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FACULTY OF MANAGEMENT AND ECONOMICS
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THE POWER OF MISTAKES: CONSTANT LEARNING CULTURE AND TECHNOLOGY

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The Power of Mistakes: Constant Learning Culture and Technology

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Abstract: Change adaptability reflects intelligence and learning capacity. Mistakes are powerful in relation to teaching potency and learning efficacy, but they are not likely to be accepted by organizations. This has become a serious organizational problem. Is it possible to learn without making mistakes? This study conducts an in-depth exploration of the relation between change adaptability and acceptance of mistakes. Organizational learning is crucial for development, and technology is a major driver of growth in today's fast-changing world. The majority of learning at work is in the form of human interactions. Hence, the question is: How do technology-driven interactions influence adaptability to change via the acceptance of mistakes in the learning process?

This study analyzed 380 cases of Polish employees working in knowledge-driven organizations in various industries between November and December 2019. Analysis of moderated moderation was conducted using PROCESS software. The author found that high intensity of contacts via technology supports change adaptability through the acceptance of mistakes only for the IT industry.

The main novelty from this study is that the overall "mindset" and working conditions consistency determines the employees' ability to non-formal learning from mistakes and change adaptability. Hence, the consistency of mindset and non-formal working conditions is important. Moreover, it has been noted that the industry factor matters for organizational learning studies.

Keywords: change adaptability, organizational learning, acceptance of mistakes, organizational intelligence, IT industry, knowledge-driven organizations, non-formal learning, learning organizations.

JEL: D83, M14, M14

1. Introduction

Knowledge creation is an intense process of human imagination, finding solutions, and learning from errors (Jakubik, 2008). However, the majority of learning and knowledge-intensive organizations do not accept employees making mistakes at work. Senge (2006) claimed that if a person wants to learn, they must be ready to be wrong. The value of learning via mistakes was also highlighted by Debowski (2001) and Anselmann and Mulder (2018). Organizational learning has been defined as the course of identifying and modifying mistakes resulting from interactions between coworkers (Argyris & Schön, 1997). Mistakes are efficient in relation to learning for those who want to learn, but their effectiveness in the learning process needs to be examined, as some lessons from mistakes can be expensive. The essence of the mistakes paradox is that people cannot learn without making mistakes, but mistakes are never welcomed. This study explores the influence of acceptance of mistakes on adaptability to change across industries in employees' everyday interactions at work.

Change is not only the key characteristic of today's business environment, but also a focal result of learning, which is why making mistakes can foster change adaptability. Organizations need to be flexible and adapt to the changes to grow (Griffin, Rafferty, & Mason, 2004). When people learn, their perceptions change because their knowledge increases. This occurs for both individuals and organizations. Organizational learning and change are interconnected (Argyris, 1982; Watad, 2019). The intersection of organizational change and learning is a fascinating phenomenon, and it is worth to be more-in depth investigated (Za, Ghiringhelli, & Virili, 2020). Nadim and Singh (2019) pointed out that change as a phenomenon is related to continuous learning. Moreover, Garvin, Edmondson, and Gino (2008) stressed that learning organizations are open to making changes when needed, and errors are the essence of organizational learning (Zappa & Robins, 2016). Hence, it is important to understand the extent to which the acceptance of mistakes fosters change adaptability across industries.

The majority of learning at work takes place via interactions (Coghlan & Coughlan, 2015; Poell & Van der Krogt, 2010). Garcia, Guidice, and Mero (2019) and Park and Lee (2019) observed the importance of the communication context and overall employee interactions at work. Human interactions foster learning and knowledge dissemination (Su & Vanhaverbeke, 2019). Moreover, Zhou, Kautonen, Wang, and Wang (2017) pointed out that technology can effectively support interactions. Information technology (IT) is claimed to leverage knowledge management and organizational agility (Panda & Rath, 2018). Therefore, the present study aims to explore how the intensity of technology-driven human interactions moderates adaptability to change driven by the acceptance of mistakes. This topic has not yet been explored and is important for organizational learning studies.

