

# Agile and Attached: The Impact of Agile Practices on Agile Team Members' Affective Organisational Commitment

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**Abstract.** The current shortage of information systems (IS) specialists is leading to a strongly competitive labour market for the IT workforce. Technology companies need opportunities to prevent high replacement costs and knowledge loss by strengthening the affective organisational commitment (affective OC) of their employees. Using structural equation modelling, we investigate the influence of agile information systems development (ISD) on team members' affective OC. Our results demonstrate that agile project management (APM) positively predicts affective OC directly as well as indirectly via team members' job autonomy (JA) and their supervisors' support (SS). Our study gives empirical evidence on the relationship between agile ISD practices and affective OC and provides implications how to successfully leverage team members' affective OC. For practitioners, our research expounds why and how agile ISD is a suitable instrument to transform leadership culture within the company so as to raise affective OC beyond the IT workforce.

**Keywords:** Agile information systems development, affective organisational commitment, IT workforce, supervisor support, job autonomy

## 1 Introduction

Expenditure on IT is currently at its highest level and points to a new cycle of growth in the IT industry [1]. Consequently, the IT sector is now the strongest sector with respect to jobs in Germany, which is why IT professionals are in greater demand than ever before [2]. Simultaneously, the IT industry suffers from high labour fluctuation [3]. A current average turnover rate of 13.2% makes the software industry the unfortunate leader among all industries in this regard [4]. The consequences of turnover, such as high replacement costs and a significant loss of knowledge [3], indicate the need for measures that counteract the resignation of employees.

One main factor influencing turnover is organisational commitment (OC). Committed employees feel personally attached to their company [5], and therefore, they are willing to invest effort on behalf of the organisation [6]. To bind their employees, companies have to be attractive and convey values that employees regard as positive [7]. By introducing and living a culture within the company to which employees can

relate, they (the employees) identify with the organisation and satisfaction, engagement and performance increase [6].

Currently, a widely used method of sustainably modifying not only work processes but also values in the organisation is the introduction of agile information systems development (ISD). Using the concept of job redesigning, agile ISD practices influence job characteristics, as well as value constructs, and thereby, they change individuals' outcomes in terms of job satisfaction and motivation [8, 9]. We use this perspective of agility as a form of job redesigning to investigate the connection between agile practices and attachment by examining this question: “*What are the effects of agile project management (APM) practices on the affective OC of agile ISD team members?*”

We claim that agile ISD practices predict affective OC both directly and indirectly. First, agile practices interfere with values embedded within the organisation [10, 11], and consequently, they affect the value congruence and the identification of employees with the organisation. Second, by following the principle of self-organisation, agile ISD shifts responsibility to the team level, and at the same time, it provides a supervisor with the ability to support and protect the team in the face of difficulties [12, 13]. This rise of autonomy and supervisor support determines the commitment of employees to an organisation [14]. Using structural equation modelling, we aim to demonstrate the impact of agility both directly and indirectly on affective OC.

The paper is structured as follows. First, we explain the theoretical background research regarding agile ISD as well as affective OC. Second, we introduce the research model, as well as the hypotheses based on the literature review. Third, we describe the research method, as well as the study approach, and introduce the results of the structural equation model. Last, we discuss the implications and give further recommendations concerning affective OC in the context of agile ISD.

## **2 Theoretical Background**

### **2.1 Agile Information Systems Development**

Agile ISD is widely used in companies of various sizes and those belonging to various industries [15]. Within our paper, we define agile ISD as “the continual readiness of an information systems development method to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment” [16]. The strength of agile ISD practices is decisive here: Agile approaches react to the challenges and needs of a fast-moving environment. By embracing change in projects, agility enables flexible planning, even when the scope of projects remains unstable [17].

At the employee level, agile ISD acts as an instrument for job design [8]. Agility improves team structures [18], reduces negative effects of subgroups [19] and influences job characteristics such as skill variety and task identity [8]. Furthermore, the ability to complete a whole task in the form of “user stories” leads to an increase in motivation, as well as ambition, to improve constantly [9]. Because of these factors, agile ISD influences the working processes of agile team members.

Agile ISD also causes an alteration in individuals' values and principles, changing the software development process fundamentally. In contrast to traditional development methods, agile ISD puts the focus on people and collaboration [11, 20]. Agile ISD trusts in self-organised teams that decide independently the extent and implementation of the requirements [21]. Equally, the supervisor assumes a coordinating and mentoring role [22]. This shift to flat hierarchies reduces cumbersome processes and makes agile teams faster and more efficient, allowing high-speed and top performance within the software development process [12, 13].

In our paper, we define an agile ISD team as a cross-functional team building and updating software, mostly using agile ISD practices and including members both focusing on delivering software as well as managing the team [8].

