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Doing Agile vs. Being Agile - Understanding Their Effects to Improve Agile Work

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Completed Research

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Abstract

Companies show a growing demand in corporate agility. The effects of so-called doing and being agile are the key for positive outcomes in agile work. Scrum is used by companies to make them more agile. The present study examines the interaction of doing agile (leadership, work design) and being agile (individual characteristics, empowerment) in relation to satisfaction and commitment based on an online survey of 129 Scrum development team members. The results show that work design and leadership impact empowerment and that the latter leads to both job satisfaction and commitment. Team orientation has no effect. Openness for new actions moderates the relationship between work design and the outcome variables. The results can be used in practice to increase the satisfaction and commitment within Scrum. They provide an insight into the impact structure within Scrum and are thus also the basis for future research.

Keywords: Scrum, empowerment, work design, leadership, being agile, doing agile

Introduction

The current world of work is affected by constant changes in technology, more risk, and instable user requirements (Ravichandran 2018). As a result, organizations have to deal with a higher level of complexity and need to tackle these challenges to ensure the company's profitability (Sharifi and Zhang 2001; Tallon et al. 2019). Accordingly, organizational agility, which is defined as the ability of the company to deal competitively with changes (Sharifi and Zhang 2001), is becoming significantly more present in practice. This is reflected in an increased demand for agile working methods (Salo and Abrahamsson 2008).

Agility in organizations (explicitly in software development) is largely defined by the agile manifesto (Beck et al. 2001), which captures the values and principles of agile work. The success of an agile method depends

on the interplay of external work structures (doing agile) and the internal structures of the individual (being agile) (Duka 2012). “Doing agile” and “being agile” are labels that are already widely discussed in practice (for example Hoffmann 2018; Peters et al. 2019) but have received little scientific evaluation so far. This is where our research comes in and thereby discusses on a scientific level what is being discussed in practice already. Doing agile is the way of working, which is determined by the rules for an agile methodology or framework like Scrum (Kruchten 2013). “Doing agile” comprises everything that affects the employees in their work process by using agile methods, etc. Scrum as one of these agile methods provides both leadership approaches and characteristics of work design (Schwaber and Sutherland 2017). This sets the boundaries for the behavior of the employees. In this way, the "doing" is reflected in doing agile and fits our included constructs leadership and work design. Being agile comprises the internal processes of the individual employee, which reflect the personal being in the agile context. It is the way of thinking, which includes the attitudes, orientations, and mentality patterns of an individual towards living agile values and principles. Another important aspect of being agile is psychological empowerment (Cockburn 1999; DeMarco 1995; Koutsoukus 2006; Moreira 2013; Soundararajan 2013). Thomas and Velthouse (1990) define psychological empowerment as a cognitive state. This cognitive state encompasses the four dimensions of meaning, competence, self-determination, and choice. Many agile projects are not successful and fail. Not even half (48%) of the respondents said that all or most of their agile projects are successful (VersionOne 2018). Reasons for failure can often be found in aspects of being agile. For example, Dikert et al. (2016) describe the challenge of implementing agile methods as the openness of those affected to the new way of working.

So far, there has been little research on agile methods from a work psychological perspective, which takes up the aspects of doing agile and being agile. Pantiuchina et al. (2017) are also calling for further research into these two areas. To improve agile work, the effects of doing agile and being agile have to be known (Rahman et al. 2018). The results are especially relevant for companies that noticed a lack of agility in their processes and activities and came to the conclusion that they have to increase agility to be able to successfully deliver products and services to their customers in the future. Based on our confirmatory research findings, the recruiting and development of employees and the design of work in agile organizations can be improved.

There are several agile methods, e.g., lean software development, Scrum, and extreme programming (Dybå and Dingsøyr 2008), that determine the way of doing agile. In order to achieve findings that are as generalizable as possible, we have focused our present research on Scrum, since this method is most widely used compared to other agile methods (Salo and Abrahamsson 2008). Scrum includes three roles: The Scrum master, the product owner, and the development team. Because the members of the development team represent the development-executing part of Scrum's participants (Schwaber and Sutherland 2017), it makes sense to base the research on this important group to generate first insights. Based on the previous given definitions, we use work design and leadership as aspects of doing agile, while individual characteristics and empowerment are aspects of being agile. Psychological empowerment is used as a mediator for all income variables. Companies that want to establish agile work do so in order to achieve objective measures of success, such as a better product (Maruping et al. 2009a; Maruping et al. 2009b). A study by Highsmith (2002) mentions employee satisfaction as an important goal of agile working methods. Job satisfaction and affective commitment as outcome variables are demonstrably related to objective performance measures (Judge and Bono 2001; Meyer et al. 1989) and can therefore be used as indicators for good agile work from a company perspective. Therefore, the following research question is raised:

RQ: How do aspects of doing agile and being agile affect the job satisfaction and the affective commitment of development team members in Scrum?

Theoretical Background and Hypotheses Development

Empowerment

The concept of psychological empowerment is developed based on the theory of self-efficacy (Bandura 1977; Maynard et al. 2012). There have been several studies to date that confirm the relationship between self-efficacy and positive outcomes (Judge and Bono 2001; Prussia et al. 1998). This relationship could also be confirmed regarding job satisfaction (Judge and Bono, 2001) and commitment (Pillai and Williams, 2004). Empowerment, which could be discovered as an important construct in IS literature as well (e.g.Gandomani et al. 2014), can be seen as an indication of the state of being agile (Moreira 2013; Soundararajan 2013). In empowerment research, a large number of studies have already confirmed the connection between psychological empowerment and positive outcomes such as productivity, innovative ability, job satisfaction, motivation, and affective commitment in various forms of organization (Chen et al. 2011; Seibert et al. 2011). Affective commitment is a component of organizational commitment. A high degree in this construct is linked with seeing the organization as part of their own identification (Meyer and Allen 1991). This component of commitment, according to a study by Chen et al. (2011), is particularly influenced by psychological empowerment.