To fulfill the aims of this research, a literature review is presented to identify the gap and formulate the hypotheses. Next, the research methodology and results are presented and discussed. Finally, in light of the study's limitations, practical and scientific implications are presented. General conclusions close the investigation.

2. Literature review

Learning via mistakes

According to Downs (1971, p. 1), “learning rarely happens without mistakes.” There is sparse literature on this topic, which may be the result of controversies regarding the existence of mistakes in organizations. Organizations want to be, and claim that they are, “learning organizations,” but they exclude the right to make mistakes. In a study on “managerial mistakes perception,” Palmer, Simmons, and de Kervenoael (2010) recalled a study by Husted and Michailova (2002) that listed many uncertainties that encourage managers and employees to place mistakes into a “shadow.” That is, errors are pushed into the organizational shadow as a result of uncertainty about the team’s reaction to somebody’s failure; the fear of negative consequences for future career prospects, which discourages employees from admitting to mistakes; the risk that failure may have financial consequences; and overall cultural uncertainty regarding the degree of acceptance or hostility toward mistakes. Lee, Peterson, and Tiedens (2004) used Heider’s (1958) attribution theory and stressed that managers prefer to align themselves with success rather than failure. As a result, mistakes are not exposed, discussed, or accepted, even though they have positive learning outcomes. Watkins and Marsick (1993) noted that the first step in building a learning organization is to create the ability to learn and change. Argyris and Schön (1997), Debowski (2001), Senge (2006), Garvin et al. (2008), and Rebelo and Gomes (2011a, 2011b, 2017) highlighted that a learning culture must include the acceptance of mistakes to enable people to leave their comfort zone and solve problems by developing new approaches. Hind and Koenigsberger (2008) and Thomas and Brown (2011) agreed with this and stressed that a higher level of acceptance of mistakes fosters a learning process. that is visible in the level of adoption of inevitable change. Mainga (2017) and Kucharska and Bedford (2019b) stressed that a constant learning culture must be composed of a learning climate and the acceptance of mistakes. Hence, based on the above literature review, the following hypothesis has been developed:

H1: Acceptance of mistakes positively influences adaptability to change.

Technology-driven human interactions—expected moderator

Most studies about technology-driven human interactions focus on e-learning and other dedicated learning programs, applications, and actions (e.g., Chaudhari, Murphy, & Littlejohn, 2019; Fukuzawa & Cahn, 2019; Hayes & Graham, 2019; Schweighofer, Weitlaner, Ebner, & Rothe, 2019; Sharon Hill & Wouters, 2010; Shen & Ho, 2020). The present study does not focus on formal learning via technology-dedicated applications; rather, it focuses on non-formal, everyday learning processes via the acceptance of mistakes made by average individuals. Informal learning mostly occurs in active meetings (Treasure-Jones, Sarigianni, Maier, Santos, & Dewey, 2019). The context of this study is workplaces in which people interact via technology such as social software (Ali-Hassan, Nevo, & Wade, 2015; Dindar, Alikhani, Malmberg, Jarvela, & Seppanen, 2019; van Puijenbroek, Poell, Kroon, &

Timmerman, 2014). Mitić, Nikolić, Jankov, Vukonjanski, and Terek (2017) identified a positive connection between IT and communication satisfaction and organizational learning.

Interactions via technology are part of the work conditions in most businesses. Technology is a factor that may moderate the relation between acceptance of mistakes and adaptability to change. It is worth examining this topic for several reasons. First, technology is perceived to be a driver of change (Ghazinoory, Ali Ali, Hassanzadeh, & Majidpour, 2019; Huda, 2019). Second, an increasing number of employee interactions at work are conducted via technology (Walker & Venker Weidenbenner, 2019). For example, some companies allow their employees to work from home and interact with others via technology (Lee & Ma, 2019; Pathak, Bathini, & Kandathil, 2015; Tietze & Musson, 2010; Timsal & Awais, 2016). Statista.com (2019) noted that industries such as finance and professional business services dominate among those industries that employees most frequently are working from home. Third, people who use technology are more likely to be open-minded (Kmieciak, 2019). Therefore, they may be more ready than others to learn and adapt to change after making mistakes (Samaranayake & Takemura, 2017; Solnet et al., 2019). Campana and Agarwal (2019) found that low-technology environments are not a barrier to learning.