## 2.2 Affective Organisational Commitment

OC is "the relative strength of an individual's identification with and involvement in a particular organisation" [5] and consists of affective, normative and continuance commitment [23]. It is particularly important in the IT context as it has a great impact on turnover intention [38]. People with high productivity or fulfilment often perceive themselves as inseparable from their jobs. Consequently, their personal commitment to, and professional engagement with, the organisation for which they work is borne out [24].

Organisational culture and environment are strongly related to affective OC [25, 26]. The person-organisation fit and perceptions of congruence between worker and company sustainably influence employee commitment [27]. The more important values for an employee are reflected in the company the more the employee's commitment rises [28]. Therefore, the active management of embedded organisational culture and values has significant influence on retention.

Another essential point here is how decisions are made within the company. Informal culture and communication, as promoted within the context of an agile system, bind the team members in the form of an organisational family, and therefore, they foster OC [25, 26]. The empowerment to decide regarding work tasks gives an employee the opportunity to contribute to the success of the company, and consequently, it increases their interest in the enterprise's well-being [29, 30].

## 3 Research Model

The results of the literature review indicate the influence of agile ISD on affective OC beyond agile team members. In our study, we use our research model to investigate the impact of APM practices on affective OC. We hypothesise that APM practices influence affective OC in two ways. First, the impact happens directly through the embedding of positive, agile values into the organisation's processes, thereby affecting the person-organisation fit (H1). Second, the impact of APM practices occurs indirectly consequent to the change in leadership culture by affecting JA (H2a+b) and SS (H3a+b). **Figure 1** illustrates the research model.

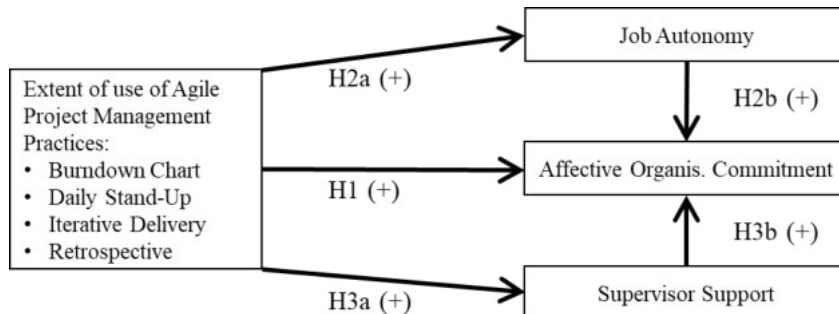


Figure 1. Research model

### 3.1 Direct Influence of Agile Practices on Affective OC

By promoting agile ISD within the company, the enterprise advocates positive agile values such as collaboration or customer involvement [10]. Retrospectives drive the team to constant reflection and at the same time improve the bond within the team. [31]. The principle of iterative delivery helps team members not only to see individual work packages, but rather to gain an overview of the entire development process [8]. Thus, an agile employee experiences a change at work under the umbrella of attractive and people-oriented values [20].

Agile values and principles play an essential role for agile teams. Williams [32] show that the majority of agile teams (65%) is not only committed to implementing agile practices, but rather to pursuing agile values. We suggest that this integration of agile values within organisational values influences the ways in which employees perceive their organisation. The advocacy of agile values in the company leads to an increased value congruence between employee and company, which implies an increased level of perceived person–organisation fit and supports identification with the enterprise [7, 33], as well as OC [28]. Thus, we hypothesise the following: *H1: The use of APM practices positively influences affective OC of agile ISD team members.*

### 3.2 Indirect Influence of Agile Practices on Affective OC

JA, which is described as “the degree to which the job provides substantial freedom, independence and discretion in scheduling the work and in determining the procedures to be used in carrying it out” [34], has increased in the past few years within the IT sector. JA decentralises decision-making to those who actually carry out the work, and thus, it provides the team and the individuals with the flexibility to react faster to changes and unforeseen circumstances [15].

Self-organisation occurs at both the team and individual levels and is a decisive principle of agile practices [11, 13]. In accordance to [8] we suggest that agile methods support JA by combining the doing, the planning, and the controlling of the software development activities and providing the team with the possibility to manage a personal

client relationship [8]. Furthermore, agility trusts in the self-coordination of teams and follows a shared decision-making approach [21]. Contrary to traditional software development, where managers delegate, coordinate and supervise work, agile teams are encouraged to organise work independently and make decisions jointly. This principle is, for example, followed by the agile practice of iterative delivery, which encourages team-based estimations regarding workload [35]. Thus, we hypothesise the following: *H2a: The use of APM practices positively influences JA of agile ISD team members.*

JA, as one dimension of intrinsic rewards, positively influences self-disciplined and commitment-driven behaviours. These behaviours are expressed by the presence of hard work, voluntary initiative and the support of organisational objectives [36]. Workers who are self-responsible for the organisation and the coordination of their work are more closely associated with the company.

