, 2003). Qualitative interviews were conducted with executive managers/entrepreneurs from 40 small businesses (60 managers total). Additionally, questionnaire data was collected from 563 Employees from these 40 businesses (between 5 and 52 responses per business, response rate between 54% and 100 %).

Questionnaire items:  
-Error management and error avoidance: 12 items from Van Dyck et al. (2005)  
-Innovativeness/Creativity: 4 items from Miron et al. (2004) adaption- innovation questionnaire, constructed according to adaption-innovation theory by Kirton (1976) and referred to the actual workplace  
-Learning: 3 items from Tang et al. (1999)  
We conducted multilevel confirmatory factor analyses (results below) to test the basic model.

## Results

Analyses were done using Mplus 5.21 (Muthen & Muthen, 2009), according to Hox (2010). We first conducted confirmatory factor analyses to assess the psychometric properties of the model. We examined a basic measurement model including all four individual level latent variables and all five organizational level variables (four latent ones and one growth in sales as a manifest variable). This initial measurement model produced adequate fit indices ( $\chi^2=179,73$ ;  $Df=157$ ;  $CFI=0,91$ ;  $RMSEA=0,015$ ;  $SRMR=0,033$ ). The model was superior to an alternative one factor model.

	2-level SEM		2-Level Mediation			
	Full model		Error management model		Error avoidance model	
Within Organizations	estimate	se	estimate	se	estimate	se
DV Creativity (w)						
Error management	0,18*	0,08	0,18*	0,08	0,16*	0,09
Error avoidance	0,17**	0,06	0,16*	0,06	0,16*	0,07
Between Organizations	estimate	se	estimate	se	estimate	se
DV Creativity (Mediator)						
Error management	-0,72	0,41	-0,81**	0,25		
Error avoidance	-,44 <sup>+</sup>	0,30			-0,90 <sup>+</sup>	0,55
DV Growth in Sales						
Error management	-0,83*	0,35	-0,35	0,30		
Error avoidance	-0,53	0,37			-0,24	0,89
Creativity (b)			0,60 <sup>+</sup>	0,33	0,73	0,78
Indirect effect			-14,79*	6,79	-8,30	21,70

Note: STDYX-Standardized results; \*p<.10; \*p<.05; \*\* p<.01

Mediators	Error-Avoidance		Error-Management	
	Ind. Level	Org. Level	Ind. Level	Org. Level
Learning	-	-	+	+
Innovativeness	+	-	+	+

Note: - = hypothesized negative effect; + = hypothesized positive effect; red = negative effect; green = positive effect; gray = non-significant

	2-level SEM		2-Level Mediation			
	Full model		Error management model		Error avoidance model	
Within Organizations	estimate	se	estimate	se	estimate	se
DV Learning (w)						
Error management	0,26**	0,05	0,26**	0,05	0,26**	0,05
Error avoidance	-0,11*	0,05	-0,12*	0,05	-0,12*	0,05
Between Organizations	estimate	se	estimate	se	estimate	se
DV Learning (Mediator)						
Error management	-0,00	0,54	-0,19	0,62		
Error avoidance	-0,55 <sup>+</sup>	0,35			-0,86	0,89
DV Growth in Sales						
Error management	-0,88*	0,42	-0,77*	0,34		
Error avoidance	-0,53	0,40			-0,54	1,08
Learning			0,30	0,35	0,40	1,51
Indirect Effect			-1,91	6,87	-4,64	12,15

Note: STDYX-Standardized results; \*p<.10; \*p<.05; \*\* p<.01

Qualitative statements support the idea that management conceptions on error management relate to individual creativity and learning. Comparing one company with high error avoidance and low error management (ORG1) with an organization with high error management and low error avoidance (ORG2 2), we found ORG1 to have difficulties in communicating errors. For example, the manager mentioned an employee who recently left the organization and it was after the leave when he found out about some serious mistakes this employee had made. This manager further mentioned his high trust in his employees and that they work self organized, indicating low managerial impact on error handling. Managers of ORG2, by contrast, introduced a well established quality control system into their business. In their business they see it as their responsibility to talk about errors and implement systems which help to discover common mistakes.

## Discussion

Results concerning differential effects of error management and error avoidance on mediators at both levels of analyses:

- For creativity, on the individual level both error management and error avoidance are positively associated with individual creativity. This supports both the motivating function of error management which leads to more experimentation, but it also shows a positive function of error avoidance. For example, employees may use their creativity to hide errors from other organizational members.
- On the organizational level error avoidance shows its flip-side in a negative effect of error avoidance on organizational creativity.
- For learning, on the individual level error management is positively and error avoidance is negatively associated to individual learning. Additionally, on the organizational level, error avoidance is negatively associated to learning.

These results are in line with predictions that error management generally facilitates individual learning, and low error avoidance helps to learn on the organizational level to reduce fatal errors.

Contrary to previous research (e.g. Van Dyck et al.,2005) we found a negative effect of error management on growth in sales. However, qualitative results indicate that organizations existing in more complex environments have more elaborate error systems. So error management practices may be an adaptation to environmental pressures which may lead to both more error management and weaker performance. Limitations are the low number of level 2 units. Also, our objective measure of firm success may be biased, for example through recent economic crises. Future research should address the issue of error management and its effect on error rates in organizations as we have not looked at this issue in this research yet.