In light of the above discussion, it is worth examining whether employees who intensively interact via technology at work adapt to changes better than other employees. A moderated effect of intensity of interaction via technology is expected for the relation between acceptance of mistakes and adaptability to change. Based on this, the following hypothesis has been developed:

H2: Intensity of interactions via technology moderates adaptability to change driven by acceptance of mistakes.

Age—expected moderated moderation

Voigt and Swatman (2006) proved that technology can effectively support the interactions of young learners. Their study focused on e-learning and raised questions about the meaning of age in the process of adaptability to change via the acceptance of mistakes. It is believed that young people are more open to change than adults (Clark, Gray, & Mooney, 2013; Hauk, Huffmeier, & Krum, 2018). Hence, it is worth verifying whether age is important and whether it moderates the relation between change adaptability and the acceptance of mistakes in conditions of intensity of technology-driven employee interactions at work. Young people who are at the beginning of their career make more mistakes at work compared with experienced employees. Thus, based on the above, the following hypothesis has been formulated:

H3a: Age moderates the moderated by intensity of contacts via technology relation between mistakes acceptance and change adaptability.

Industry—expected moderated moderation

IT competency differs across industries (Kucharska & Erickson, 2019). Brougham and Haar (2018) noted that higher usage of smart technology negatively affects employees' wellbeing

and interactions in the service sector. Fukuzawa and Cahn (2019) noted that the influence of technology on learning effectiveness may depend on the overall environmental context. Hence, it is worth examining how industry affects change adaptability via acceptance of mistakes in working conditions characterized by intensive technology-driven employee interactions. Based on this, the following hypothesis has been proposed:

H3b: Industry moderates the moderated by intensity of contacts via technology relation between mistakes acceptance and change adaptability.

Figure 1 illustrates the theoretical model of the proposed research.

Figure 1: Theoretical model

Figure 1

3. Method

Sample

To achieve the study's aims, a sample comprising 380 cases was employed. Respondents were recruited among Polish employees working in knowledge-driven organizations across industries via a research panel conducted by answeo.com (see Appendix A). The majority of the sample was represented by men (60%), aged 25–34 (43%), working in small and medium companies (56%) in the IT (30%), sales (12%), finance (11%), and production (9%) industries. All respondents were highly educated and typical knowledge workers (declared by the qualification question). Total variance was extracted at the 72% level, and a Kaiser-Meyer-Olkin (KMO) test of the sample's adequacy at the 0.81 level confirmed the sample's good quality (Cerny & Kaiser, 1977; Hair, Anderson, Babin, & Black, 2010; Kaiser, 1974). Further, a Harman single-factor test (Podsakoff & Organ, 1986) was run, and the 35% result confirmed there was no bias. Data were obtained from November to December 2019. Respondents responded to statements from Kucharska and Bedford's (2019b) study using a seven-point Likert scales. Appendix B presents the statements as well as scales and reliabilities. After the positive sample and scales assessment, composite variables were created to analyze the hypothesized relations using the PROCESS procedure for SPSS Version 3.4 (Hayes, 2018).

4. Results

Figure 2 presents a summary of the obtained moderated effects on the focal relation between the acceptance of mistakes and adaptability to change. Significant effects were noted for moderation by intensity of contacts via technology and moderated moderation of industry. The effect of the age-moderated moderation is not significant. It is noted that the intensity of technology interactions is significantly moderated by age (see Appendix C), but it is not noted

that this next moderates the focal causal effect of adaptability to change driven by mistakes. Hence, it is presented in Figure 2 as not significant for the essence of the investigation. That is, age does not influence adaptability to change as a result of acceptance of mistakes under conditions of technology usage intensity for communication at work.