Furthermore, employees who are challenged with self-organisation at work experience greater well-being and job satisfaction. This is because JA lowers stress, increases motivation and enhances work engagement [8]. Self-organised employees develop a personal interest in the well-being of the company, and consequently, commitment rises and turnover drops [29, 30]. Thus, we hypothesise the following: *H2b: JA positively influences affective OC of agile ISD team members.*

Although agile ISD calls for self-organisation, it does not mean that leadership has become obsolete. To maintain a functioning team, organisational guidance and particularly the support of supervisors are still needed [11, 12, 37]. Agile development requires a new, changed image of managers. Instead of trite adherence to hierarchy and micromanagement, agile ISD calls for management styles that foster the collaborative self-management of teams [37].

Studies already show the positive effects of this new form of leadership. Windeler, Maruping and Venkatesh [38] provide evidence by investigating 73 ISD teams in which empowering leadership contributes to a reduction in role ambiguity, role conflict and stress, and thus, the authors of that study determine that this management style is a suitable measure against technical risk factors [38]. Tyssen, Wald and Heidenreich [39] show that task and people-oriented leadership behaviours in temporary organisations, such as IT projects, are aimed above all at follower commitment in projects, thus having indirect effects on project success [39].

We consider this shift in management styles as beneficial and claim that the change to self-organisation in agile teams does not compensate the need for organisational support; rather, it enhances the perception of SS. By carrying out retrospectives, the team is able to detect problems more quickly and forward them to their supervisor. The use of burndown charts also allows ongoing and rapid feedback from the manager. Thus, we hypothesise: *H3a: The use of APM practices positively influences perceived SS of agile ISD team members.*

Organisational support is one essential key driver of affective OC [40]. By fulfilling socioemotional needs as affiliation and fostering the norm of caring, employees feel the obligation to improve performance and care about the organisation's welfare [41]. Consequently, employees perceive a higher level of satisfaction with their jobs and are more committed to their organisation.

SS, as one dimension of organisational support, reflects the connection between organisational support and affective OC [14, 41]. On the basis of the perceived identification of a supervisor with their organisation, managers act as organisational agents. Therefore, supervisors who appear to be valued by their organisation can highly influence the perceived organisational support of employees [14]. Consequently, we claim that the link between organisational support and commitment can also be transferred to the sub-dimension of SS. Due to flat hierarchies and close cooperation in agile ISD, we suggest that this effect might even be intensified and therefore, we hypothesise the following: *H3b: SS positively influences affective OC of agile ISD team members.*

## **4 Research Method**

### **4.1 Study Design**

Our study was conducted in cooperation with a German company operating in the automotive industry. The company employs approximately 130,000 workers, 4,500 of whom can be allocated to the IT function. The IT organisation strives for a holistic, agile approach, and therefore, it introduced company-wide agile practices in 2016.

We decided to perform the study with the aid of structural equation modelling (SEM). Because of the unestablished character of the theory and the occurrence of 2<sup>nd</sup> order constructs within the model, we chose Partial Least Squares Structural Equation Modelling (PLS-SEM) over Covariance Based Squares Structural Equation Modelling (CB-SEM) and selected SmartPLS as the software tool [42, 43]. As a foundation for the procedure, we used the instructions of [43].

### **4.2 Participants and Data Collection Procedure**

Due to restrictions, it was not possible to survey the entire IT department of the cooperating company and therefore we had to limit to a smaller target group. To capture a wide range of agile approaches, we intended to reach employees engaged in software engineering, with various degrees of agile experience and with different roles within the teams. On the basis of these parameters, we sent the survey to 380 potential candidates from different departments that use agile methods.

The survey achieved 172 responses, representing a response rate of 45%. The company in which the study was carried out works in close cooperation with external service providers because of which the company employs many people at managerial positions internally. It is, therefore, not surprising that around half of all respondents (52%) stated that they hold project managerial positions, such as Scrum Master Product Owner. The rest of the respondents were Business/System Analysts (15%), Software Developers (9%) and those in other positions (12%). In addition, 12% of all participants belonged to senior management. Most of the respondents had started to use agile methodology within the last 1.5 years (75%), while 6% had medium agile experience (1.5–3 years) and 12% had used agile practices for more than 3 years.

### 4.3 Measures

For the study, only established measures published in prior research with good quality criteria were chosen. To measure the extent of APM practices, we oriented on [8]. In order to investigate the most common agile practices we conducted a pre-survey within the company with 15 selected representatives from different divisions, with various roles and different degree of agile experience. The pre-survey revealed that iterative delivery (ID), daily stand-up (SU), retrospective (RE) and burndown chart (BD) were the most applied methods in the cooperating company (80 % of all respondents used ID and SU, 70 % used RE and 50% used BD), which is why we decided to integrate these practices in our survey. To assess JA, we used the scale from the job diagnostic survey by [34]. SS was measured using the five-item scale of [44]. For the assessment of affective OC, we used a scale from [45]. All items asked for the participants' agreement on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

### 4.4 Model Analysis

We built the structural equation model based on our research model. In accordance with [8], we defined the construct "APM Practices" as a reflective-formative 2<sup>nd</sup>-order construct, compounding burndown chart, iterative delivery, retrospective and daily stand-up. The other scales were modelled as reflective as proposed by the respective authors.

