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accepted for publication in

Journal of Organizational Change Management

and, is available at: https://www-1emerald-1com-1chkhik4b149d.han.bg.pg.edu.pl/insight/content/doi/10.1108/JOCM-02-2020-0052/full/html

Citation:

Kucharska, W. and Bedford, D.A.D. (2020), "Love your mistakes!—they help you adapt to change. How do knowledge, collaboration and learning cultures foster organizational intelligence?", Journal of Organizational Change Management, **Vol. ahead-of-print No. ahead-of-print.** https://doi.org/10.1108/JOCM-02-2020-0052

Love your mistakes! —They help you adapt to change. How do knowledge, collaboration, and learning culture foster organizational intelligence?

Abstract

Purpose: The study aims to determine how the acceptance of mistakes is related to adaptability to change in a broad organizational context. Therefore it explores how knowledge, collaboration, and learning culture (including "acceptance of mistakes") might help organizations overcome their resistance to change.

Methodology: The study uses two sample groups: students aged 18–24 (330 cases) and employees aged >24 (326 cases) who work in knowledge-driven organizations. Structural equation models were developed, assessed, and compared.

Findings: The effect of the "learning climate" on "adaptability to change" mediated by "acceptance of mistakes" has been detected for young students aged 18-24; however this relationship is not significant for business employees aged >24. This result suggests that organizations, unlike universities, do not use mistakes as a tool to support learning that is to lead to change.

Limitations: Both samples used in the study come from Poland. The business sample is in the majority represented by small and medium-sized enterprises. Therefore the presented findings may only apply to Poland.

Practical implications: Acceptance of mistakes is vital for developing a learning culture. Mistakes help employees adapt to change. Hence, a learning culture that excludes the acceptance of mistakes is somehow artificial and may be unproductive. Paradoxically, the findings reveal that the fact that employee intelligence (adaptability to change) improves via mistakes does not mean that organizational intelligence will also increase. Thus, organizations that do not develop mechanisms of learning from mistakes lose the learning potential of their employees.

Scientific implications: The study presents mistakes as a valuable resource that enables the adaptation and development of intelligence. Hence, this study brings to attention a promising research area of "learning from organizational mistakes" in the context of adaptability to change. The study should be replicated for large Polish companies, international companies, and other countries to get a total picture of this phenomenon. Moreover, the acceptance of mistakes would be a significant step to advance learning technologies.

Novelty: This study proposes a constant learning culture scale that includes the "acceptance of mistakes" and "learning climate" dimensions. Further, it empirically proves the value of mistakes for adaptability to change. Moreover, it also contributes to the existing literature by

demonstrating the mechanism of the relationship between knowledge, collaboration, and learning cultures in the context of adaptability to change. This study breaks with the convention of “exaggerated excellence” and promotes the acceptance of mistakes in organizations to develop organizational intelligence.

Keywords: adaptability to change, constant learning culture, knowledge culture, collaborative culture, acceptance of mistakes, organizational intelligence

Introduction

If we want to learn, we must be ready to be wrong (Senge, 2006). Paradoxically, the majority of learning organizations expect people to learn without making mistakes. Most organizations have a low tolerance for mistakes. Hence the question: How can organizations learn and adapt to changes fast without making mistakes? Change is inevitable and occurs every day. Garvin *et al*. (2008) stressed that being a learning organization means opening yourself up for changes when needed. Therefore, it is important to understand the extent to which the acceptance of mistakes fosters adaptability to change. This study aims to assess the effect of learning on adaptability to change via the acceptance of mistakes. To deliver the purpose of the study, based on empirical evidence, a scale of constant learning culture composed of "acceptance of mistakes" and "learning climate" dimensions is needed. The lack of "mistakes acceptance" component in existing scales of "learning culture" (Yang, 2003; Marsick and Watkins, 2003; Yang *et al*., 2004; Pérez Lopez *et al*., 2004; Graham and Nafukho, 2007; Song, 2008; Dirani, 2009; Joo, 2010; Rebelo and Gomes, 2011b; Jiménez-Jiménez and Sanz-Valle, 2011; Islam *et al*., 2013; Choi, 2019; Nam and Park, 2019; Lin *et al*., 2019) is a serious gap. People make mistakes, especially those who actively look for new horizons, those who want to learn and grow. Therefore, filling this knowledge gap is substantive for the study of adaptability to change.

Since organizational change and culture are firmly tied (Brandt *et al*., 2019; Baek *et al*., 2019), organizational culture appears to be an important factor in determining how employees learn via acceptance of mistakes. Not forgetting that it is common for humans to make mistakes, another important question should be posed: How does company culture influence the learning process via mistakes? Recent studies of Farnese *et al*. (2019) and Farnese *et al*. (2020) demonstrated the importance of cultural orientation for the ability to learn from errors and established the need for more in-depth studies of this problem. Developing their idea, the assumption has been made that knowledge culture and collaboration culture may be vital for supporting constant learning culture with the embedded "mistakes acceptance" dimension. Still, there are no empirical studies to confirm this assumption. Eid and Nuhu (2011) and Mueller (2014, 2018) noted the significant influence of a knowledge culture on knowledge sharing and learning. Moreover, a proper climate for knowledge spreading is gained by collaborative culture thanks to interactions and communications between employees that foster learning (Pinjani and Palvia, 2013; Arpaci and Baloglu, 2016). Also, Nugroho (2018) accented that a collaborative culture might support organizational learning. We still lack research that explores the mechanism of the relationship between knowledge, collaboration, and learning cultures in the context of adaptability to change, and that is what this study also aims to establish.

Summarizing, the purpose of the study is:

- to find out, based on empirical evidence, how knowledge, collaboration, and learning culture (including "acceptance of mistakes") foster adaptability to change (organizational intelligence);

- to develop and validate a scale of constant learning culture composed of "acceptance of mistakes" and "learning climate."

The essence of the expected novelty from the proposed research is twofold. First of all, to empirically prove the value of mistakes for adaptability to change by delivering a piece of justified argument that will break with the convention of "exaggerated excellence" that disagrees with human nature. Second of all, to promote the acceptance of mistakes on a reasonable level to develop organizational intelligence.

This study begins with a literature review and the development of the theoretical model. Next, the empirical model is performed and replicated based on two independent samples to ensure that the presented findings (and achieved reliabilities of new scales) are not the result of a coincidence. Table 1 outlines the framework of the whole study.

Table 1: Study overview

Table 1

Theoretical background

An organizational culture that supports learning appears to be vital in the development of organizational intelligence. Gupta *et al*. (2000) suggested that organizational learning requires the desire for constant improvement to be shared by all members of the organization. Together, the norms of learning behaviors and shared values enhance organizational learning (Hedberg, 1981). Rebelo and Gomes (2009) defined learning culture as behaviors that are oriented toward the promotion and facilitation of workers' learning. The knowledge dissemination fosters organizational development and performance. As a result, a constant learning culture via the acceptance of mistakes can make adaptability to change more effective.