Figure 2: Results

Figure 2

Notes: $n = 380$; * $p < .05$, ** $p < .01$, *** $p < .001$; ns: not significant result; all results are not standardized; level of confidence for all confidence intervals in output: 95.

The second hypothesized moderated moderation effect—namely, the industry factor—is significant and has interesting implications. A negative effect is noted after first analyzing only the moderated effect of contacts via technology intensity on change adaptability driven by mistakes. Figure 3a illustrates that for the highest acceptance of mistakes, change adaptability decreases in intensive contacts via technology working conditions and, it grows when technology usage is low. It is worth highlighting that the overall observed change adaptability is higher for those employees who use technology for everyday contacts on a high level than for those who use it on a low level. However, when the same relation is analyzed separately for the IT industry and for others (see Figure 3b), the opposite (positive) effect is observed for IT. For other industries, this effect is confirmed.

Figure 3a: Intensity of contacts via technology—total sample moderated effect

Figure 3a

Notes: $n = 380$; level of confidence for all confidence intervals in output: 95; all results are not standardized.

Figure 3b: Intensity of contacts via technology—IT industry vs other moderated-moderated effects

Figure 3b

Note: n = 380; IT n = 114 (30% of the total sample); other n = 266; level of confidence for all confidence intervals in output: 95; all results are not standardized.

Based on the above, it can be claimed that all hypotheses are confirmed except H3a, regarding moderated moderation of age. Table 1, which is based on the PROCESS procedure for SPSS Version 3.4 output details presented in Appendix D, summarizes the verification of the hypotheses.

Table 1: Hypotheses verification

Table 1

5. Discussion

The findings presented above show that probably other than the IT industry, peer-to-peer human interactions are more efficient than interactions conducted via technology for adaptability to change driven by acceptance of mistakes. This suggests that the above relations strongly depend on the overall “technological mindset.” It is visible in the cohesion of the “technological mindset” represented by the IT industry and the higher than other industries, change adaptability driven by the acceptance of mistakes in working conditions characterized by intensive human interactions via technology. The same is visible when analyzing the “non-technological mindsets” results, represented by other industries. They adapt to changes better and learn non-formally from mistakes better in working conditions characterized by low-intensity of technology-supported contacts. The ability of IT employees to learn from mistakes and adapt to change is supported by their interactions via technology, whereas employees with a non-technological mindset are not. Other industries learn better when interacting with peer-to-peer. Their ability to accept mistakes and non-formally learn from them significantly supports their adaptability to change when they interact via technology in a non-intensive way. Thus, the overall mindset (perceptions) and actions (methods of interactions) of the individual are consistent and important for non-formal learning from mistakes and adapting to change.

It is worth mentioning another study on the effect of technology on human–work relations. Brougham and Haar (2018) noted that higher usage of smart technology in the service sector leads to lower organizational commitment and career satisfaction, as well as higher cynicism and depression among employees. This shows that technology is perceived differently by people working in different industries. Chang et al. (2015) pointed out that technical, cognitive, and social dimensions are important for learning. Further, Chang and Wang (2008) noted that interactions via technology are linked with the general acceptance of IT. It can be assumed that the IT industry has the highest level of IT acceptance, but technology today is accepted everywhere. Hence, the findings can probably be explained in terms of internal

consistency of the human mindset and working environment. Thus, people with an IT mindset who work in an IT environment adapt to change via the acceptance of mistakes at the same level as those who work in other industries and who interact with others directly. Hence, the consistency of mindset and non-formal working conditions is important.

6. Practical implications

The first practical implication of this study is that technology is not a remedy for low adaptability to change or a driver for personal development via mistakes. Rather, it is a good tool for “technological mindsets” and is less efficient for “non-technological mindsets.” The second implication is that perceptions of employees from the IT industry significantly differ from those of other employees. Hence, communication and non-formal learning methods may significantly differ between IT employees and other employees. Hence, it may be difficult for organizations to find effective methods of cooperation, communication, and dissemination of knowledge between these two groups. Moreover, the difference in mindsets may be important for the effects of formal e-learning.