Psychological empowerment has often been shown to be a mediator variable for positive outcomes (Maynard et al. 2012), and there are studies that confirm the increase of the psychological empowerment of Scrum users (Laanti 2013; Tessem 2014; Tessem and Maurer 2007). Agile working methods have the goal of empowering the employees (Breu et al. 2002). First, qualitative research findings are already available, which also show this connection within Scrum (Tessem 2014). However, quantitative results with validated scales are missing. Our research wants to close this issue. Likewise, companies which implement agile methods were able to measure increased subjective benefit and success compared to traditional working methods (Abrahamsson et al. 2002; Nerur et al. 2005). It can be deduced that Scrum's empowerment should also be measurable in a quantitative study. It can therefore be assumed that the positive relationship between psychological empowerment and job satisfaction as well as affective commitment also exists within Scrum and that psychological empowerment positively influences these outcome variables. The following hypothesis can be derived from this fact:

H1. The psychological empowerment (aspect of being agile) of a development team member influences (a) job satisfaction and (b) affective commitment.

Work Design

The concept of empowerment has several parallels with the Job Characteristic Model (JCM) by Hackman and Oldham (1975). Hackman and Oldham (1974) define the variety of requirements, the task identity, the task significance, autonomy, and feedback through the task as core characteristics of work, which in turn leads to the psychological experience of perceiving significance, responsibility, and knowledge of the results (Hackman and Oldham 1974). Work design in our research is therefore theoretically based on the JCM according to Hackman and Oldham (1974, 1975), which assumes that the five characteristics mentioned above (task identity, autonomy, task significance, feedback, and skill variety) are the decisive work design dimensions. Spreitzer (1996), with her conceptualization of empowerment, extends the JCM with the psychological states of competence and influence (Spreitzer 1996). A job with a high variety of needs, which has a high importance for the organization, should be more challenging. Together with the dimension feedback by colleagues, supervisors, or feedback by one's own employees, the feeling of competence and influence should be generated within the individual. It can be deduced that all five core characteristics of the JCM affect psychological empowerment. So far, there is qualitative research (e.g. Tessem and Maurer 2007) that investigated these job characteristics in Scrum, and it was able to show the relevance of them. However, no quantitative research has been done to evaluate the strength of their effects and furthermore no research is available regarding their influence on individual characteristics in Scrum. We want to close this gap and analyze the work design as an aspect of doing agile because it is determined by the external structures of Scrum (Schwaber and Sutherland 2017).

Scrum requires development team members to continually make decisions about the number and the actual implementation of product backlog records. Likewise, they must choose the practice of implementation and

independently generate new solutions when problems arise (Schwaber and Sutherland 2017). This structure gives them a high level of autonomy. Autonomy is the degree of freedom an individual has got to carry out their work assignment (Hackman and Oldham 1975). According to the JCM (Hackman 1980), it can be assumed that the autonomy within Scrum has a positive effect on the psychological empowerment of the employees.

Another core feature of work is task identity. This feature describes the extent to which a job allows the individual to work on a task from start to finish (Hackman and Oldham 1974). As part of Scrum, the team members work together in a sprint on a potentially deliverable product increment (Schwaber and Sutherland 2017). In this way, members experience a holistic process of development. According to the JCM (Hackman and Oldham 1974), the identity of the tasks leads to a state of cognitive experience of importance, to which Spreitzer (1995) refers in her conception of empowerment. The holistic nature of the tasks as an aspect of Scrum's work design should therefore have a positive connection to the psychological empowerment of a Scrum team member.

Skill variety is the degree to which a job requires one employee to handle a wide range of tasks (Morgeson and Humphrey 2006). This core feature of a workplace can also be found within Scrum. Since there are no hierarchies in a Scrum team and the entire team is responsible for the outcome at the end of the sprint (Schwaber and Sutherland 2017), members must also fulfil tasks from different hierarchies and competence areas. According to the model of Hackman and Oldham (1974), the development team members are expected to experience an increase in psychological experience states that are very close to psychological empowerment through the variety of tasks required during a sprint.

Another core feature in JCM is task significance. This feature describes the degree to which work has a substantial impact on the lives or work of others (Hackman and Oldham 1974). In the context of Scrum, the development team members have to work closely together, are responsible for the resulting increment, and continue to build on it (Schwaber and Sutherland 2017). Thus, the work has a decisive influence on the work of the other members. Because of this, it can be assumed that the significance of Scrum has a positive influence on the psychological empowerment of the development team members.

In their model, Hackman and Oldham (1974) also take up the core feature feedback through the task. This describes the extent to which a job immediately provides clear information about the effectiveness of a task performance (Hackman and Oldham 1974). While the Scrum team members also receive feedback from the task by testing the product increment, feedback from the other team members is a more essential component. Feedback from others refers to the degree to which other individuals within the company, such as colleagues and supervisors, convey information to the individual in charge of their performance (Stegmann et al. 2010)[1]. The development team members receive feedback, e.g., by conducting a retrospective feedback from others about their work and the nature of the collaboration. Feedback, as postulated in the JCM, should therefore have a positive impact on the psychological experience. The results suggest that the relationship between feedback from others and job satisfaction or affective commitment are mediated through psychological empowerment, as feedback reflects one's own impact and thus empowerment. This in turn affects job satisfaction and affective commitment.