The major focus of this study is the development and validation of the constant learning scale including the "acceptance of mistakes" factor that will enable us to measure the abovementioned relationship. This type of measurement scale already exists (e.g., Butler Institute for Families, 2014). However, it overlooks the acceptance of mistakes factor, which is fundamental to this study. Similarly, other studies have also rejected the acceptance of mistakes when measuring organizational learning culture (Yang, 2003; Marsick and Watkins, 2003; Yang *et al*., 2004; Pérez Lopez *et al*., 2004; Graham and Nafukho, 2007; Song, 2008; Dirani, 2009; Joo, 2010; Rebelo and Gomes, 2011b; Jiménez-Jiménez and Sanz-Valle, 2011; Islam *et al*., 2013; Choi, 2019; Nam and Park, 2019; Lin *et al*., 2019). The authors decided to fill this gap in the literature by designing a scale of constant learning culture that empirically verifies the value of acceptance of mistakes. Mistakes are a part of human learning, and the challenge that comes with the change grows as fast as, or even faster than, human skills (Kotter, 2007, 2012). Thus, it is important to combine the abovementioned relationship in one structure to learn more about the value of mistakes in relation to adaptation to change. The process of adapting to change is neither easy nor fast because people prefer assurance, repetitiveness, stability, and safety (Duhigg, 2012; Bocos *et al*., 2015; Rafferty and Jimmieson, 2017). The abovementioned relationships are undoubtedly tied to organizational intelligence. Thus, they are included in the current study to obtain a complete picture of the creation of adaptability to change, which is a proxy for organizational intelligence (Feuerstein *et al*., 1979).

Literature review and hypotheses development

To simplify Feuerstein's (1979) definition, intelligence is the ability to adapt to change. In today's aggressive and complex business conditions, organizations must continuously evolve and adapt to changes (Goswami, 2019), which makes adaptability and organizational intelligence necessary. Also, these two are linked with many other paradigms, including organizational learning and knowledge management (Yolles, 2005). Organizations need to possess the power to manage knowledge and learning and to exploit this knowledge to make decisions and adapt to changes in business (Soltani *et al*., 2019). Culture is the "key ingredient in shifting from knowledge to intelligence" (Rothberg and Erickson, 2005, p. 283). Thus, the literature review begins by examining the influence of knowledge, collaboration, and the learning culture on adaptability to change. At first, the author conducted an initial search of key scientific databases (e.g., Emerald, Elsevier, Wiley, Taylor & Francis, and Springer) using article keywords. Relevant articles were identified by verifying whether the study topic and context matched the present study's purpose. Based on this procedure, the selected literature was studied and applied to the formulation of the current study's hypotheses.

Knowledge culture

Humans acquire knowledge, but passive knowledge does not produce value. Knowledge in action (Rothberg and Erickson, 2005) requires strategic and tactical intelligence, which comes from the intellectual capital of the organization and its knowledge processes. A set of knowledge routines that becomes visible in the organizational pattern of behaviors is called a knowledge culture. Culture is the "key ingredient in shifting from knowledge to intelligence" (Rothberg and Erickson, 2005, p. 283). A significant influence of a knowledge culture on knowledge sharing and learning was pointed out by Eid and Nuhu (2011), and Mueller (2014, 2018). Hence, knowledge culture is important, but it is insufficient for constant development. There is no learning culture without a knowledge culture. Garvin (1993, p. 80) defined learning culture as "an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights." Thus, a desire to possess knowledge is a motivation for learning. Islam *et al*. (2015) described knowledge culture as conditions that support the effective and efficient flow of knowledge throughout the organization. A knowledge culture is powerful, but a learning culture is fundamental for growth. Learning guarantees development, but a knowledge culture is required to enhance the positive attitude and motivation to learn routines. Hence, knowledge culture influences learning culture dimensions. Therefore, the following hypotheses have been formulated:

H1a: Knowledge culture influences the "learning climate."

H1b: Knowledge culture influences the "acceptance of mistakes."

Moreover, knowledge processes, such as knowledge creation and sharing, cannot proceed without collaboration (Nonaka and Toyama, 2003). Hence, the culture of knowledge must be a driver of collaboration routines at work. Therefore, a hypothesis has been proposed as follows:

H2: Knowledge culture influences the collaborative culture.

Collaborative culture

What characterizes collaborative culture are shared values and beliefs regarding an organization's open communication, encouragement of respect, teamwork, adaptability, risk-taking, and diversity (Pérez Lopez *et al*., 2004; Barczak *et al*., 2010). When we look at the collaborative culture, we can observe an appropriate climate for knowledge dissemination, reflected in interactions and communications that foster employee learning (Pinjani and Palvia, 2013; Arpaci and Baloglu, 2016). Shaping a collaborative culture takes place trough learning the organization's outlines, attitudes, and behaviors to foster competitive performances (López et al., 2004; Muneeb et al., 2019). intellectual capital creates a competitive advantage (Bounfour, 2003; Sobakinova *et al*., 2019). Relational capital supported by culture fosters the development of competitive advantage and performance (Nazari *et al*., 20011; Zardini *et al*., 2015; Covino *et al*., 2019; Chowdhury *et al*., 2019). Most learning at work requires interaction; namely, employees learn faster when learning together – one from another (Poell and Van der Krogt, 2010). According to Julien-Chinn and Liets (2019), the decision-making process is supported through group dialogue, and the ideas of collaboration and shared decision-making are congruent with a learning culture. The collaboration broadens the perception of things, helps understand things deeper by enabling a shift in the particular individual's mindset and fostering learning (Senge, 2006). Collaboration throughout the organization enables learning and changes in behavior (Garvin *et al*., 2008). Pérez López *et al*. (2004) and Nugroho (2018) stressed that organizational learning might be affected by a collaborative culture. Hence, a collaborative culture positively influences learning routines. Based on this, the following hypothesis has been developed:

H3a: Collaborative culture positively influences "learning climate."

Organizational learning has also been defined as the course of identifying and modifying mistakes resulting from interactions (Argyris and Schön, 1997). Hence, it is hypothesized that:

H3b: Collaborative culture positively influences "acceptance of mistakes."

Constant learning culture

A constant learning culture is important for continuous improvements and learning (Ahmed *et al*., 1999; Conner and Clawson, 2004; Bates and Khasawneh, 2005). The organizational learning culture was mainly conceived to promote and support constant learning in organizations. Rebelo and Gomes (2011a, 174) noted that "learning as one of the organization's core values, a focus on people, concern for all stakeholders, stimulation of experimentation, encouraging an attitude of responsible risk, readiness to recognize errors and learn from them, and promotion of open and intense communication, as well as the promotion of cooperation, interdependence, and share of knowledge." Hence, an organizational constant learning culture is composed of "learning climate" and "acceptance of mistakes." Therefore, the proposed new scale splits constant learning culture into "learning climate" and "acceptance of mistakes." People with a learning mindset are ready to be wrong (Senge, 2006)—that is, they accept that mistakes happen, and they learn from them. Zappa and Robins (2016) noted that the essence of

organizational learning is to identify and modify errors. Based on this, the following hypothesis has been developed:

H4: “Learning climate” fosters “acceptance of mistakes.”

Watkins and Marsick (1993) noted that the first step in building a learning organization is to create the ability to learn and change. Rebelo and Gomes (2011a) 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. A higher level of acceptance of mistakes fosters a learning process reflected in the level of the adaptation to inevitable change (Hind and Koenigsberger, 2008; Thomas and Brown, 2011). Hence the following can be hypothesized:

H5: Acceptance of mistakes fosters adaptability to change.