Following [46] and [47], we used a multilevel approach for assessing the structural equation models in order to analyse the added effects of agile practices on the suggested model. First, we modelled the direct effects of JA and perceived SS on the dependent variable affective OC (Model 1). Collectively, the manifest variables explained 24.2% of the variance of affective OC. When we included the agile practices (Model 2), the variance of affective OC increased to 26.9%. To test whether this increase was significant, we followed the instructions of [46] and calculated  $f^2 = (R^2_{\text{Model2}} - R^2_{\text{Model1}}) / (1 - R^2_{\text{Model2}})$ . Afterwards, we performed a pseudo F-test  $(f^2 * (n - k - 1))^1$  [48]. The results indicated a significant change in  $R^2$  ( $F = 4.65$ ,  $df: 1, 130$ ), which lets us conclude that the construction of the model is valid.

Subsequently, we evaluated the measurement model by conducting tests for internal consistency reliability, convergent validity and discriminant validity. The results of Cronbach's alpha, composite reliability and AVE can be found in **Table 1**. Cronbach's alpha of Retrospective, as well as composite reliability of Retrospective and Supervisor Support showed a critical value of  $> 0.95$ . However, in order to avoid losing informative value of the scales by deleting items, we decided to keep the scales as suggested and not to delete any items [43]. In addition, the outer loadings all exceeded the threshold of 0.7. Finally, the results of the cross-loading analysis demonstrated that all items loaded higher on the intended construct than they did on all other constructs, thus implying the construct's discriminant validity [49].

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<sup>1</sup> \*  $n$  = sample size,  $k$  = number of independent variables

**Table 1:** Reliability scores and AVE

		<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>	<b>Average Variance Extracted (AVE)</b>
BD	Burndown Chart	.874	.923	.799
ID	Iterative Delivery	.835	.901	.752
RE	Retrospective	.964	.976	.933
SU	Daily Stand-Up	.891	.933	.822
JA	Job Autonomy	.904	.938	.834
SS	Supervisor Support	.947	.960	.827
OC	Organis. Commitment	.820	.880	.648

To examine the validity of our formative 2<sup>nd</sup>-order construct, we followed the guidelines of [43, 45]. The assessment demonstrated that all 1<sup>st</sup>-order constructs significantly loaded on the 2<sup>nd</sup>-order construct. We, therefore, conclude that the modelling of our 2<sup>nd</sup>-order construct is valid.

Finally, we investigated collinearity, the  $Q^2$  and the  $R^2$  values, to provide evidence for the validity of the structural model. The inner VIF values were all clearly beneath the critical value of 5 and left no indication for a strong correlation between the predictor constructs [43]. Likewise, all  $Q^2$  values, resulting from the blindfolding procedure, exceeded the value of 0, and thus, they provided evidence for the predictive relevance of the model [43].  $R^2$  of affective OC (0.269) implied a low effect [50].

## 5 Results

The path coefficient analysis provided evidence for the positive impact of the use of agile practices on affective OC. First, the results show that agile practices significantly and directly influence affective OC (0.201,  $p < 0.01$ ).

This indicates that agile team members are more committed to their organisation. Thus, H1 is fully supported. Furthermore, we found confirmation for indirect links from APM practices to affective OC. JA was significantly influenced by the use of APM practices (0.262,  $p < 0.01$ ), and furthermore, it (JA) impacted affective OC (0.212,  $p < 0.05$ ). These results imply that agile teams perceive more autonomy in their work processes, which consequently leads to a higher level of commitment. Therefore, both Hypotheses 2a and 2b can be supported. In addition, the analysis demonstrated the significant influence of agile practices on SS (0.217,  $p < 0.01$ ) as well as that of SS on affective OC (0.282,  $p < 0.01$ ). Agile team members accordingly feel more supported by their direct supervisors; consequently, affective OC rises. Thus, Hypotheses 3a and 3b are fully supported. The results of the path analysis can be found in **Figure 2**.