Thus, the following hypothesis can be derived:

H2. The positive effect of the work design (aspect of doing agile) on (a) job satisfaction and (b) affective commitment is mediated by the psychological empowerment (aspect of being agile) of the development team member.

Individual Characteristics

Scrum requires certain characteristics of the job to be perceived as appropriate by the individual in order to increase satisfaction and commitment to the organization. The framework defined by Scrum, such as the continual adaptation and optimization by the final reflection events of the sprint, and in response to the complexity of the environment (Schwaber and Sutherland 2017), development team members are required to be constantly open to new actions. Openness for new actions indicates the willingness to try different

[1] This source is a German source. Since this is a German sample, we preferred using already validated German scales.

activities (Ostedorf and Angleitner 2004)[2]. Development team members who bring along this feature thus show a fit between the job's requirement and their character in this aspect. According to the findings of Kristof-Brown, Zimmermann and Johnson (2005), a fit should lead to increased performance, job satisfaction, stronger commitment, and reduced turnover. Openness is defined as a value of Scrum (Sutherland 2018). A development team member who shows openness thus lives the values. This can be considered as one aspect of being agile. While Baumgart, Hummel, and Holten (2015) could already confirm the importance of openness for the development team members in qualitative interviews, there is a lack of research work that shows the quantitative effect of openness in Scrum and integrates it into a holistic model. Since the explained fit only comes about when the working characteristics, as given in Scrum, interact with the corresponding characteristic of openness for new actions, the following hypothesis can be derived:

H3a, b. The openness to new actions (aspect of being agile) of a development team member moderates the indirect effect of the work design (aspect of doing agile) on (a) job satisfaction and (b) affective commitment through psychological empowerment (aspect of being agile); The greater the openness to new actions, the stronger the impact of psychological empowerment on job satisfaction / affective commitment.

Personality traits play a crucial role in the study of psychological empowerment (Seibert et al. 2011). However, Maynard, Gilson, and Mathieu (2012) also call for a stronger focus on orientations as factors influencing empowerment, since these too have not been the focus of research interests in the framework of empowerment. As described earlier, Scrum requires development team members to work closely together as a team. In the agile manifesto, individuals, interactions, and collaboration are defined values of agility (Beck et al. 2001). Derived from this, team orientation can be described as a lived value of agility and is therefore to be regarded as an aspect of being agile. As part of Scrum, the team bears the joint responsibility for the product increment and self-organizes its own product development process (Schwaber and Sutherland 2017). A development team member will then match the requirements of working with Scrum if they are team oriented. While there is research regarding teamwork in agile work (e.g. Moe et al. 2010), there are results missing regarding the individual team orientation of development team members. Personal characteristics were increasingly studied as a moderator between work characteristics and work satisfaction (Fried and Ferris 1987; Kristof-Brown et al. 2005; Loher et al. 1985). Also, within Scrum, individual characteristics, such as team orientation, could be a moderator function on the relationship between the work design and psychological empowerment. The psychological states of influence, self-determination, competence, and meaning – the dimensions of psychological empowerment – in turn result in increased job satisfaction and affective commitment. The following hypothesis can be derived from this:

H3c, d. The team orientation (aspect of being agile) of a development team member moderates the indirect effect of the work design (aspect of doing agile) on (c) job satisfaction and (d) affective commitment through psychological empowerment (aspect of being agile); the stronger the team orientation, the stronger the impact of psychological empowerment on job satisfaction / affective commitment.

Leadership

Schwaber and Sutherland (2017) describe the role of the Scrum master as that of a servant leader. Leadership is part of the external structure of agility and thus an aspect of doing agile. Servant leadership has been repeatedly explored for its positive impact on work satisfaction (Barbuto and Wheeler 2006), organizational commitment (Dannhauser and Boshoff 2006), empowerment (Earnhardt 2008), and engagement (van Dierendonck 2011). Leadership enables employees to make decisions themselves, share information, and advise employees. It also demonstrates innovative achievements (van Dierendonck 2011) attributed to the Scrum master, which provides the framework for the agile work of the development team and thus enables the employees to feel empowered by shaping the characteristics of the work. As psychological empowerment has been meta-analytically confirmed as the mediator of the above-mentioned results (Seibert et al. 2011), servant leadership of the Scrum master can be a predictor of influence on the psychological empowerment of the development team members. The psychological empowerment of the developers in the context of Scrum, as already explained, should result in an increased job satisfaction as well as increased commitment. Accordingly, the following hypothesis can be derived:

[2] This source is a German source. Since this is a German sample, we preferred using already validated German scales.

H4. The positive influence of the Scrum master's servant leadership (aspect of doing agile) on (a) job satisfaction and (b) affective commitment is mediated by the psychological empowerment (aspect of being agile) of the development team member.

Scrum is a method of successfully developing products in highly complex environments (Schwaber and Sutherland 2017). Zacher and Rosing (2015) focus on leadership behavior in their research that leads to success especially in environments that are characterized by high complexity. In doing so, they examined ambidextrous leadership behavior, which consists of closing and opening behavior and can be adapted to the product owner role in Scrum.