Organizational learning and change are interconnected (Argyris, 1982; Watad, 2019). Learning fosters change, and change stimulates learning. Learning requires motivation (Heckhausen *et al*., 2010). Change is inevitable. Organizational learning efficiently and effectively drives business challenges and provides resilient adaptation for rapid growth (Vithessonthi and Thoumrungroje, 2011). It provides a chance to learn and an opportunity to deliver unique value to the organization—for example, via innovations (Ghasemzadeh *et al*., 2019). Further, learning occurs when observed organizational behaviors change (Bahrami *et al*., 2016). Learning enhances the efficiency of business opportunities - chance management (Li *et al*., 2014). Dynamic and uncertain environments require a culture that is oriented towards constant, productive learning, which leads to innovative approaches (Rebelo and Gomes, 2011a). Therefore, a learning culture is essential for knowledge organizations' survival and development (Scott-Ladd and Chan, 2004). A culture of learning is important for continuous improvement (van Breda-Verduijn and Heijboer, 2016). Change can be considered a phenomenon that is tied to continuous learning and further adaptation to change (Nadim and Singh, 2019). According to Yeo (2007), organizational learning cannot be said to exist unless a change is noted in the way the employees confront their daily problems and engage in defensive (against changes) routines. Organizations that continuously renew their knowledge are in a better position to adapt to changes in the business environment and respond to them more quickly (Sanz-Valle *et al*., 2011). Hence, it is hypothesized that:

H6: “Learning climate” fosters adaptability to change.

Expected mediations

It is only natural to conclude that knowledge culture should drive adaptability to change, which is a proxy for organizational intelligence. However, it may not be easy to detect a direct influence between the two. Moreover, adaptability requires a learning culture, which is not the same as a knowledge culture. Hence, some mediation in the relationship between knowledge culture and adaptability is expected. According to Nonaka and Toyama (2003), knowledge

processes cannot proceed without collaboration. Therefore, we should assume that collaborative culture mediates the relationship between knowledge culture and learning:

KC->CC->LCC, namely: knowledge culture (KC) fosters "learning climate" (LCC) via a "collaborative culture" (CC).

KC->CC->LCM, namely: knowledge culture (KC) fosters "acceptance of mistakes" (LCM) via a "collaborative culture" (CC).

According to Garvin *et al*. (2008), learning organizations should be able to adapt to an unpredictable future more quickly than organizations that are not open to constant learning. Hence, learning is a driver of adaptability to change. Thus, a constant learning culture increases the pace of adaptability to change. Based on the above, and remembering the importance of the acceptance of mistakes, the following mediations are expected:

LCC->LCM->CHA, namely: "learning climate" (LCC) fosters change adaptability (CHA) via "acceptance of mistakes" (LCM).

Figure 1 presents the theoretical model of the current study based on the above formulated hypotheses and expected mediations.

Figure 1: Theoretical model

Figure1

Method

According to deVellis (2017, p. 2), "measurement is a fundamental activity of science." Social science measures focus on social constructs that are not easy to measure directly via, e.g., observation. Hence, scales, which are collections of statements that reflect the meaning of a particular construct, are used to reveal unobserved social variables. When it comes to knowledge culture, collaborative culture, and learning culture, the existing scales do not fully reflect the meaning (definitions) of the constructs that are in line with the essence of this study. Therefore, the Authors proposed new versions of existing scales to be sure that the current study measures what must be measured to fulfil the objectives of the study. Further, the thorough analysis showed that the measurement bias might occur by statements overlap. For example, the collaborative culture scale of Pérez López *et al*. (2004) reflected the definition of constant learning by Rebelo and Gomes (2011a, p. 174). Pérez López *et al*.'s (2004) constant learning scale ignored the "acceptance of mistakes" component, but this component was included in Lei *et al*. (2019) "knowledge-centered culture" scale. Similarly, the knowledge-centered culture scale proposed by Donate and Guadamillas (2011), and developed by Yang *et al*. (2019), consisted of the components of "learning disposition" and "acceptance of mistakes." Hence, to avoid potential bias, and inspired by Meek *et al*. (2019) and Netemeyer *et al*. (2003, p. 6), the abovementioned existing scales were revised to align them more accurately to the current study's purpose, based on the main definition provided for each construct. The already existing "personal change adaptability" scale refers to career adaptability (e.g., Maggiori *et al*., 2017) rather than adaptability to organizational change. Hence, to ensure we measure what we

are interested in, based on Ployhart and Bliese's (2006, p. 13) definition, we propose a personal change adaptability scale that measures individuals' ability to adapt to change. In summary, we first synthesized statements from prior studies according to given definitions, and then validated scales according to procedures used by Meek *et al*. (2019) and deVellis (2017). Table 2 presents a summary of this stage of the study—namely, the measured constructs, their definitions, and statements of proposed measurement scales.

Table 2: Constructs and statements

Table 2

Samples

The scale validation procedure requires a minimum of two separate samples (de Vellis, 2017; Meek *et al*., 2019) to verify the reliability and validity of the proposed scales. To do this, we used the following samples:

SAMPLE I is composed of 330 cases gathered among management students at the Gdańsk University of Technology. The sample was obtained in October 2019. Sample quality assessment: total variance extracted on 84% level, and KMO- Barlett test of the sample's adequacy on 0.796 level has been noted, which confirms the good quality of the sample (Kaiser, 1974; Hair, 2010). Also, we ran one Harman single factor test (Podsakoff & Organ, 1986). The 30% result confirmed that there was no bias.

SAMPLE II is composed of 327 cases gathered via research portal answeo.com among Polish employees working in knowledge-driven organizations. This sample was obtained from November to December 2019. Sample quality assessment: total variance extracted on 75% level, and KMO- Barlett test of the sample's adequacy on 0.876 level has been noted, which confirms the good quality of the sample (Kaiser, 1974; Hair, 2010). We also ran one Harman single factor test (Podsakoff & Organ, 1986). The 34.5% result confirmed the lack of a serious bias.

Both samples were non-random. All respondents were asked for voluntary participation. The snowball (STUDY I) and convenience (STUDY II) methods of sampling enabled the researchers to identify respondents who were sincerely interested in the subject, which contributed to the high quality of the answers. Attachment 1 contains descriptions of the samples. Table 3 compares the quality of the samples and the reliabilities obtained for the proposed scales.

Table 3: Comparison of the samples

Table 3

Confirmatory factor analysis was conducted to assess the convergent and discriminant validity of the models. Each measured construct achieved indicator loadings (standardized) above the reference level of >0.6 (Forner and Larcker, 1981; Hair *et al*., 2010; Bartlett, 1950). Internal consistency of the constructs was assessed using Cronbach's alpha >0.7 (Francis, 2001) and

average variance extracted (AVE) >0.5 (Byrne, 2016; Hair *et al*., 2010). Further, composite reliability >0.7 (Byrne, 2016; Hair *et al*., 2010) was used to justify the reliability of the scales. Next, after the positively assessed statistical power of the chosen items, discriminant validity was checked (Forner and Larcker, 1981; Hu and Bentler, 1999; DeVellis, 2017). Namely, similar theoretically related constructs were verified to ensure they did not supercharge each other (Fornell–Larcker Criterion). The obtained square root of the AVE was larger than the correlation observed between the particular constructs, which meant that the discriminant validity of the proposed scales worked properly. Table 4 presents the details of this verification.