7. Limitations and further research

The main limitation of this study is that it focuses on non-formal and probably subconscious training via acceptance of mistakes to adaptability to change. The obtained low $R^2=0.0865$ can be explained by the fact that non-formal learning, especially from mistakes, is subliminal. Therefore, findings for formal and conscious e-learning may be different and should be verified. The elaborated significance of mindset, methods, tools, and consistency of conditions for learning via mistakes is an interesting subject and should be explored in more depth. National culture is important for knowledge sharing and job satisfaction issues (Kucharska & Bedford, 2019a), as well as acceptance of mistakes and adaptability to change. The results in this study were based on a Polish sample; therefore, further national studies are needed.

8. Conclusion

All the above findings suggest that the overall “mindset” consistency with working conditions determines the ability of non-formal learning from mistakes and change adaptability. In light of the results from IT-industry, it may also be concluded that industry characteristics matter for organizational learning studies. Moreover, this article, similarly to Kucharska and Bedford (2019b), exposes the paradox of mistakes ignorance by “learning organizations” today. The current study showed that learning from mistakes let organizations adapt better to changes. Hence, it is essential to create mechanisms that support learning from mistakes. As it was noted in the introduction section, errors are perceived by organizations as a phenomenon that should be eliminated. Therefore employees very often hide mistakes. Everybody makes mistakes, and everybody hides them, so it all together creates some kind of illusion. Findings of the current study encourage the learning organizations to “be mature” and develop internal mechanisms supporting learning from mistakes.

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Appendix A: Description of samples

	SAMPLE
Gender	Female: 40% Male: 60%
Age	18–24 (15%) 25–34 (43%) 35–44 (23%) 45–54 (15%) 55–74 (3%) >75 (1%)
Company size	Small (25%) Medium (31%) Big (21%) Large (12%)
Industry	IT (30%) Sales (12%) Finance (11%) Production (10%) Service (9%) Education (8%) Construction (7%) Healthcare (4%) Logistics (3%) Others (3%)

Appendix B: Scales and reliabilities

Scale	Composite variable mean/SD	Reliability
<p>“Mistakes acceptance” dimension of constant learning culture (MA):</p> <ul style="list-style-type: none"> • people know that mistakes are a learning consequence and tolerate them to a certain point • most people freely declare mistakes • we discuss problems openly without blaming • mistakes are tolerated and treated as learning opportunities <p>(Kucharska & Bedford, 2019)</p>	5.13/1.42	Cronbach α = .85
<p>Personal change adaptability (CHA)</p> <ul style="list-style-type: none"> • I am flexible to changes • I can adjust to changes • I adopt to changes easily • I am used to changes <p>(Kucharska & Bedford, 2019)</p>	5.67/1.1	Cronbach α = .88