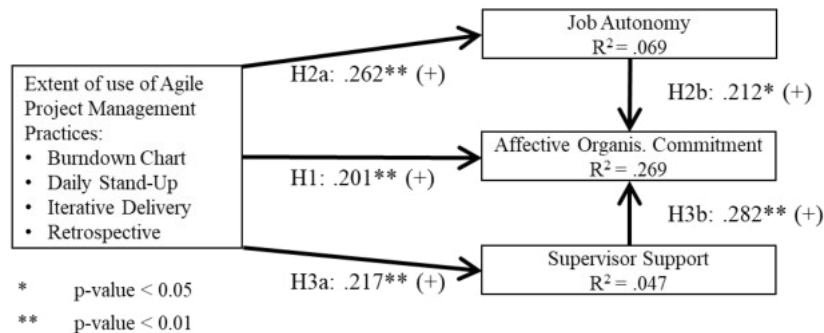


Figure 2. Path analysis results

## 6 Discussion

The findings of our study are in line with previous research [8, 35]. As with previous studies, we provide evidence for the existing conclusion that the extent of use of agile ISD practices positively predicts JA in agile ISD teams [8]. Furthermore, we reveal that team members of agile ISD teams gain high levels of support and empowerment from their supervisors [35].

We extend existing knowledge and provide insights that go beyond the results of previous research. When focusing on agile ISD practices, prior studies often investigated a particular practice, such as extreme programming or assessed agility, as a concept rather than investigating the extent of its use [51]. Most previous studies only investigated perceptions of work such as job satisfaction [8] and motivation [52]. The present study theorised and validated the effect of the use of agile ISD practices on JA, SS and affective OC. The results show that agile ISD practices have a direct effect on affective OC. In addition, affective OC is indirectly influenced by JA and SS. These additional insights provide several theoretical and practical contributions, which we explain in the following.

### 6.1 Theoretical Implications

The current research focuses on assessing the motivating and satisfying potential of agile ISD practices [8, 52]. Our theoretically conceptualized and validated research model is the first step in research on agile ISD to consider affective OC as a direct and indirect outcome variable and investigate how JA and SS predict affective OC. Thus, the contribution of our paper to existing literature is threefold.

First, our study contributes by theorizing and validating that agile ISD practices positively effects team members' affective OC. Analyzing the data with structural equation modeling, we show that there is a direct positive relationship between agile practices and affective OC in agile ISD teams. Thus, our paper extends existing knowledge on the effect of agile ISD practices on job perceptions of agile team members. The relationship between agile practices and team motivation was

investigated by [52]. As well, Tripp, Riemenschneider and Thatcher [8] found that team members are more satisfied if agile ISD practices are used by showed that particular agile practices are related to job characteristics, such as skill variety and feedback. Therefore, we contribute to the agile ISD literature by indicating that in addition to increased satisfaction and motivation, team members are also higher committed to their organisation. By investigating affective OC in agile ISD teams, we also contribute to research on turnover of IS professionals in general [30]. Van Scotter and Motowidlo [36] found that affective OC is a valid predictor of employees' turnover intention. Existing studies often investigated teams using particular practices (such as Pair Programming [53]). This approach has gained critique as it does not assess the amount of use of agile practices, but rather the "high level concept of use of that method" [51]. Our study extends existing knowledge on agile practices as we measured the extent of use of agile practices, as suggested by [51]. In summary, we contribute to literature on agile by demonstrating that the extent of use of agile practices positively affects team members' affective OC.

Second, prior literature indicates that the extent of use of agile practices is positively related to team members' JA [8]. Our study replicates the findings in a conceptual manner [54] and shows a significantly positive relationship between the use of agile practices and team members' JA. As well, we found that JA positively affects affective OC in agile ISD teams. Based on previous literature indicating that self-organisation is a decisive principle of agile practices [11, 13], we theorized that the amount of agile practices positively predicts autonomy in agile ISD teams. The use of agile practices decentralizes decision-making to those who actually carry out the work, providing the team and the individuals with the flexibility to faster react to changes and unforeseen circumstances [15]. Thus, we argue that this principle of self-organisation is fostered when agile practices are used. As well, we theorized based on literature indicating that self-organised employees develop personal interest in the well-being of the company and, as a consequence, higher commitment [29], that JA predicts affective OC in agile ISD teams. Employees who are self-responsible for the organisation and the coordination of their work are more closely associated with the company. These theoretically derived effects have been proven within our study. Therefore, our study contributes to research as we replicate the results of [8] by indicating that the use of agile practices directly influences team members' JA. In addition, our results extend research focusing on affective OC [29] by revealing JA as a predictor of affective OC in agile ISD teams. Furthermore, the findings of our study extend prior literature on self-organisation and turnover such as [30] by providing evidence that JA significantly predicts affective OC in agile ISD teams. Moreover, our results also extend existing general literature on self-organisation of agile ISD teams such as [12], [13] and [22] by revealing that there is not only a direct effect of self-organisation on affective OC, but of JA on affective OC as well. In summary, we contribute to literature on self-organisation of agile ISD teams by providing evidence for a positive effect of agile practices on JA as well as a positive relationship between JA and affective OC.