Closing leadership behavior leads to a reduction in the variance of employee behavior. The manager uses corrective measures, sets specific standards, controls, and monitors the process of achieving the goals. On the other hand, opening leadership behavior should generate a greater variance in employee behavior. Managers are challenged to experiment, to do things in different ways, to change the status quo, and to provide space for their own thinking and actions (Rosing et al. 2011). This behavior can be largely attributed to the product owner. The development team has the ability to continue the development process independently of the product owner and customize the backlog entries. Thus, the product owner shows opening leadership. The closing leadership behavior of the product owner can be found especially in the sprint review. Here, the product owner checks which backlog entries have been completed according to the previously set standard and which are not. He reflects the current status of the development process and sets new deadlines if necessary. In this way, he monitors the target achievement process and, if necessary, takes corrective action. This leads to better work results, which in turn are strongly related to job satisfaction and affective commitment. The corrective actions of the product owner must never refer to the working method of the developers in the context of Scrum but are only corrective measures in the context of the product backlogs (Schwaber and Sutherland 2017).

Leadership styles in general have been explored between a variety of variables as a mediator or moderator (Durward et al. 2019; Eagly et al. 2003; Northouse 2012; Simmert and Peters 2020). While there are already first results regarding leadership styles for Scrum master (Holtzhausen and Klerk 2018) or team leadership (Moe and Dingsøyr 2008), the kind of leadership of the product owner is not part of the existing research. We want to close this research gap by analyzing the leadership style concerning ambidextrous leadership. Since it is precisely opening leadership behavior that combines strongly enabling aspects, it can be assumed that ambidextrous leadership will also have a positive effect on empowerment. The ambidextrous leadership (aspect of doing agile) by the product owner has a positive effect on the psychological empowerment (aspect of being agile). It can be deduced that the opening leadership behavior enables the development team members to self-organize their way of working, to shape them autonomously, and to implement the goals through the chosen method of working. The closing behavior of the product owner could provide a structure for the development team members. The important next steps are always dictated by the entries in the product backlog and adjustments to the complex environment are incorporated so that the development team always works effectively on priorities. Thus, the ambidextrous leadership can have a positive effect on the psychological empowerment, which in turn, as previously explained, influences job satisfaction and affective commitment. The following hypothesis can be derived from this:

H5. The positive influence of the ambidextrous leadership (aspect of doing agile) of the product owner on (a) job satisfaction and (b) affective commitment is mediated by the psychological empowerment (aspect of being agile) of the development team member.

The whole research model can be seen in Figure 1.

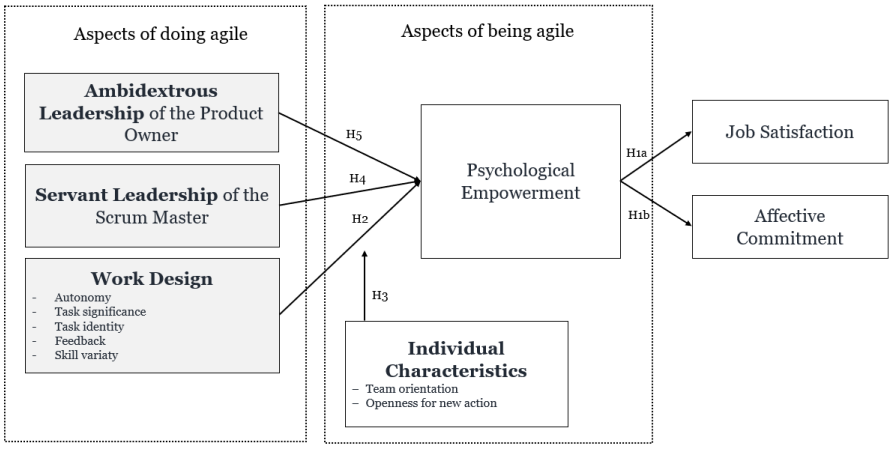

Figure 1. Research Model

Research Method

Procedure and Data Collection

In order to investigate the hypotheses, we developed an online questionnaire that draws on already validated scales. The defined acquisition target group defined developers as respondents. The participants answered the questionnaire based on their agile work as developers in one Scrum team. The questionnaire was also designed for the target group of developers and was developed iteratively with experts. Before the online questionnaire was activated, a pretest was conducted with five participants. The participants were, among others, people who were familiar with the topic (from the field of psychology or Scrum users). Based on the collected feedback and the generated data of the participants, some changes of the items were made in order to avoid misunderstandings and to ensure the plausibility of the questionnaire. The duration of the pretest was between 12 and 19 minutes.

The study was conducted using an online survey. Over a period of two months, the data was collected. The acquisition was handled primarily via circular email to organizations that are known for using Scrum and via business social networks. The survey was addressed to Scrum development team members. The written online survey was conducted with 129 German-speaking development team members. The participants are between 19 and 68 years old (M = 40.25, SD = 9.43), and 75.4% are male.

The participants have on average 4.33 years of experience with Scrum (SD = 2.9), which means from half a year to 12 years. Almost 50% of the participants say they work with Scrum in the IT industry (47.3%). The sample is primarily made up of people with an academic degree (Bachelor / Master / PhD), who represent 2/3 (67.6%) of all participants.

265 participants opened the questionnaire. After a comprehensive data cleaning, the total number of valid responses is 132 persons. We checked the response behavior with reversed coded items to ensure the attention of the participants. The data were checked for outliers with box plots, which allows a graphical representation of outliers. These were selected according to the 1.5*IQR rule (McGill et al. 1978). In addition, extreme residuals, detected by histograms and scatterplots with the deleted residuals, were considered (Cohen et al. 2003). Individual values that were identified by the analyses as deviating significantly from the data structure were eliminated. After data cleansing, 112 complete data sets could be generated. A further 18 data sets were not complete but could help to answer the research questions, as not all variables are included in all analyses. The final sample thus consists of 129 data sets.

