UCAM

UNIVERSIDAD CATÓLICA
SAN ANTONIO

Programa de Doctorado en Ciencias Sociales

Actividad Formativa

Presentación de Resultados de Investigación y Plan de Trabajo para el curso siguiente

28/02/22

Interpersonal and contextual factors in the development of intelligent social systems
a mixed-methods approach on software development teams working in a self-organised environment using agile working methods.

Author:
Laura Sophie Aichroth

Supervisors:
Prof. Dr. Laura María Campoy & Prof. Dr. Mandy Nuszbaum

Abstract

This report of the research results gives insights into the progress, status, and plans of the dissertation project, which started in October 2019. It consists of two major parts: firstly, the status of the dissertation project in January 2022 will be given, including an overview of the activities done in the third year. Furthermore, an overview of the conducted studies will be provided.
The initial title is a working title and modifications are requested to the Committee for the final title: "Innovation calling! Building a framework for measuring collaboration effects in software development: The influence of leadership through organisational and team mediating effects on initiative and learning during COVID-19."
It was required to adapt the title and dissertation project due to the COVID-19 pandemic in agreement with the supervisors. The approach was to quantitatively measures of the perception of leadership and work of members of software development teams.

Keywords: transformational leadership; team-level transformational leadership; organizational psychological safety; organizational initiative; teamwork quality; high-performing team; individual learning; collaboration, software development; Germany; COVID-19.

1 Introduction

Being innovative is essential when aiming to remain successful and thrive globally (Brand et al., 2021; Brem & Nylund, 2021). Technological innovations positively influence organisations, whereby technology organisations experience high competition (Heinze & Heinze, 2020; Jahanshahi et al., 2020). With increasing changes in modern organisations and their environments, continuous learning and innovations are becoming increasingly important to stay competitive. Furthermore, organisations are dependent on capable individuals and multi-disciplinary teams since teamwork promotes individual participation, the willingness to try, learning motivation, loyalty, and creativity. Those effects are relevant for high performance, change, and innovation and essential for the success of a team and the whole organisation (Brodbeck, Anderson & West, 2000b). Thereby, optimal working conditions benefit employees and organisations alike (Ilies et al., 2017).

Overall, there is an increasing importance of technological solutions, which sets the focus of this dissertation project on members of software product development teams. Furthermore, the influence of disruptive technologies on the innovation climate and the ongoing cultural challenges supports the importance of this target group (Newman et al., 2020; Thorgren & Caiman, 2019). Therefore, this dissertation project aims to examine the perception of members of software product development teams at work. The research is based on three multi-organisation studies in Germany.

This report of the research results and progress contains the current state in 2022, including an overview of the status of the activities of the dissertation project. Furthermore, insights will be given into the conducted studies within the dissertation project. Since this report is handed in together with the final thesis, the only outlook is the following tribunal afterwards.

2 Project status 2022

This chapter includes an overview of the completed activities and the development in 2020, 2021, and 2022. Furthermore, insights will be delivered for the status of the three studies of the PhD project.

2.1 Status of activities

During the last year, the requirements of activities changed from the academic committee. However, all initially required eight activities were fulfilled and outline in the following. In the second and third year of the PhD program, the following activities were completed:

- **Activity 1: Research Seminars** done.
- **Activity 2: Research Seminars II** offered by FOM was attended in 2019 and 2020
- **Activity 3: Review of a relevant scientific article** was presented to the FOM in 2019.
- **Activity 4: Presentation of a communication in a National Congress** was given in 2020 at the 3rd International Conference on Modern Research in Social Sciences (ICMRSS) in Munich, Germany.
- **Activity 5: Presentation of a poster in an International Congress** was given in 2019 at the International Scientific Conference Modern Economy, Smart Development at the University of Sopron, Hungary.
- **Activity 6: Scientific article** is accepted.
- **Activity 7: Doctoral Workshop** offered by UCAM was attended in 2020.
- **Activity 8: Presentation of own Research Results and the Research** is done.

2.2 Development in 2020, 2021, and 2022

The main effort in the second and third year went into fulfilling the started or missing activities and designing, conducting, and evaluating the second and third studies. Now, not only all activities are fulfilled but also the thesis is written and corrected. Both supervisors signed all needed forms to hand in the thesis. With this, the dissertation project is completed after two and a half years.