Appendix C: PROCESS software outcome—age-moderated moderation

Run MATRIX procedure:

```
***** PROCESS Procedure for SPSS Version 3.4 *****

      Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
Documentation available in Hayes (2018). www.guilford.com/p/hayes3

*****
Model   : 3
  Y     : CHA
  X     : MA
  W     : TECH
  Z     : AGE
Sample
Size:   380
*****
OUTCOME VARIABLE:
  CHA
Model Summary
      R      R-sq      MSE      F      df1      df2      p
      .2940      .0865      1.1253      5.0290      7.0000     372.0000      .0000
Model
      coeff      se      t      p      LLCI      ULCI
constant      5.9881      1.0841      5.5238      .0000      3.8564      8.1197
MA              -.1350      .2315      -.5832      .5601      -.5902      .3202
Tech            -.0963      .2160      -.4459      .6559      -.5211      .3285
Int_1           .0250      .0462      .5417      .5883      -.0658      .1158
Age             -.7711      .3661     -2.1066      .0358     -1.4910     -.0513
Int_2           .1479      .0822      1.8000      .0727      -.0137      .3096
Int_3           .1644      .0761      2.1616      .0313      .0149      .3140
Int_4          -.0275      .0167     -1.6436      .1011     -.0604      .0054

Product terms key:
Int_1 :      MA      x      TECH
Int_2 :      MA      x      AGE
Int_3 :      TECH     x      AGE
Int_4 :      MA      x      TECH x      Age

Test(s) of highest order unconditional interaction(s):
      R2-chng      F      df1      df2      p
X*W*Z      .0066      2.7015      1.0000     372.0000      .1011
-----
      Focal predict: MA      (X)
      Mod var: TECH      (W)
      Mod var: AGE      (Z)

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

NOTE: Standardized coefficients not available for models with moderators.

----- END MATRIX -----
```

Appendix D: PROCESS software outcome—industry-moderated moderation

```
***** PROCESS Procedure for SPSS Version 3.4 *****

      Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
Documentation available in Hayes (2018). www.guilford.com/p/hayes3

*****
Model   : 3
  Y     : CHA
  X     : MA
  W     : TECH
  Z     : IND
Sample
Size:   380
*****
OUTCOME VARIABLE:
  CHA
Model Summary
      R      R-sq      MSE      F      df1      df2      p
.2923   .0854   1.1265   4.9644   7.0000  372.0000   .0000
Model
      coeff      se      t      p      LLCI      ULCI
constant  3.3983   .5099   6.6645   .0000   2.3956   4.4009
MA         .3439   .1021   3.3702   .0008   .1433   .5446
TECH       .4404   .0979   4.4970   .0000   .2478   .6329
Int_1     -.0638   .0196  -3.2550   .0010  -.1024  -.0253
IND        2.4710   1.1553   2.1389   .0331   .1993   4.7427
Int_2     -.4486   .2651  -1.6921   .0915  -.9700   .0727
Int_3     -.6286   .2394  -2.6255   .0090  -1.0994  -.1578
Int_4      .1102   .0521   2.1176   .0349   .0079   .2126

Product terms key:
Int_1   :      MA      x      TECH
Int_2   :      MA      x      IND
Int_3   :      TECH    x      IND
Int_4   :      MA      x      Tech x      IND

Test(s) of highest order unconditional interaction(s):
      R2-chng      F      df1      df2      p
X*W*Z   .0110     4.4842     1.0000    372.0000    .0349
-----
***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

----- END MATRIX -----
```

Table 1: Results

Regression Model Summary						
R	R-sq	MSE	F	df1	df2	p
.2940	.0865	1.1253	5.0290	7.0000	372.0000	.0000
Hypothesis		β	t-value	p-value	Hypothesis verification	
H1 MA->CHA		.34	3.37	***	supported	
H2 TECH moderation on MA->CHA (MA ^x TECH)		-.064	-3.25	***	supported	
H3a AGE moderation on TECH moderation on MA->CHA (MA ^x TECH ^x AGE)		-.027	-1.64	.10	not supported	
H3b IND moderation on TECH moderation on MA->CHA (MA ^x TECH ^x IND)		.11	2.11	*	supported	

note: n= 380 * p < .05 ** p < .01 ***p < .001

PROCESS Procedure for SPSS Version 3.4 output details available in Appendixes C and D; standardized coefficients not available for models with moderators.