Ordinary least squares (OLS) regressions were used for the analysis of interrelation, mediations, and moderated mediation. Nonparametric bootstrapping was taken, whereby corrected confidence intervals can be provided to test the hypotheses (Preacher et al., 2007; Hayes, 2013). This approach enables the research model to be analyzed and alternative explanatory models to be considered (Muller et al., 2005). On this basis, the conditions under which the presumed effects arise can be examined. In our investigations

we have never included all variables in a regression but only related the respective constructs derived from theory. The needed sample size, according to the formula for large populations from Cochran (1963, p. 75), for a representative sample is 96 participants (z= 1.96; p = .50; e=.10). With 129 adjusted data sets, we can thus underline the representativeness of the sample and exceed the minimum number.

In order to check the common method variance, Harman's single-factor test was applied in a first step (Podsakoff et al. 2003). The results of the factor analysis show two factors, with the first clarifying 40.59 % of the variance and the second clarifying 16.11 % of the variance. From this it can be concluded that the common method variance does not pose a problem in the present survey. The next step was a correlation test by Pavlou, Liang, and Xue (2007), which refers to a method by Bagozzi, Yi, and Phillips (1991). It is shown that no variables correlate extremely highly (> .90) with each other, so the common method variance can be negated as a strong influence in this case as well.

Instrument Development and Data Analysis

The work design was based on the reflective measuring scales autonomy in decisions (2 Items, Cronbach's Alpha = .83) and method (3 Items, Cronbach's Alpha = .77), task identity (4 Items, Cronbach's Alpha = .72), skill variety (4th Items, Cronbach's Alpha = .80), task significance (4 Items, Cronbach's Alpha = .83), and feedback from others (3 Items, Cronbachs Alpha = .85) from the Work Design Questionnaire (WDQ) by Stegmann et al. (2010). All items of the work design were queried on a five-point Likert scale (1 = fully true, to 5 = not at all).

As individual characteristics, openness for new actions and team orientation were chosen. Team orientation was based on the cooperation scale of the Bochum inventory on job-related personality description according to Hossiep and Krüger (2012) and was measured with eight items. The reflective scale has a reliability of Cronbach's Alpha .84. Openness for new actions of the Scrum team members was measured using a subscale of openness from the NEO personality inventory revised (Ostedorf and Angleitner, 2004) with eight items. The reflective scale achieves the desired reliability with a Cronbach's alpha of .75. The items were collected on a five-point Likert scale (1 = fully true, 5 = not at all).

The construct of the servant leadership was created with the short scale of Sendjaya et al. (2017). With one item each, the scale raises the dimensions of voluntary submission, authentic self, alliance, responsible morality, transcendental spirituality, and transformative influence (Sendjaya et al., 2017). The items have been adapted to the Scrum master in their choice of words. Reliability was confirmed in the study (Cronbach's alpha = .87). The response scale spanned five levels, from 1 (= fully true) to 5 (= not at all). The developer evaluates this scale in regard to the Scrum master's behavior.

The reflective ambidextrous leadership scale was developed by Rosing et al. (2011). This consists of two subscales, the opening and the closing leadership behavior, each measured with seven items. To improve the reliability values, an item was eliminated from the scale of closing leadership behavior. Both subscales are reliable with a Cronbach's alpha of .82 in the case of opening leadership behavior and .74 in the case of closing leadership behavior. Overall, there is a satisfactory Cronbach's Alpha of .78. The items have been adapted to the product owner according to the research environment. The construct of ambidextrous leadership was ranked with a 5-step frequency scale from 1 (= very common) to 5 (= never). The participating developers answer the scale in regard to the product owner's behavior.

To capture the psychological empowerment of development team members, we used the reflective scale by Spreitzer (1996). The scale with twelve items has a satisfactory reliability value of Cronbach's Alpha = .90. The construct is built upon four subscales. These are influence, competence, significance, and self-determination with three items each. All subscales show satisfactory reliability values of Cronbach's Alpha from .78 to .87. A Likert scale from 1 (= fully true) to 5 (= not at all) categorizes the answers of the participants.

Job satisfaction was enhanced by three selected items of the reflective scale by Hackman and Oldham (1974) in the translation of van Dick (2006). The reliability of the scale in the present work is satisfactory with a Cronbach's Alpha of .81. Job satisfaction was measured on a five-point Likert scale (1 = fully true, 5 = not at all).

To measure the affective commitment, selected items from the questionnaire instrument "Commitment, Organization, Occupation and Employment form" according to Felfe et al. (2014) were reported. The

reflective scale with three items has a reliability of Cronbach's Alpha = .85 and is therefore sufficiently accurate. This scale is also calculated on the five-level approval scale described above. The control variables were age, gender, experience with Scrum, and highest educational level. Table 1 in the appendix sets out the correlations of the regression variables. In order to check the validity of the data, we have considered the significance for each scale according to Bartlett, the Kaiser-Mayer-Olkin criterion, and the explained variance and the significance for every item according to discriminatory power and the Measure of Sampling Adequacy. The results demonstrate the validity of our results. To check for autocorrelation in the mediations or moderated mediations, we used Durban Watson tests (Durbin and Watson 1950). For all sub-hypotheses, valid values of 1.87 to 2.07 were found, which thus confirms the use of regressions.