Table 4: Descriptive statistics and correlations

Table 4

note: STUDY I n=330 / STUDY II n=327

KC – knowledge culture, CC – collaborative culture, LCM – learning culture „ acceptance of mistakes", LCC – learning culture „climate", CHA –adaptability to change

Next, two structural models were developed that presented results obtained separately for both samples composed of two different groups: students aged 18–24 and employees aged >24 who worked in knowledge-driven organizations. The models were compared to determine what kind of "mental model" (Senge, 2006) they reflect in terms of adaptability to change driven by knowledge culture in two different environments: university and business.

Results

This study aimed to determine the extent to which knowledge culture fosters organizational intelligence via the acceptance of mistakes. Collaboration, knowledge, and learning cultures shape organizational behaviors; hence, all direct and indirect relationships of the above variables were examined. Table 5 presents the verification of all formulated hypotheses regarding the direct influences on both samples. Hypothesis H1a regarding the direct positive influence of knowledge culture on the learning climate is not significant for both samples. In contrast, Hypothesis H1b regarding the positive influence of the knowledge culture on the acceptance of mistakes is significant for both samples but negative for the employee sample. This means that students, driven by the knowledge culture of the university, accept mistakes, but working adults do not. Hypothesis H2 regarding the positive influence of knowledge culture on collaboration culture has been confirmed for both samples. Similarly, hypothesis H3a regarding the positive influence of collaborative culture on the learning climate as well as hypothesis H3b regarding its influence on the acceptance of mistakes were confirmed. For hypothesis H4, the positive influence of the learning climate on the acceptance of mistakes was confirmed only for students. This was also the case for hypothesis H5 regarding the positive influence of the acceptance of mistakes on adaptability to change. Conversely, hypothesis H6 regarding the positive influence of the learning climate on adaptability to change was not significant for students but was significant for employees. Table 5 and Figure 2 present the direct results of the study, and Table 6 presents the indirect effects.

Figure 2: Results

Figure 2

Note: STUDY I/STUDY II

STUDY I: n = 330 $\chi 2(110) = 270$ CMIN/df = 2.46 ML, standardized results, RMSEA = 0.067, 90% CI [0.057, 0.077], CFI = 0.969, TLI = 0.962, ***p < .001.

STUDY II: n = 326 $\chi 2(110) = 191.58$ CMIN/df = 1.74 ML, standardized results, RMSEA = 0.048, 90% CI [0.036, 0.059], CFI = 0.972, TLI = 0.966, ***p < .001.

Table 5: Results

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Table 6: Mediations analysis

Table 6

note: STUDY I / STUDY II

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Table 6 presents an analysis of the expected mediations. Full mediation was observed for both samples in the collaborative culture relationship between knowledge culture and "learning climate." This means that knowledge culture leads to a learning climate only via collaborative culture in both the students' and employees' environments. The first difference between the results obtained for the samples was observed for the relationship between knowledge culture and acceptance of mistakes mediated by collaborative culture. It is complementary for the students' sample (STUDY I) but competitive for adults (STUDY II). Thus, without the support of a collaborative culture, knowledge culture has a negative effect on the acceptance of mistakes for adults. It reflects the attitude that when we deal with a culture of knowledge, there is no room for mistakes. Whereas it is quite the opposite in the case of students. The second difference is observed for climate learning and adaptability to change via the acceptance of mistakes, which is fully mediated for the student sample but not for adults. Hence, mistakes help students foster their adaptability to change. Adults adapt to changes in the learning culture directly from the learning climate, without the acceptance of mistakes. Based on the obtained R2 = 0.14 for adults and R2 = 0.05 for students, it may be concluded that there are other factors,

which are not included in the structural model, that influence the adaptability to change of these groups. The most surprising result is the low R2 obtained for the student sample.

Discussion

The presented findings prove that the acceptance of mistakes is vital for adaptability to change. "Change and transformation require two separate but inter-related processes of self-discovery and self-improvement." (Nadim and Singh, 2019, p. 515) Thus, it is probable that mistakes are not the source of learning for those who choose not to notice them or do not want to learn from them. This explains why the R2 results are so low. It also suggests that after conducting this complex study on the acceptance of mistakes and adaptability to change, we know almost nothing about them. However, other variables exist that have not been included in the structural model, and these should be investigated in more depth. To do this, some post hoc hypotheses have been developed and verified.

Hypotheses "post hoc"—more-in-depth investigation

Following the above, we developed a hypothesis that the culture of the environment, university or company, is likely to determine the acceptance of mistakes and adaptability to change. To verify this hypothesis, both samples were incorporated, and the relationship between the acceptance of mistakes and adaptability to change, including "age" as moderator, was examined. A moderator is a variable that explains the conditions under which a particular causal effect occurs (Hayes, 2018). Therefore, it is hypothesized that the culture of the environment might completely change the relationship between learning from mistakes and adaptability to change. We can come to this conclusion based on the age variable because, in this case, the age is consistent with the environment of the respondents, i.e., university or business. Hence, PROCESS macro software (Hayes, 2018) was used to verify the hypothesized moderation with the use of OLS regression. Figure 3 illustrates the results, and Appendix 2a presents the PROCESS software output.

Figure 3: Moderated by age relationship between the acceptance of mistakes on adaptability to change.

Figure 3

As Figure 3 and Appendix 2a show, unlike employees, university students did not increase their adaptability to change when they accepted mistakes. This confirms the hypothesis that the culture of the environment is vital for learning behaviors. Based on the structural models, the university environment culture (based on the students sample) was found to foster adaptability to change, but the business environment culture (based on the business sample) did not. When we eliminate culture as a predictor and focus only on adaptability to change driven by the acceptance of mistakes, we will observe that students do not adapt to changes via mistakes, whereas employees do. Continuing the analysis of the influence of culture, knowledge culture, and collaborative culture, all these factors have been verified as moderators for the focal relationship. As a result, knowledge culture was not identified as a significant moderator, whereas the collaborative culture was. Figure 4 and Appendix 2b present the details of these

findings. The above proves our earlier assumption that knowledge culture is robust, but a collaborative, learning culture is fundamental for adaptability to change. Figure 4 presents a moderated by collaborative culture effect of moderated by age relationship between mistakes acceptance on change adaptability.

Figure 4: Moderated by collaborative culture effect of moderated by age relationship between mistakes acceptance on change adaptability.