Figure 1: Theoretical model

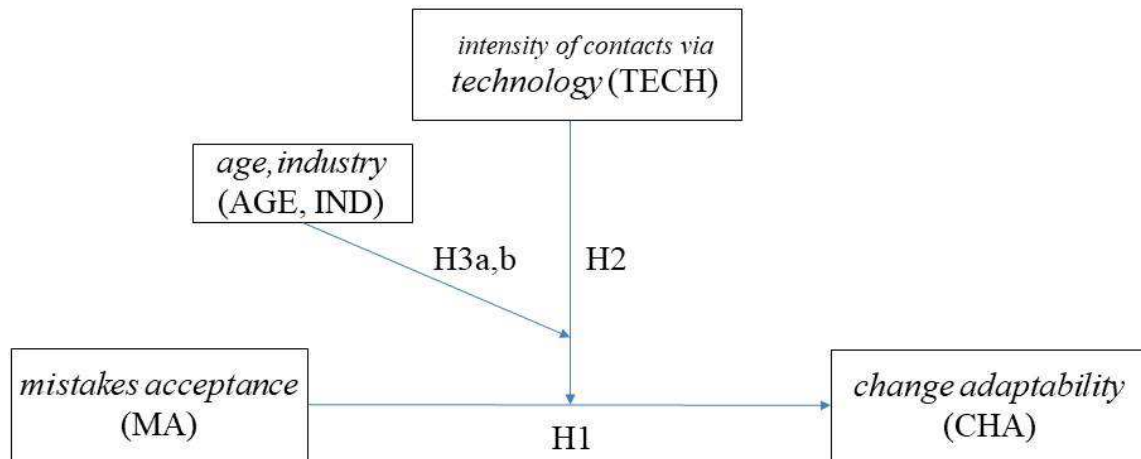


Figure 2: Results

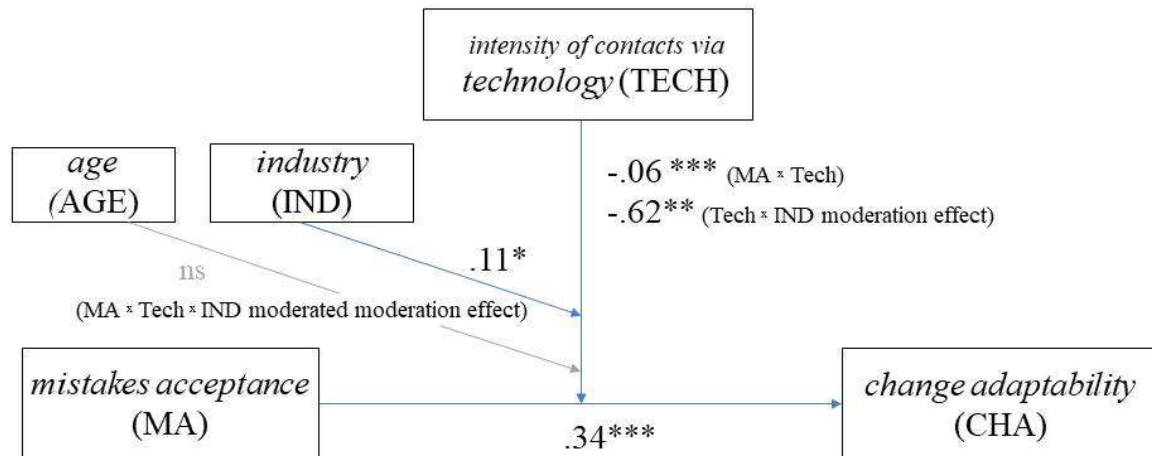


Figure 3a: Intensity of contacts via technology—total sample moderated effect