Results

Hypotheses 1 to 5 are subsequently checked on the basis of regression analysis. Hypotheses 1a and 1b use psychological empowerment (aspect of being agile) as a direct determinant of job satisfaction and affective commitment. The results from the regression analysis to verify H1a show a positive relationship between the psychological empowerment of development team members and their work satisfaction (R^2 = .30**, b = .51**). Consequently, hypothesis 1a can be confirmed. The positive relationship between the psychological development of the development team members and the affective commitment to the organization is slightly weaker (R^2 = .21**, b = .26**). Thus, hypothesis 1b can be confirmed.

Hypothesis 2 is a mediation. According to Holmbeck (1997) and Baron and Kenny (1986), four aspects must be fulfilled for the examination of mediators. First, path a, which exists between the independent variable and the mediator, must be significant. Second, the mediator must have a significant effect on the dependent variable (path b). Third, path c, which describes the effect between the independent and dependent variables without considering the mediator, must be significant. Finally, the scientists describe that the effect between the independent variable and the dependent variable, taking into account the mediator (path c'), must decrease or not become significant compared to path c (Baron and Kenny 1986; Holmbeck 1997).

The variable work design (H2a) is an indirect determination of job satisfaction. The results from the regression analysis show that paths a-c are significant. The relationship of the work design with job satisfaction with a b value of .43** (path c) to .08 (path c ') decreases when psychological empowerment is included as a mediator in the model. R^2 increases from .17** .30**. Mediation proves to be significant after applying the Sobel-Z test (p <.000) and considering the confidence interval. The subscales individually also show a significant mediation. Thus, hypothesis 2a can be confirmed. The results of the regression analyses for H2b show that the a-c pathways are also significant in this case. The b value of the direct relationship between the work design and the affective commitment decreases from .64** (path c) to .18 (path c ') and is no longer significant. R^2 increases from .13** .21** and is therefore in a high range. After testing with the Sobel-Z test (p <.000) and considering the confidence interval, the mediation can be described as significant. Hypothesis 2b is thus confirmed (see Table 2).

Dependent Variable	Path a	Path b	Path c	Path c´	Indirect effect
Work Satisfaction	.66**	.52**	.43*	.08	.34 CI (.20; .50)
Affective Commitment	.68**	.68**	.64**	.18	.47 CI (.23; .72)
Notes. *p < .05, **p < .001, n = 119 (H2a); n = 127 (H2b), CI = 95 % Confidence interval					

Table 2. Regression coefficients of mediation H2a and H2b

In the present research model, Hypothesis 3 is a moderated first-order mediation (see Edwards and Lambert 2007). The analysis shows a moderated mediation index (see Hayes 2015) of -.17 and the confidence interval from -.39 to -.01 does not include 0, so moderated mediation can be assumed. Hypothesis 3a is thus confirmed on the basis of the data. In the review of hypothesis 3b, a moderated mediation index of -.15 is shown, and the bootstrap confidence interval excludes 0 (CI = -.30; -.03). Thus, it is also in this case a moderated mediation. An examination of hypothesis 3c of the model with the interaction term shows a determination coefficient of R^2 = .48**. However, there is only a significant effect of work design (aspect of doing agile) on psychological empowerment (aspect of being agile) (b = .89**), while team orientation (b = .10, p = .41) and the interaction term between work design and team orientation (aspect of being agile) (b = -.06, p = .24) have no significant influence on psychological empowerment

(aspect of being agile). The analysis of moderated mediation also shows no significant index (-.03, 95% CI -.08, .06). H3c cannot be confirmed. Based on the nonexistent moderation of team orientation between the work design (aspect of doing agile) and psychological empowerment (aspect of being agile), hypothesis 3d cannot be confirmed with the effect of moderation on the affective commitment. The moderated mediation index accordingly indicates that there is no moderated mediation (moderated mediation index = -.04; CI = -.12; .07).

The results of the regression analysis of hypothesis 4a show that the direct relationship between the servant leadership (aspect of doing agile) and the job satisfaction of the development team members decreases from b = .26** (path c) to .03 (path c ') when psychological empowerment (aspect of being agile) is included in the model as a mediator. Path c ' is not significant. R^2 increases from .10** to .32** when looking at the model with the mediator. The examination of the mediation with the Sobel-Z test shows a significant result (p <.000), and also the confidence interval does not include 0, whereby the hypothesis 4a can be confirmed. The review of H4b shows that paths a-c are also significant in this case. Again, the regression analysis shows that the b value decreases from .46** (path c) to .22 (path c ') when calculating the model with psychological empowerment (aspect of being agile) as a mediator, and R^2 increases when the mediator is added (from. 15** to .23**). The Sobel-Z test shows significance with a p value of .00 and the confidence interval does not include 0, which confirms hypothesis 4b. Table 3 summarizes the results for hypothesis 4 again.

Dependent Variable	Path a	Path b	Path c	Path c´	Indirect effect
Work Satisfaction	.38**	.59**	.26*	.03	.21 CI (.10; .33)
Affective Commitment	.39**	.63**	.47**	.22	.27 CI (.12; .48)
Notes. *p < .05, **p < .001, n = 112 (H4a); n = 120 (H4b), CI = 95 % Confidence interval					

Table 3. Regression coefficients of mediation H4a and H4b

Using linear regressions, H5a validation revealed that a-c pathways are significant (see Table 19). The direct effect of the ambidextrous leadership (aspect of doing agile) on job satisfaction of the development team members decreases to b = .03 when psychological empowerment (aspect of being agile) as a mediator is added and does not become significant. The explained variance (Nagelkerke 1991) increases from .04* to .31**. Hypothesis 5a can thus be confirmed. Table 5 shows the summary of the linear regressions for checking the significance of paths a-c with respect to H5a and b. All three paths show significant effects. It could be determined that in the case of H5b the effect of path c (b = 79**) decreases to b = 51* (path c ') and remains significant if psychological empowerment (aspect of being agile) is included in the model calculation. Thus, it is a partial mediation (see Holmbeck 1997). R^2 increases from .17** to .28** when taking the mediator into account. A check based on the confidence intervals and the Sobel-Z test (p <.00) shows that the mediation is significant, which supports hypothesis 5b.