Figure 4

Figure 4 shows that in the case of students, the more intensive the collaborative culture, the more negative the relationship between acceptance of mistakes and adaptability to change is. The opposite moderated effect is observed for business employees. The more intensive the collaborative culture, the more positive the relationship between acceptance of mistakes and adaptability to change is observed. These results show the extent to which the university environment culture and business environment culture differ. According to the "reference group theory'" (Ashforth and Mael, 1989), young people define themselves strongly in light of a particular group. Therefore it is likely that they will also "keep up collective resistance" against change. It is interesting in the light of the results of structural models presented earlier, which showed that knowledge culture at university is a strong predictor that fosters adaptability to change. Therefore, it is worth to notice that the knowledge culture of a university is significant as a predictor but not significant as a moderator. It is in line with the general idea of the "moderator variable", moderator explains the conditions under which a particular effect occurs. So, knowledge culture is a constant condition at university. Therefore, it is a good predictor but is not a proper moderator.

The expected factor that can help us better understand the above-described situation is "risk." In light of the theory of planned behavior (Ajzen, 1991), the attitude toward risk may be relevant here. Moreover, according to Quintal *et al*. (2010), perceived risk influences decision-making processes. Hence, people who avoid risk-taking will likely use the well-known, old methods of work to avoid mistakes for fear of failure. Figure 5 attempts to explore this by presenting risk and age moderating moderations on the relationship between adaptability to change and acceptance of mistakes. Appendix 2c presents the output details of PROCESS software for this analysis.

Figure 5: Moderated by risk effect of moderated by age relationship between the acceptance of mistakes on change adaptability.

Figure 5

Figure 5 shows that failure is a good opportunity to take a lesson, but only for those who are brave enough to take this lesson (take a risk). For young people who avoid risk, the effect of acceptance of mistakes on adaptability to change is negative, as observed in Figures 3 and 4. Hence, young people are not likely to take the risk at university. In a broader context of this study (not only Figures 3–5), students follow the university culture, which is understood to be a set of knowledge, collaboration, and learning climate, so they accept mistakes and adapt to

changes according to the university's rules. In contrast, adults learn from their mistakes and adapt to changes. Those who are not "risk-taking people" adapt faster and better. Hence, analyzing this effect in a broader context of the entire study, and taking into account knowledge, collaboration, and learning cultures, which we can define as a business circle culture, it is clear that this environment does not accept mistakes. This is why employees are so likely to effectively (and probably quickly) learn from them. Business organizations do not accept them, so employees are motivated to learn from them (to avoid them). They learn fast how to be fitted to the organizational system, which is constant. It is a paradox: employees learn and adapt to change, whereas organizations do not. All these conclusions lead to interesting practical implications.

Practical implications

Knowledge is power, but learning is everything. Mistakes are an interesting source of new knowledge – they are, in a way, a 'call for change' – in personal and organizational behavior. Based on the presented empirical evidence, which is with a line with the meta-model for organizational change (Maes and Van Hootegem, 2019), scanning, interpretation, learning, and incorporation phases of, e.g., mistakes analysis may initiate a change. Specifically, when mistakes are transformed into meaning, the organization may capture new knowledge. However, there is no chance to gain new knowledge from it if a person or an organization is not willing to learn. The same is true for organizations that are not prepared for errors. Paradoxically, if an organization is unprepared and does not accept mistakes, their employees learn effectively, and their intelligence grows, but the intelligence of the organization does not. The employee learns how to bypass the system, e.g., to avoid mistakes, and if they occur (making mistakes is human), how to cover them up. Therefore, the fact that employee intelligence is increasing does not mean that organizational intelligence is expanding. Employees learn how to adapt to the company system and do not make mistakes, but it does not develop the entire company system and does not help the organization to grow.

Organizations must be ready to be wrong to benefit from the development of their employees. However, if they begin to accept mistakes, their employees will not be as motivated to grow as they are when errors are forbidden. Hence, a love-hate relationship with the acceptance of mistakes is recommended. Mistakes are efficient in terms of adaptability to change, but only for those who want to learn from them. The essence of the mistakes paradox is that people cannot learn without making mistakes, but mistakes are never welcomed. As it was noted before, errors are commonly perceived as a phenomenon that should be eliminated, and that is why employees often conceal their mistakes. Since everybody makes mistakes, and everybody covers them up, it contributes to creating a sort of illusion. It is why this study's findings should encourage organizations to "be mature" and develop internal mechanisms that will help them take advantage of the mistakes employees make to transform them through "lessons learned."

Finally, the fact that mediated by "acceptance of mistakes" effect of the "learning climate" on "adaptability to change" has been detected for young students aged 18-24, whereas this relationship is not significant for business employees aged >24, suggests that organizations,

unlike universities, do not use mistakes as a tool to support learning leading to change. To do this, they need to develop internal mechanisms of "learning from mistakes."

Mistakes are the best source of new knowledge, which is vital if we want to achieve greater adaptability to change and increase intelligence. Mature organizations that want to learn from mistakes must develop appropriate mechanisms to fulfill this objective since organizations without such tools lose the potential of development.

Limitations and scientific implications

In light of the given in-depth investigation presented in this study, the next research question which arises is: Are organizations that do not accept mistakes considered learning organizations? On the one hand, in light of Senge's theory of learning organization, being ready to be wrong is a focal point to learn (Senge, 2006). Hence, knowledge organizations that do not accept mistakes may have problems with learning. On the other hand, employees who work in such organizations are motivated to learn fast (they want to avoid mistakes by learning quickly). In light of the presented findings that those employees who don't take risk learn better lessons from errors than those who take risks - this provokes another question. Perhaps a better question than previous is: Which types of organizations learn faster and better, and which strategy is better in the long run? Those that do accept mistakes or those that do not? Do big hierarchical and mature organizations learn from mistakes and adapt to changes better or worse than small and young enterprises? What about risk? How is a risk related to organization type in the context of learning from mistakes and adaptability to change? Does leadership matter for this relationship? How technology-driven interactions influence adaptability to change via the acceptance of mistakes in the learning process? Moreover, how might broad acceptance of mistakes influence formal and non-formal learning technologies? These questions inspire interesting topics for further research.

Also, we must not forget that national intellectual capital levels also differ (Labra and Sánchez, 2013). Jamali and Sidani (2008), and Kucharska and Bedford (2019) showed that the context of the country under investigation is important in organizational learning and knowledge sharing studies. It would be interesting to observe how the presented theory is reflected in the context of countries other than Poland.

The main limitation of this study is that the "student sample" was composed of students from just one university, majoring in the same field. Findings obtained from students with a different mindset (e.g., with another major than management) may be different. Moreover, the "business sample" mostly included small and medium-sized companies (Appendix 1). Hence, the business sample may reflect the national (post-communist) culture of Poland. Large companies usually design their culture so that it matches their business aims. Therefore, this study can be replicated for big Polish companies, international companies located in Poland, and other countries. It would be interesting to benchmark these findings with large companies and across industries or national cultures.

In summary, mistakes are presented here as a valuable resource that enables the adaptation and development of intelligence. Hence, this study brings to attention a promising research area, i.e., "learning from organizational mistakes."

Conclusion

This study breaks with conventions of 'exaggerated excellence' and promotes acceptance of mistakes in organizations to develop organizational intelligence. It proposes a constant learning culture scale that embodies 'acceptance of mistakes' and 'learning climate' dimensions of learning. Further, it empirically proves the value of mistakes for adaptability to change. This study also exposes the essential paradox of organizations today: if they accept errors, their employees will not grow, but if they do not accept mistakes, their employees will grow, but the growth of employees is not equal to the growth of organizational intelligence. Thus, referring to Senge's (2006) theory of learning organizations, it is not clear which type of organizations learn faster and better: those that accept mistakes or those that do not. Which strategy is better in the long run? This is an interesting question which deserves future research.