2.3 Study 1 – Is there a relationship between the perceived team climate for innovations and the experience of flow and worry for members of software development teams?

The research interest of the first study was the climate for innovation and the experience of flow and worry of team members of software product development teams during work. Companies strive to create an environment that is conducive to the development of innovations. Numerous studies have already been conducted on the conditions and positive correlations of the climate for innovation - but hardly any connection with the experience of flow and adverse personal effects (Newman, 2020; Brodbeck et al., 2000; Csikszentmihalyi, 1999; Anderson & West, 1998).

Due to prior research on flow experience, this study examined whether team size had a moderating effect. The first study data have been cleaned and analysed ($N = 323$), and the according paper is submitted to a journal that fulfils UCAM requirements. This study was used and published in a paper to fulfill activity 6.

3.2.1 Study 2 – Does the perceived climate for initiative mediate the relationship between transformational leadership and the climate for psychological safety for members of software development teams?

Due to the first study results, the second study focused on the perceived leadership climate and the extent of perceived psychological safety and climate for initiative (N = 121). Transformational leadership means leading through intrinsic motivation with vision, encouragement, trust, values, and competence (Carless et al., 2000). Like pretty much all leadership styles, this one is not entirely uncritical (e.g., Siangchokyoo et al., 2020; Banks et al., 2016), but it is most suitable for the work context of interest, since in the field of software product development, for example, a lot of leadership is about vision and delegation.

The concept of psychological safety implies that otherness is tolerated, mistakes are not used against anyone, there is a sense of being able to ask for help and take risks, a mutual appreciation of skills and talents, and being able to raise problems and complex issues (Baer & Frese, 2003; Edmondson, 1999). Initiative means, among other things, setting a focus on solutions instead of problems, wanting to achieve goals, or implementing ideas (Baer & Frese, 2003; Frese et al., 1997).

The second study investigated the relationship between perceived leadership and the experienced climate for psychological safety and whether this relationship is mediated by a perceived climate for initiative (Baron & Kenny, 1986). This study is part of the thesis.

3.2.2 Study 3 – Is the relationship between the perceived team-centric transformational leadership and individual team members' learning mediated by teamwork quality for software development teams?

Continuing the findings and needed contribution of the second study, the third study focused on the perception of members of software product development teams on leadership, the quality of teamwork as well as being a high-performing team, and individual learning. The results partly supported the scientific state of research and provided recommendations for action in organisations.

The results were cleaned and analysed (N = 224). Being a high-performing team partially mediated the path between the perceived team-level transformational leadership and individual learning However this was not the case for teamwork quality. Moreover, team interventions did not moderate the path between high-performing team and individual learning.

Furthermore, results supported Mathieu et al. (2019) and their theory of teams as complex systems with the approach to examining mediating variables. This study is part of the thesis.

3 Outlook

Since all activities are fulfilled, the next step is handing in the thesis and finishing the tribunal.

3.2 Upcoming focus

The following months will focus on preparing the tribunal, which will be handed in in March 2022.

4 Conclusion

Until now, the dissertation project is in time and close agreement and contact with the supervisors. Therefore, currently, there is no risk in sight for the dissertation project to be finished in time as planned. All external dependencies were managed successfully since all activities are completed.

5 References

Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: development and validation of the team climate inventory. *Journal of Organizational Behavior*, *19*(3), 235258. https://doi.org/10.1002/(SICI)1099–1379(199805)19:3%3C235::AID-JOB837%3E3.0.CO;2-C

Baer, M., & Frese, M. (2003). Innovation is not enough: climates for initiative and psychological safety, process innovations, and firm performance. Journal of Organizational Behavior, *24*(1), 45–68. https://doi.org/10.1002/job.179

Banks, G. C., Davis McCauley, K., Gardner, W. L., & Guler, C. E. (2016). A meta-analytic review of authentic and transformational leadership: A test for redundancy. *The Leadership Quarterly*, *27*(4), 634–652. https://doi.org/10.1016/j.leaqua.2016.02.006

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Brand, M. *et al.* (2021). Agility as an innovation driver: towards an agile front end of innovation framework. *Review of Managerial Science, 15*, 157–187. https://doi.org/10.1007/s11846-019-00373-0