Dependent Variable	Path a	Path b	Path c	Path c´	Indirect effect
Work Satisfaction	.37**	.56**	.24*	.03	.21 CI (.10; .33)
Affective Commitment	.44**	.63**	.79**	.51*	.27 CI (.12; .48)
Notes. *p < .05, **p < .001, n = 113 (H5a); n = 121 (H5b), CI = 95 % Confidence interval					

Table 4. Regression coefficients of mediation H5a and H5b

Discussion and Implications

There are several contributions to answer the research question “How do aspects of doing agile and being agile affect the job satisfaction and the affective commitment of development team members in Scrum?”, which are shown in the following. According to the available data, psychological empowerment (aspect of being agile) in the framework of Scrum has a decisive and significant effect on job satisfaction and affective commitment. It should be noted, however, that psychological empowerment affects work satisfaction even more than affective commitment. However, affective commitment is a form of organizational attachment (Meyer and Allen 1991). It is therefore explainable that the influence of empowerment in working with Scrum is stronger on job satisfaction than on the affective commitment to an organization and contributes with this insight to the research field of organizational agility.

Work design and leadership are aspects of doing agile, while psychological empowerment, together with team orientation and openness to new actions, are aspects of being agile. All three determinants have a positive effect on psychological empowerment (aspect of being agile) and its relationship to job satisfaction and/or affective commitment. There are (with the exception of ambidextrous leadership with affective commitment as a consequence) complete mediations. The success of Scrum is thus decisively shaped by being agile (empowerment of the developers).

The work design (aspect of doing agile) has the strongest influence on psychological empowerment. The two leadership styles (aspects of doing agile) account for 27% (servant leadership) and 12% (ambidextrous leadership) of the variance of development team member empowerment (aspect of being agile). Since work design (aspect of doing agile) is a continuous factor at work, which means that it affects all phases of Scrum, it has a particularly strong influence on psychological empowerment. The Scrum master as well as the product owner, with their respective leadership styles, are only temporary parts of the job. Basically, it should be noted that the aspects of doing agile are important factors influencing empowerment as an aspect of being agile.

Team orientation (aspect of being agile) can be seen as an important factor influencing psychological empowerment and its relationship to job satisfaction or affective commitment, according to the person-job-fit theory (Kristof-Brown et al. 2005). Team orientation is hereby examined as a moderator variable. This could not be confirmed in the present study. Team orientation has no significant impact on psychological empowerment (aspect of being agile) and does not act as a significant facilitator between work design (aspect of doing agile) and psychological empowerment. It is possible that there is a high degree of specialization in the tasks of the development team in which the respondents work. Moe and Dingsøyr (2008) observed in their study that specialization within teams leads to lower team orientation and developers tend to focus on their own tasks.

Furthermore, openness for new actions (aspect of being agile) from the person-job-fit theory (Kristof-Brown et al. 2005) can be seen as a decisive factor influencing psychological empowerment (aspect of being agile) and its relation to job satisfaction and affective commitment. Openness for new actions in this case should take on a moderator function. With a higher level of openness, the relationship between work design and empowerment should become stronger. In this way, the importance of the individual characteristics of the development team members in terms of being agile is emphasized once again. Therefore, it is not enough to create only external agile structures (doing agile), but the employees also have to develop internal agile structures (being agile).

Theoretical Contribution

Overall, our study makes four major theoretical contributions. First, it expands research in organizational agility by demonstrating the interaction of doing agile and being agile aspects and defines foundations for a holistic perspective for this research field. We thereby contribute to the knowledge base in this area where doing vs. being agile is highly discussed in practice already. Furthermore, our study expanded the research of agility in IS, which is often focused on doing agile aspects, with important psychological aspects.

Second, as far we know, never before has the product owner's leadership style as ambidextrous leadership been under consideration. Our study contributes to leadership theories by analyzing the extent of ambidextrous leadership in Scrum. Third, team orientation has been assumed to have an important impact. In our survey we were able to show that team orientation does not show this effect. With this result we offer new knowledge on which further research work can be built. Fourth, a quantitative study with this holistic view on Scrum development team members, as far as we know, has not been done before. So, for the first time, there are quantified measures especially for this group of people working with Scrum to confirm the connections between their aspects of work. This closes several research gaps, where results were only known in qualitative research work and the strengths of effects were not possible to offer.

Practical Contributions

This study offers several key practical contributions. Executives, who are responsible for agile projects, have the possibility to provide more successful agile projects by, first, having a clear understanding of how the work has to be designed and, second, supporting the development of servant leadership for Scrum masters

and ambidextrous leadership for product owners. Third, recruiting people with a high degree of openness supports the success of agile projects.