Third, our study reveals that the use of agile ISD practices significantly influences team members' SS and this, in turn, predicts their affective OC. Hence, with an increasing amount of use of agile practices, team members gain more support from their

supervisor. As a result, when perceiving themselves as being highly supported by their leader, team members feel more committed to the organisation. The present paper contributes to existing literature such as [55], who state that empowering leadership is crucial for project performance in agile ISD teams, by demonstrating that agile practices significantly affect team members' perceived support by their supervisor. Moreover, we contribute to existing knowledge such as [38], who find that empowering leadership is related to lower role ambiguity, role conflict and stress in software development, by showing that perceived SS is also positively related to affective OC. By fulfilling socioemotional needs as affiliation and fostering the norm of caring, employees feel the obligation to increase performance and care about the organisation's welfare [41]. In consequence, they are more committed to their organisation. Additionally, we extend literature such as [39], who found that people-oriented leadership behaviours in IT projects are aimed at follower commitment, by revealing that SS positively predicts affective OC. Summarizing, the present paper contributes to agile literature and psychological commitment literature by revealing that agile practices positively affect SS, which in turn is positively related to affective OC.

## **6.2 Practical Implications**

In addition to theoretical derivations, our study also provides insights for practitioners. The results of the study demonstrate that agile ISD significantly influences not only work processes but also the well-being of IT professionals. By means of APM methods, it is possible to influence the perception of employees towards their company. Through striving for agile principles, an employee finds a common basis with their organisation and feels more connected to their company.

In addition, the results highlight the impact of leadership in empowered teams. The study proves that autonomy in agile teams by no means makes leadership obsolete but rather puts it at the centre of the scheme of things. The results demonstrate that JA and SS are of equal importance for an employee. This indicates the necessary shift in the current leadership culture. Supervisors must position themselves in a supportive and protective function to further encourage the self-organisation of their teams. This concept enhances the well-being of individuals and retains employees for the long term.

## **6.3 Limitations and Future Work**

We want to emphasise the importance of attachment in the IT environment, thus encouraging future work regarding affective OC in the IT context. In this regard, we want to draw attention to our limitations to correctly classify the interpretation of the results and simultaneously create space for future research. First, we point out the importance of an enriched replication of this study. Hypothesis 1 is based on the argument that the introduction of agile values leads to an increase in person-organisation fit, which consequently leads to a rise in organisational commitment. This reasoning was derived from research by [7] and [28]. Unfortunately, we were not able to measure the person-organisation fit aspect in our study. Furthermore, we would like to point out that the scales used only allow a measurement of the application of agile

practices, but at the same time do not indicate that agile values are actually adapted in the company. We consider the investigation of the influence of agile practices on person-organisation fit as an important field of research, which is why we recommend to inspect this in future research. Second, our study was explorative in character, and therefore, it includes modest  $R^2$  values. Because of the explorative character of this study, these results are comprehensible. We compared the variance with other explorative research in the area of affective OC and found similar results [e.g. 33, 56] because of which we think that our study brings essential contribution to the current agility research. In future, a replication of the study with a bigger sample size could lead to results with higher variance. Finally, we would also like to point out the possibility of reverse effects in the model. As OC leads to positive behavior [57], we recognize that the extent of agile practices may also be affected by the appearance of affective OC. For future research we therefore also recommend an investigation of the interaction of the presented independent and dependent variables.

## 7 Conclusion

Our paper provides insights into the influence of APM practices on affective OC. Based on structural equation modelling, our results demonstrate (1) the direct impact of agile ISD on affective OC via affecting values within the organisation and (2) the indirect impact of agile ISD on affective OC via following the agile principle of self-organisation and the consequent fostering of JA and SS. Our study, therefore, sheds light on the effects of agile practices on affective OC, while emphasising the importance of empowered teams and their relationship with leadership in the IT context.

## References

1. Gartner, Inc., <https://www.gartner.com/newsroom/id/3871063> (Accessed: 29.08.2018)
2. Bitkom, <https://www.bitkom.org/Presse/Presseinformation/Bitkom-Branche-ist-erstmalig-groesster-Industrie-Arbeitgeber.html> (Accessed: 29.08.2018)
3. Joseph, D., Ng, K.Y., Koh, C., Ang, S.: Turnover of information technology professionals: A narrative review, meta-analytic structural equation modeling, and model development. *MIS Quarterly* 31, 547-577 (2007)
4. LinkedIn, <https://business.linkedin.com/talent-solutions/blog/trends-and-research/2018/the-3-industries-with-the-highest-turnover-rates> (Accessed: 29.08.2018)
5. Mowday, R.T., Steers, R.M., Porter, L.W.: The measurement of organizational commitment. *Journal of Vocational Behavior* 14, 224–247 (1979)
6. Porter, L.W., Steers, R.M., Mowday, R.T., Boulian, P.V.: Organizational commitment, job satisfaction, and turnover among psychiatric technicians. *Journal of applied psychology* 59, 603 (1974)
7. Finegan, J.E.: The impact of person and organizational values on organizational commitment. *Journal of Occupational & Organizational Psychology* 73, 149-169 (2000)
8. Tripp, J.F., Riemenschneider, C., Thatcher, J.B.: Job Satisfaction in Agile Development Teams: Agile Development as Work Redesign. *Journal of the Association for Information Systems* 17, 267–307 (2016)