Finally, whether organizations like it or not, mistakes have always been a part of human life, and this will never change. It is up to organizations if they will perceive mistakes as an opportunity for developmental change or worrisome burden. Based on the findings presented in this study, a love-hate relationship with the acceptance of mistakes is recommended. Love them as an opportunity to learn and grow, hate them when this opportunity is lost.

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Appendix 1

Description of samples

	SAMPLE I	SAMPLE II
Gender	Female: 48% Male: 52%	Female: 44% Male: 56%
Age	18–24 years	25–34 (52%) 35–44 (28%) 45–54 (16%) 55–74 (3%) >75 (1%)

Company size	Gdansk University of Technology—large university with more than 100 years of tradition	Small (28%) Medium (31%) Big (21%) Large (9%)
Industries	Education	IT (26%) Sales (13%) Finance (12%) Production (10%) Education (10%) Service (9%) Construction (7%) Healthcare (4%) Logistics (3%) Others (3%)

Appendix 2

PROCESS output

a) Figure 3

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Model  : 1
    Y  : change adaptability
    X  : acceptance of mistakes
    W  : age
Sample Size:  657

**************************************************************************

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .2366      .0560     1.4566     5.1811     3.0000   262.0000      .0017

Model
              coeff         se          t          p       LLCI       ULCI
constant     4.4899      .2883    15.5731      .0000     3.9222     5.0576
mistakes      .2043      .0542     3.7694      .0002      .0976      .3110
age           1.6404      .6265     2.6184      .0093      .4068     2.8740
Int_1        -.3373      .1274    -2.6484      .0086     -.5881     -.0865

Product terms key:
 Int_1    :        mistakes     x        age

Test(s) of highest order unconditional interaction(s):
       R2-chng          F        df1        df2          p
X*W      .0253     7.0140     1.0000   262.0000      .0086

Level of confidence for all confidence intervals in output:  95.0000
NOTE: Standardized coefficients not available for models with moderators.
```

b) Figure 4

```
Model  : 3
Y  : change adaptability
    X  : acceptance of mistakes
```

```
    W  : age
    Z  : collaborative culture (CC)

Sample Size:  657

**************************************************************************
Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .3159      .0998     1.4105     4.0871     7.0000   258.0000      .0003

Model
              coeff         se          t          p       LLCI       ULCI
constant     7.7136     1.3885     5.5553      .0000     4.9793    10.4478
mistakes     -.5762      .2784    -2.0697      .0395    -1.1244     -.0280
age          -5.0827     2.2173    -2.2923      .0227    -9.4490     -.7163
Int_1        1.1495      .4949     2.3226      .0210      .1749     2.1242
CC           -.5914      .2690    -2.1982      .0288    -1.1211     -.0616
Int_2         .1393      .0506     2.7522      .0063      .0396      .2390
Int_3        1.2546      .4375     2.8676      .0045      .3931     2.1162
Int_4        -.2721      .0915    -2.9734      .0032     -.4523     -.0919

Product terms key:
 Int_1    :        mistakes   x        age
 Int_2    :        mistakes   x        CC
 Int_3    :        age        x        CC
 Int_4    :        mistakes   x        age        x        CC

Test(s) of highest order unconditional interaction(s):
         R2-chng          F        df1        df2          p
X*W*Z      .0308     8.8412     1.0000   258.0000      .0032

Level of confidence for all confidence intervals in output:  95.0000
NOTE: Standardized coefficients not available for models with moderators.
```

c) Figure 5

```
Model  : 3
Y  : change adaptability
X  : acceptance of mistakes
W  : age
Z  : Risk taking personality

Sample Size:  657

**************************************************************************
Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .2726      .0743     1.4505     2.9585     7.0000   258.0000      .0053

Model
              coeff         se          t          p       LLCI       ULCI
constant     5.4541      .9390     5.8087      .0000     3.6051     7.3031
mistakes      .0149      .1802      .0827      .9342     -.3399      .3697
age          -2.3928     1.7546    -1.3637      .1738    -5.8481     1.0624
Int_1         .4694      .3469     1.3531      .1772     -.2137     1.1524
Risk         -.6387      .5959    -1.0719      .2848    -1.8121      .5347
Int_2         .1287      .1128     1.1411      .2549     -.0934      .3508
Int_3        2.6412     1.1845     2.2298      .0266      .3086     4.9739
Int_4        -.5361      .2313    -2.3179      .0212     -.9916     -.0807

Product terms key:
 Int_1    :        mistakes x        age
 Int_2    :        mistakes x        Risk
 Int_3    :        age      x        Risk
 Int_4    :        mistakes x        age        x        Risk
```

```
Test(s) of highest order unconditional interaction(s):
         R2-chng          F        df1        df2          p
X*W*Z      .0193     5.3727     1.0000   258.0000      .0212