Brem, A., & Nylund, P. (2021). Maneuvering the bumps in the New Silk Road: Open innovation, technological complexity, dominant design, and the international impact of Chinese innovation. *R & D Management*, *51*(3) 293–308. https://doi.org/10.1111/radm.12451

Brodbeck, F. C., Anderson, N., & West, M. A. (2000). Das Teamklima-Inventar: Handanweisung. *[The Team Climate Inventory: Manual]*. WOP Working Paper No. 2000 / 2. Retrieved from http://www.psy.lmu.de/wirtschaftspsychologie_en/forschung/working_paper/wop_working_paper_2000_2.pdf.

Carless, S. A., Wearing, A. J., & Mann, L. (2000). A Short Measure of Transformational Leadership. Journal of Business and Psychology, *14*(3), 389–405. https://doi.org/10.1023/A:1022991115523 Csikszentmihalyi, M. (1999). If we are so rich, why aren't we happy? *American Psychologist*, *54*, 821–827. https://doi.org/10.1037/0003–066X.54.10.821

Csikszentmihalyi, M. (1999). If we are so rich, why aren't we happy? *American Psychologist*, *54*(10), 821–827. https://doi.org/10.1037/0003-066X.54.10.821

Demerouti, E. (2006). Job characteristics, flow, and performance: The moderating role of conscientiousness. *Journal of Occupational Health Psychology*, 11(3), 266–280. https://doi.org/10.1037/10768998.11.3.266

Edmondson, A. (1999). Psychological Safety and Learning Behavior in Work Teams. Administrative Science Quarterly, *44*(2), 350–383. https://doi.org/10.2307/2666999

Frese, M., Fay, D., Hilburger, T., Leng, K., & Tag, A. (1997). The concept of personal initiative: Operationalisation, reliability and validity of two German samples. *Journal of Occupational and Organizational Psychology*, *70*(2), 139–161. https://doi.org/10.1111/j.2044–8325.1997.tb00639.x

Heinze, K. L., & Heinze, J. E. (2020). Individual innovation adoption and the role of organisational culture. *Review of Managerial Science*, *14*(3), 561–586. https://doi.org/10.1007/s11846-018-0300-5

Ilies, R., Wagner, D., Wilson, K., Ceja, L., Johnson, M., DeRue, S., & Ilgen, D. (2017). Flow at work and basic psychological needs: effects on well-being. *Applied Psychology*, *66*(1), 3–24. https://doi.org/10.1111/apps.12075

Jahanshahi, A. A., Maghsoudi, T., & Babaei, F. G. A. (2020). What makes teams more innovative in small high-technology ventures. The role of leadership. *International Journal of Entrepreneurial Venturing*, *12*(3), Article 107933, 251. https://doi.org/10.1504/IJEV.2020.107933

Kuo, T.H., & Ho, L.A. (2010). Individual difference and job performance: the relationships among personal factors, job characteristics, flow experience, and service quality. *Social Behavior and Personality*: An International Journal, *38*(4), 531552. https://doi.org/10.2224/sbp.2010.38.4.531

Mathieu, J. E., Gallagher, P. T., Domingo, M. A., & Klock, E. A. (2019). Embracing Complexity: Reviewing the Past Decade of Team Effectiveness Research. *Annual Review of Organizational Psychology and Organizational Behavior*, *6(*1) 17–46. https://doi.org/10.1146/annurev-orgpsych-012218-015106

Newman, A., Round, H., Wang, S., & Mount, M. (2020). Innovation climate: A systematic review of the literature and agenda for future research. *Journal of Occupational and Organizational Psychology*, *93*(1), 73–109. https://doi.org/10.1111/joop.12283

Siangchokyoo, N., Klinger, R. L., & Campion, E. D. (2020). Follower transformation as the linchpin of transformational leadership theory: A systematic review and future research agenda. *The Leadership Quarterly*, *31*(1), 101341. https://doi.org/10.1016/j.leaqua.2019.101341

Thorgren, S., & Caiman, E. (2019). The role of psychological safety in implementing agile Methods across Cultures. *Research-Technology Management*, *62*(2), 31–39. https://doi.org/10.1080/08956308.2019.1563436