9. Tessem, B., Maurer, F.: Job satisfaction and motivation in a large agile team. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, vol. 4536 LNCS, pp. 54-61 (2007)
10. Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R., Mallor, S., Shwaber, K., Sutherland, J.: *Manifesto for Agile Software Development*. (2001)
11. Cockburn, A., Highsmith, J.: Agile software development, the people factor. *Computer* 34, 131-133 (2001)
12. Hoda, R., Noble, J., Marshall, S.: Self-Organizing Roles on Agile Software Development Teams. *IEEE Transactions on Software Engineering* 39, 422-444 (2013)
13. Moe, N., Dingsøy, T., Dybå, T.: Understanding Self-Organizing Teams in Agile Software Development. *Proceedings of the Australian Software Engineering Conference, ASWEC* 76-85 (2008)
14. Eisenberger, R., Stinglhamber, F., Vandenberghe, C., Sucharski, I.L., Rhoades, L.: Perceived supervisor support: Contributions to perceived organizational support and employee retention. *Journal of Applied Psychology* 87, 565-573 (2002)
15. Lee, G., Xia, W.: Toward agile: an integrated analysis of quantitative and qualitative field data on software development agility. *Mis Quarterly* 34, 87-114 (2010)
16. Conboy, K.: Agility from first principles: Reconstructing the concept of agility in information systems development. *Information systems research* 20, 329-354 (2009)
17. Erickson, J., Lyytinen, K., Keng, S.: Agile Modeling, Agile Software Development, and Extreme Programming: The State of Research. *Journal of Database Management* 16, 88-100 (2005)
18. Pflügler, C., Wiesche, M., Krcmar, H.: Subgroups in Agile and Traditional IT Project Teams. *51st Hawaii International Conference on System Sciences (HICSS)*, (2018)
19. Przybilla, L., Wiesche, M., Krcmar, H.: The Influence of Agile Practices on Performance in Software Engineering Teams: A Subgroup Perspective. *Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research*, pp. 33-40. ACM (2018)
20. Lalsing, V.: People Factors in Agile Software Development and Project Management. *International Journal of Software Engineering & Applications* 3, 117-137 (2012)
21. Moe, N.B., Aurum, A., Dybå, T.: Challenges of shared decision-making: A multiple case study of agile software development. *Information & Software Technology* 54, 853-865 (2012)
22. Shastri, Y., Hoda, R., Amor, R.: Understanding the roles of the manager in agile project management. *Proceedings of the 10th Innovations in Software Engineering Conference*, pp. 45-55. ACM (2017)
23. Meyer, J.P., Allen, N.J.: A three-component conceptualization of organizational commitment. *Human resource management review* 1, 61-89 (1991)
24. Chalofsky, N., Krishna, V.: Meaningfulness, Commitment, and Engagement: The Intersection of a Deeper Level of Intrinsic Motivation. *Advances in Developing Human Resources* 11, 189-203 (2009)
25. Paul, A.K., Anantharaman, R.N.: Influence of HRM practices on organizational commitment: A study among software professionals in India. *Human Resource Development Quarterly* 15, 77-88 (2004)
26. Messner, W.: Effect of organizational culture on employee commitment in the Indian IT services sourcing industry. *Journal of Indian Business Research* 5, 76-100 (2013)
27. Van Vianen, A.E.: Person-Organization Fit: The Match Between Newcomers' and Recruiters' Preferences For Organizational Cultures. *Personnel psychology* 53, 113-149 (2000)