Level of confidence for all confidence intervals in output:  95.0000
NOTE: Standardized coefficients not available for models with moderators.
```

Table 1: Study overview

RQ	How is the acceptance of mistakes related to organizational intelligence driven by knowledge culture?
General aim	The study aims to develop and empirically verify a theoretical model, including such constructs as knowledge, learning, and collaboration cultures, to determine how they foster adaptability to change treated as a proxy of organizational intelligence.
Specific aims	1. Develop and validate the scale of constant learning culture composed of "acceptance of mistakes" and "learning climate." 2. To find out, based on the empirical evidence on how knowledge, collaboration, and learning culture, including "acceptance of mistakes," foster adaptability to change (organizational intelligence).
Main assumptions based on the literature review	Change adaptability creation is a proxy for organizational intelligence (Feuerstein, 1979).
	In today's aggressive and complex business conditions, organizations must continuously evolve and adapt to changes (Goswami, 2019).
	Garvin et al. (2008) stressed that being a learning organization are open to making changes when needed.
	When we want to learn, we must be ready to be wrong (Senge, 2006). Mistakes are part of human learning, and the challenge caused by change is growing as fast as, or even faster than, human skills (Kotter, 2007, 2012).
	The existing constant learning scales omit the acceptance of mistakes component, which is fundamental in this study. Hence, the learning culture scale should be revised (Yang, 2003; Marsick and Watkins, 2003; Yang *et al*., 2004; Pérez Lopez *et al*., 2004; Graham and Nafukho, 2007; Song, 2008; Dirani, 2009; Joo, 2010; Rebelo and Gomes, 2011b; Jiménez-Jiménez and Sanz-Valle, 2011; Islam *et al*., 2013; Choi, 2019; Nam and Park, 2019; Lin *et al*., 2019).
	Culture is a "key ingredient in shifting from knowledge to intelligence" (Rothberg and Erickson, 2005, p. 283).
Research gaps	1. There is a lack of "acceptance of mistakes" component in existing scales of "learning culture" measurement. 2. There is a lack of empirical evidence on how knowledge, collaboration, and learning culture, including "acceptance of mistakes," foster adaptability to change (organizational intelligence).
STUDY METHODS	
Scales and models have been validated based on two samples: STUDY I: Data collected via paper version of questionnaire from October to November 2019. The sample is composed of 330 management students at Gdansk University of Technology, Poland, aged 18–24. STUDY II: Data collected via electronic version of questionnaire from November to December 2019. The sample is composed of 327 employees working in knowledge-driven organizations located in Poland, aged >24. Method of data analysis: 1. Scales reliability and validity (Table 3, Table 4) 2. SEM model (SPSS AMOS 25 software): H1:H6 and mediations verification (Table 5).	

Novelty	This study proposes a constant learning culture scale that embodies the "acceptance of mistakes" and "learning climate" dimensions. Further, it empirically proves the value of mistakes for adaptability to change.

Table 3: Samples comparison