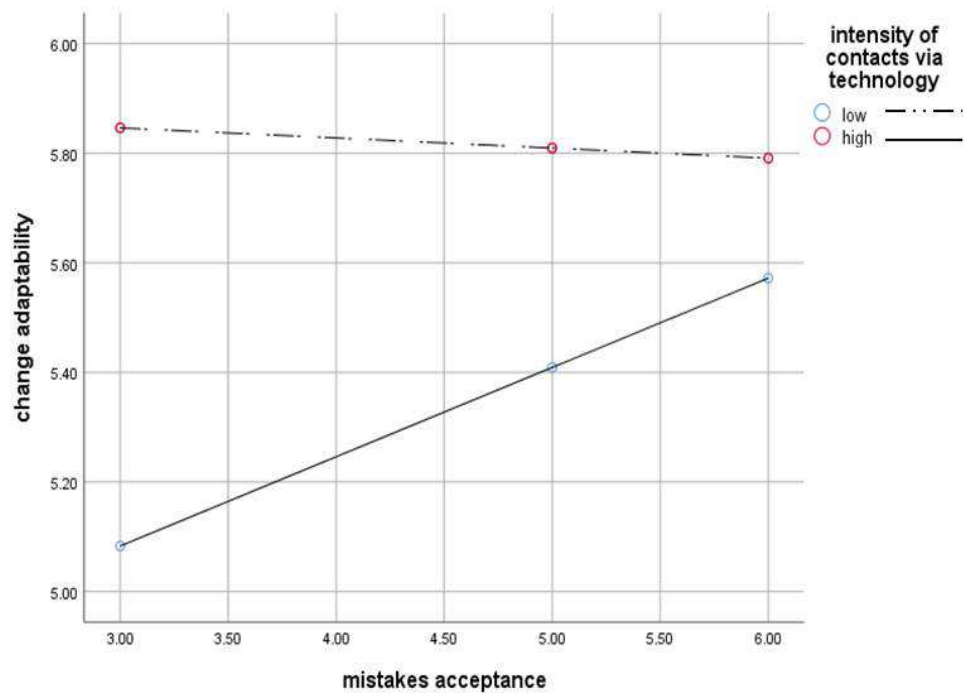
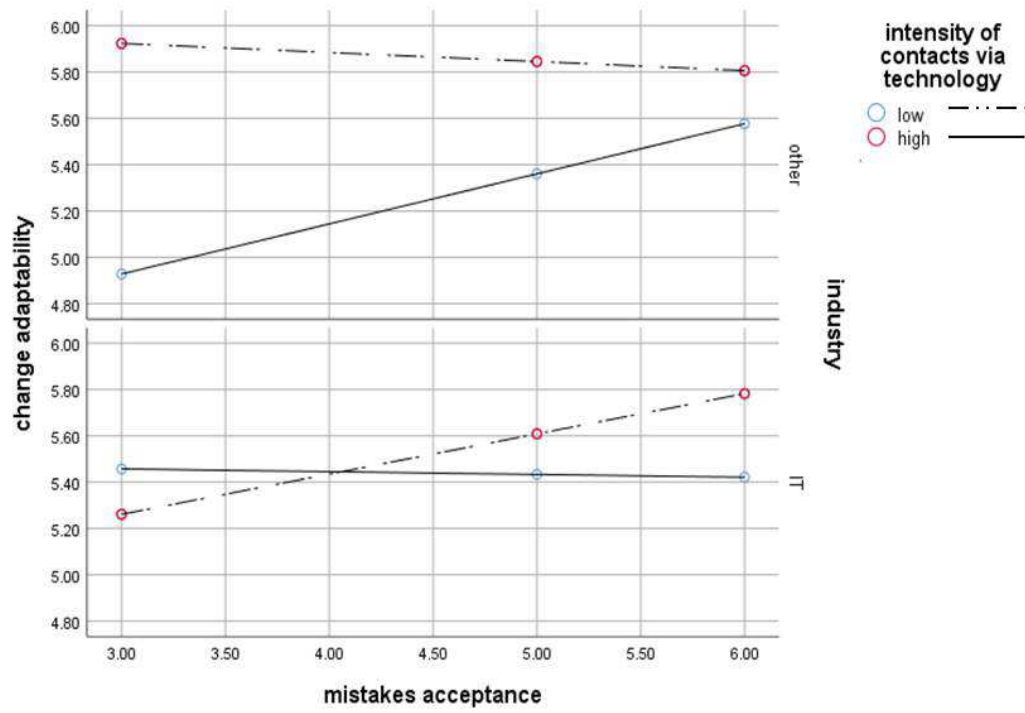


Figure 3b: Intensity of contacts via technology—IT industry vs other moderated-moderated effects



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