28. O'Reilly Iii, C.A., Chatman, J., Caldwell, D.F.: People and Organizational Culture: A Profile Comparison Approach to Assessing Person-Organization Fit. *Academy of Management Journal* 34, 487-516 (1991)
29. Aube, C., Rousseau, V., Morin, E.M.: Perceived organizational support and organizational commitment: The moderating effect of locus of control and work autonomy. *Journal of managerial Psychology* 22, 479-495 (2007)
30. McKnight, D.H., Phillips, B., Hardgrave, B.C.: Which reduces IT turnover intention the most: Workplace characteristics or job characteristics? *Information & Management* 46, 167-174 (2009)
31. McHugh, O., Conboy, K., Lang, M.: Agile practices: The impact on trust in software project teams. *IEEE Software* 29, 71-76 (2012)
32. Williams, L.: What agile teams think of agile principles. *Communications of the ACM* 55, 71-76 (2012)
33. Venkatesh, V., Windeler, J.B., Bartol, K.M., Williamson, I.O.: Person-organization and person-job fit perceptions of new IT employees: Work outcomes and gender differences. *Management Information Systems Quarterly* 41, 525-558 (2017)
34. Hackman, J.R., Oldham, G.R.: Development of the job diagnostic survey. *Journal of Applied Psychology* 60, 159-170 (1975)
35. Tessem, B.: Individual empowerment of agile and non-agile software developers in small teams. *Information and Software Technology* 56, 873-889 (2014)
36. Van Scotter, J.R., Motowidlo, S.J.: Interpersonal facilitation and job dedication as separate facets of contextual performance. *Journal of applied psychology* 81, 525-531 (1996)
37. Moe, N.B., Dingsøy, T., Dybå, T.: Overcoming Barriers to Self-Management in Software Teams. *IEEE Software* 26, 20-26 (2009)
38. Windeler, J.B., Maruping, L., Venkatesh, V.: Technical systems development risk factors: The role of empowering leadership in lowering developers' stress. *Information Systems Research* 28, 775-796 (2017)
39. Tyssen, A.K., Wald, A., Heidenreich, S.: Leadership in the context of temporary organizations: A study on the effects of transactional and transformational leadership on followers' commitment in projects. *Journal of Leadership & Organizational Studies* 21, 376-393 (2014)
40. Loi, R., Hang-Yue, N., Foley, S.: Linking employees' justice perceptions to organizational commitment and intention to leave: The mediating role of perceived organizational support. *Journal of Occupational and Organizational Psychology* 79, 101-120 (2006)
41. Rhoades, L., Eisenberger, R.: Perceived organizational support: a review of the literature. *Journal of applied psychology* 87, 698-714 (2002)
42. Ringle, C.M., Wende, S., Becker, J.-M.: *SmartPLS 3*. SmartPLS GmbH
43. Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M.: *Partial Least Squares Strukturgleichungsmodellierung (PLS-SEM)*. Verlag Franz Vahlen GmbH, München (2017)
44. Cousins, R., Mackay, C.J., Clarke, S.D., Kelly, C., Kelly, P.J., McCaig, R.H.: 'Management standards' work-related stress in the UK: Practical development. *Work & Stress* 18, 113-136 (2004)
45. Sjöberg, A., Sverke, M.: The interactive effect of job involvement and organizational commitment on job turnover revisited: A note on the mediating role of turnover intention. *Scandinavian Journal of Psychology* 41, 247-252 (2000)
46. Siponen, M., Vance, A.: Neutralization: New insights into the problem of employee information systems security policy violations. *MIS Quarterly* 487-502 (2010)

47. Venkatesh, V., Thong, J.Y.L., Xu, X.: Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly* 36, 157–178 (2012)
48. Mathieson, K., Peacock, E., Chin, W.W.: Extending the technology acceptance model: The influence of perceived user resources. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems* 32, 86–112 (2001)
49. Gefen, D., Straub, D.: A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial and Annotated Example. *Communications of the Association for Information Systems* 16, 91-109 (2005)
50. Henseler, J., Ringle, C.M., Sinkovics, R.R.: The use of partial least squares path modeling in international marketing. *New challenges to international marketing*, pp. 277–319. Emerald Group Publishing Limited (2009)
51. Tripp, J.: Thoughts on Current and Future Research on Agile and Lean: Ensuring Relevance and Rigor. *Hawaii International Conference on System Sciences*, pp. 5465-5472, Hawaii (2018)
52. McHugh, O., Conboy, K., Lang, M.: Using agile practices to influence motivation within IT project teams. *Scandinavian Journal of Information Systems* 23, 59-84 (2011)
53. Salge CA de Lima, Berente, N.: Pair Programming vs. Solo Programming: What Do We Know After 15 Years of Research? *49th Hawaii International Conference on System Sciences*, pp. 5398-5406 (2016)
54. Dennis, A.R., Valacich, J.S.: A replication manifesto. *AIS Transactions on Replication Research* 1, 1-4 (2014)
55. Shen, Y., Xu, P.: Leading Agile Teams: An Exploratory Study of Leadership Styles in Agile Software Development. *Twenty-first Americas Conference on Information Systems*, Puerto Rico (2015)
56. Jaramillo, F., Mulki, J.P., Marshall, G.W.: A meta-analysis of the relationship between organizational commitment and salesperson job performance: 25 years of research. *Journal of Business Research* 58, 705-714 (2005)
57. O'Reilly III, C., Chatman, J.: Organizational Commitment and Psychological Attachment: The Effects of Compliance, Identification, and Internalization on Prosocial Behavior. *Journal of Applied Psychology* 71, (1986)