Samples comparison	STUDY I	STUDY II
	n=330	n=327
KMO	.796	.876
Barlett test	5395.04(136) ***	3034(136)***
Harman one factor test	30 %	34,5%
Total Variance Explained	82%	74%
Common Method Bias (CMB)	53%	45%
Loadings		
KC CR=.82./.82 AVE=.53/.54 Cronbachα=.81/.80	.62 .74 .72 .81	.73 .81 .61 .78
CC CR=.90/.87 AVE= 68/.63 Cronbachα=.89/.87	.81 .88 .83 .78	.73 .83 .82 .78
LCC CR=.95/.86 AVE= .83/.60 Cronbachα=.96/.85	.92 .93 .90 .89	.73 .83 .77 .77
LCM CR=.92/.86 AVE= .74/.61 Cronbachα=.94/.86	.85 .89 .86 .84	.77 .73 .80 .81
CHA CR=.90/.90 AVE= .77/.69 Cronbachα=.93/.90	.85 .93 .89 .83	.85 .88 .80 .79

note: STUDY I n=330 / STUDY II n=327, *** p<0.001

KC – knowledge culture, CC – collaborative culture, LCM – learning culture „mistakes acceptance", LCC – learning culture „climate", CHA – change adaptability

Table 4: Descriptive statistics and correlations

variable	Mean	SD	AVE	Cronbach	CR	KC	CC	LCC	LCM	CHA
KC	5.8/6.4	1.06/0.88	.53/.54	.81/.80	.82/.82	**.72/.73**				
CC	5.1/5.5	1.04/1.15	.68/.63	.89/.87	.90/.87	.44/.48	**.82/.79**			
LCC	3.8/5.5	1.02/1.2	.83/.60	.96/.85	.95/.86	.12/.40	.26/.78	**.91/.77**		
LCM	4.8/5.0	1.02/1.5	.74/.61	.94/.86	.92/.86	.39/.08	.52/.27	.32/.69	**.86/.78**	
CHA	5.2/5.4	1.01/1.2	.77/.69	.93/90	.90/.90	.09/.17	.12/.26	.05/.37	.23/.21	**.87/.83**

note: STUDY I n=330 / STUDY II n=327

KC – knowledge culture, CC – collaborative culture, LCM – learning culture „mistakes acceptance", LCC – learning culture „climate", CHA – change adaptability

Table 5: Results

Hypothesis	β	t-value	p-value	Verification
H1a	ns / ns	.14 / .54	.88 /.588	rejected / rejected
H1b	.21 / -.41	3.2 / -5.7	*** / ***	supported / rejected
H2	.44 / .48	6.49 / 6.30	*** / ***	supported / supported
H3a	.26 / .77	3.9 / 9.98	*** / ***	supported / supported
H3b	.39 / .88	6.16 / 7.21	*** / ***	supported / supported
H4	.19 / ns	3.8 / 1,63	***/ .102	supported / rejected
H5	.24 / ns	4.06 / -.89	***/ .369	supported / rejected
H6	ns / .43	-.42 / 4.46	.674 / ***	rejected / supported

note: STUDY I / STUDY II

STUDY I: n = 330 $\chi2(110) = 270$ CMIN/df = 2.46 ML, standardized results, RMSEA = 0.067, 90% CI [0.057, 0.077], CFI = 0.969, TLI = 0.962, ***p < .001.

STUDY II: n = 326 $\chi2(110) = 191.58$ CMIN/df = 1.74 ML, standardized results, RMSEA = 0.048, 90% CI [0.036, 0.059], CFI = 0.972, TLI = 0.966, ***p < .001.

Table 6: Mediations analysis

Mediation	effects		Mediation type observed
	direct	indirect	
KC->CC->LCC	-.012 (ns) /.034 (ns)	.123 (***) /.37 (***)	indirect-only (full)/ indirect-only (f
KC->CC->LCM	.213 (**) /-.41 (***)	.191 (***) /.49 (***)	complementary/competitive mediat
LCC->LCM->CHA	-.025 (ns) / .43 (***)	.048 (***) / -.014 (ns)	indirect-only (full)/no mediation

note: STUDY I / STUDY II

STUDY I: n=330 $\chi2(110)=270$ CMIN/df=2.46 ML, standardized results, RMSEA = 0.067, 90% CI [0.057, 0.077], CFI = 0.969, TLI = 0.962, ***p < .001.

STUDY II: n=326 $\chi2(110)=191.58$ CMIN/df=1.74 ML, standardized results, RMSEA = 0.048, 90% CI [0.036, 0.059], CFI = 0.972, TLI= 0.966, ***p < .001.

Figure 1

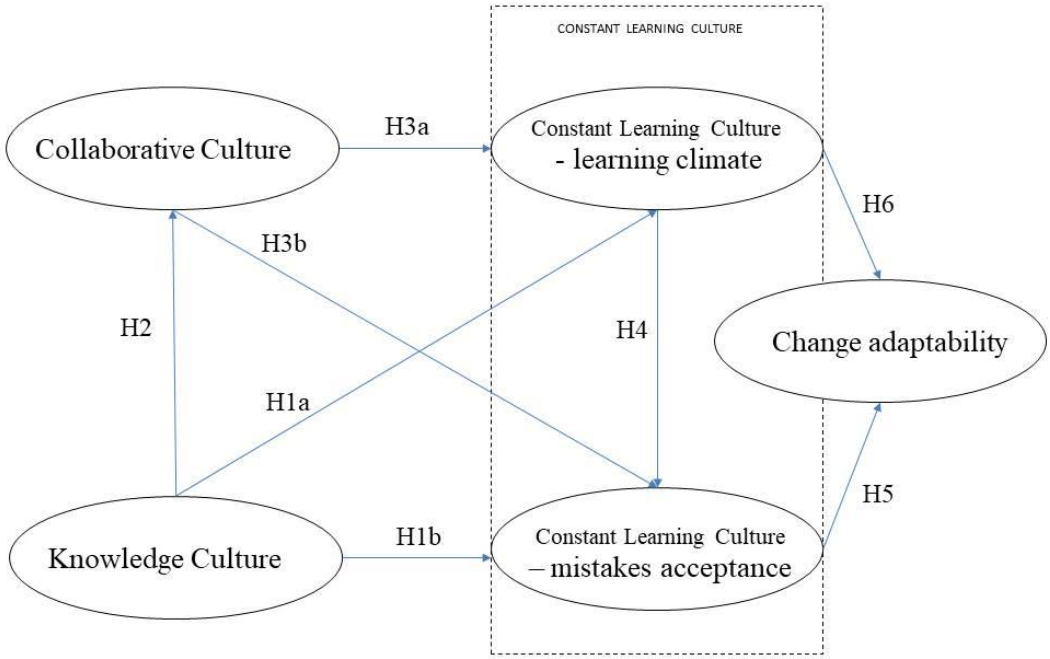

Figure 2

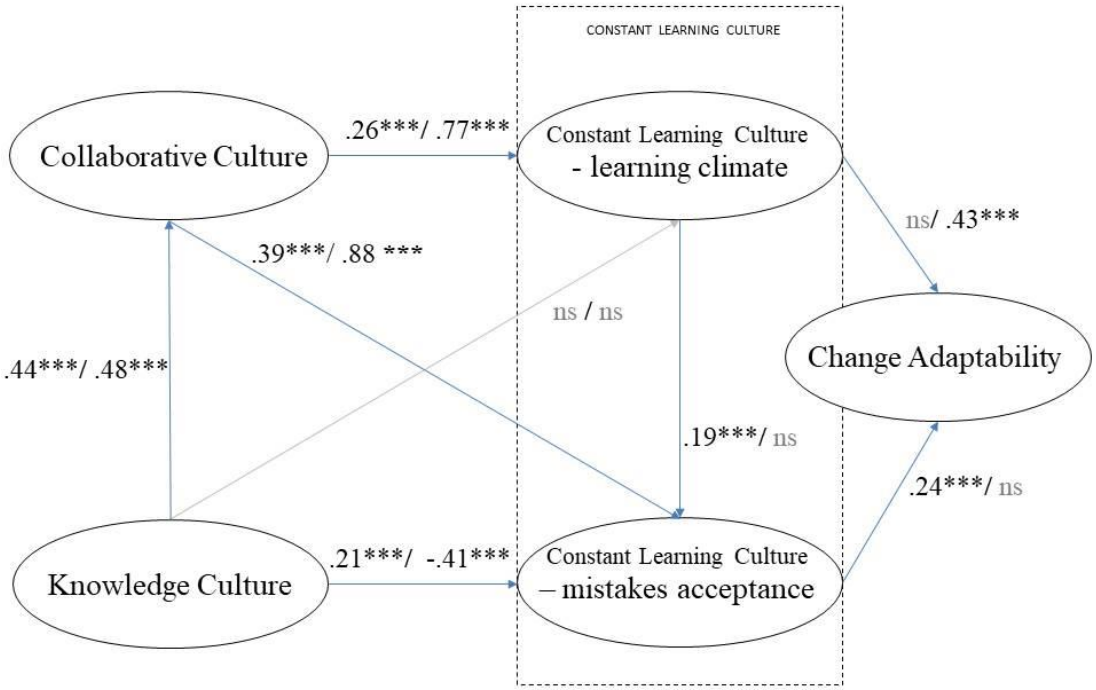

Figure 3

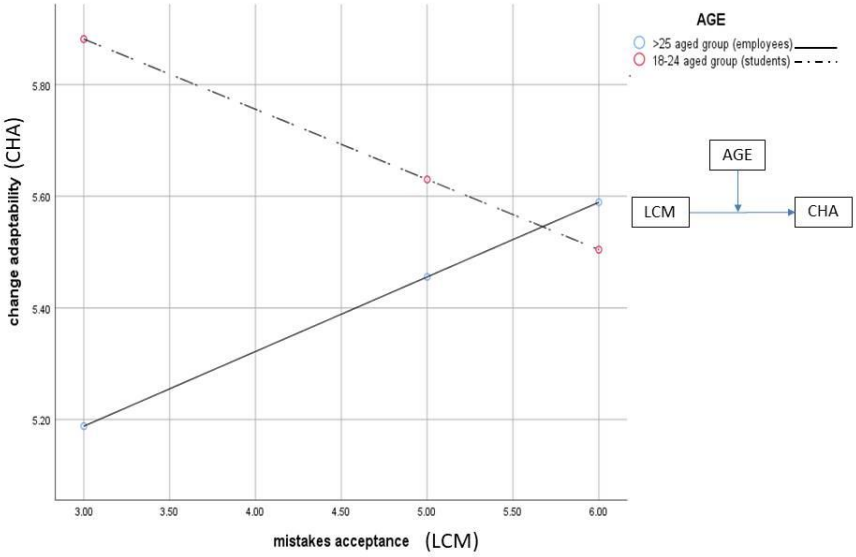

Figure 4

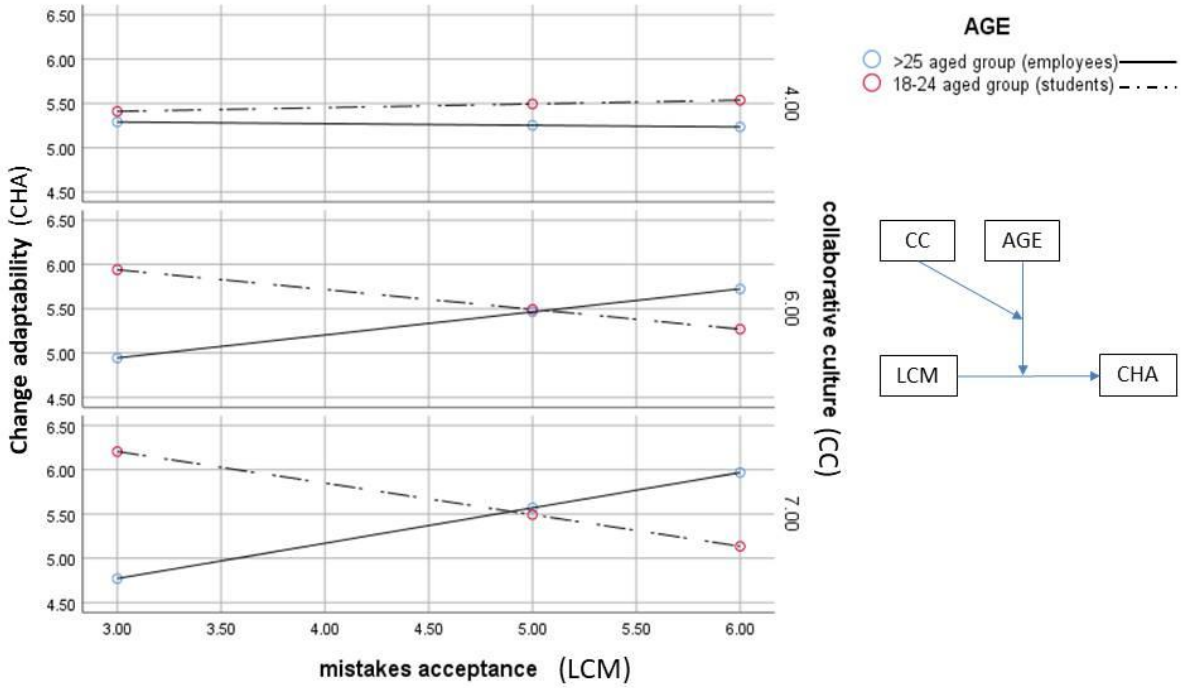

Figure 5