To increase the psychological empowerment (aspect of being agile) of development team members, the five aspects of the work design (aspect of doing agile) that are met by a proper Scrum execution are to be considered. These aspects are autonomy in method and in decisions, skill variety, task identity, importance, and feedback from others. As part of doing agile, work design has the greatest impact on the psychological empowerment of development team members. Often, Scrum is only partially implemented (Diebold et al. 2015). This may have the effect of not satisfying all aspects and thus not exhausting the positive impact of Scrum on the psychological empowerment of development team members. It is therefore important to ensure that these aspects are fulfilled when working in Scrum. For example, the developers should make their own decisions regarding the number of implemented product backlog entries and the manner of implementation of them. In case of difficulties, they should be able to independently find new solutions. In this way, the autonomy of the developers can be ensured.

The servant leadership (aspect of doing agile) of the Scrum masters has the second largest impact on the psychological empowerment (aspect of being agile) of the developers. Therefore, it should be ensured that the Scrum master comprehends and consistently applies this style of leadership to contribute to the higher job satisfaction and affective commitment in Scrum. Personnel development measures can support this. The ambidextrous leadership (aspect of doing agile) of the product owner also influences the psychological empowerment (aspect of being agile) of the developers. The product owner should govern and apply this style of leadership to contribute to the success of Scrum. As a situational leadership style, ambidextrous leadership is considered to be a trainable leadership style that can be promoted through personnel development (Fieger and Fieger 2018).

In general, personnel selection can be based on individual characteristics (aspects of being agile) and how they fit into work (Kristof-Brown et al. 2005). For developer team members who are open to new actions, the impact of Scrum's work design on psychological empowerment is strengthened. This finding suggests that developers with a high degree of openness to new actions should be selected to work with Scrum to force the success of agile work.

Limitations and Future Research

A given limitation applies to the sample used. The sample, which was acquired primarily via circle mails and an occupational social network, cannot secure a random selection of participants. Similarly, it cannot be ruled out that several developers from one team took part in the study. It is not yet clear whether and to what extent this could have influenced the results. Subsequent studies could examine Scrum and the impact of empowerment in on a survey by asking more participants in different sets of companies. Scrum is well defined in its main features by the Scrum guide from Schwaber and Sutherland (2017). Nevertheless, some organizations only perform parts of the processes. This context has not been collected. Further research could examine the impact of different events and tools on empowerment. We used Scrum as an example for agile methods because it is widely spread. Nevertheless, the results may not be generalizable for all agile methods. Other agile methods, like lean or extreme programming, should be checked in this context as well to make generalizable propositions for agile methods.

The calculations to verify the common method variance show that the collection of data from a source was not a problem. Nevertheless, in further research, a mixed-method approach that gathers quantitative and qualitative aspects from different sources (Venkatesh et al. 2016) would be a design that provides interesting insights into Scrum. In this case, for example, objective success factors (such as the number of products, sales figures, etc.) could also be examined. In addition to the aspects of being agile (team orientation, openness and empowerment), which we have taken up from theory and literature, other internal constructs of "being" can be essential. They should be investigated for the exploration of Scrum and the effect of empowerment in this framework. For example, the JCM postulates the need for personal development as a facilitator between the work design and positive work results. We have concentrated on German-speaking participants in order to generate a first impression in the research field. In accordance with the recommendations from Pauleen et al. (2006), to avoid cultural biases, we provide clear information about the origin of the data sets. Further research could add data that widens the regional scope of this paper. In this study, Scrum empowerment research was only considered on the individual level. This level

provides the basis for research on the team level as well as the organizational level. Findings on these advanced levels could be of interest to research and practice, as it would allow for a higher level of complexity.

Conclusion

Agile working methods are a way to respond to the complexity of the world of work determined by changing user requirements, increasing risks, and rapid changes. The aim of the present study was to explore how aspects of doing and being agile influence each other in agile working methods using the example of Scrum. We did so using an explanatory model based on the theoretical basis of the self-efficacy expectation theory (Bandura 1977, 1995), the Job Characteristics Model (Hackman and Oldham 1974), the goal setting theory, and the person-job-fit theory (Kristof-Brown et al. 2005). Based on an online survey, data of 129 participants were collected. The results of the regression analysis show for the first time the effects of doing agile aspects and being agile aspects on a larger scale based on quantitative data. Development team members feel more empowered (aspect of being agile) when external structures (aspects of doing agile) like the explained leadership styles and the work design are high. The individual characteristics openness and team orientation (aspects of being agile) were supposed to moderate the relationship between the work design and the psychological empowerment. The results show that only openness moderates this relationship while team orientation has no significant influence. A higher level of empowerment (aspect of being agile) leads to more job satisfaction and affective commitment.

In this paper we showed that the results are important to know for organizations to handle the trends that significantly influence the world of work, which place the manufacturing of products in complex contexts. New quantitative research results that show the interaction of doing and being agile contribute to the research fields of IS and agility. Practical implications like knowing how to design work in Scrum, recruiting Scrum development team members with high openness for action, developing servant and ambidextrous leadership styles for the Scrum master and product owner could be concluded. Nevertheless, while the use of Scrum increases, there are many unknown aspects concerning how the interplay of being agile and doing agile leads to positive outcomes. The continuing relevance of this area of research, which is evident from Scrum's high level of acceptance, frequency of use, and positive results, should be the reason and motivation for further research on Scrum from an occupational psychology perspective.

Appendix

	1	2	3	4	5	6	7	8
1 Openness	1							
2 Team Orientation	,287**	1						
3 Servant Leadership	,158*	,194*	1					
4 Work Design	0,11	,206*	,668**	1				
5 Empowerment	0,082	0,105	,559**	,666**	1			
6 Ambidextrous Leadership	-0,031	0,128	,362**	,552**	,395**	1		
7 Commitment	-0,113	0,036	,382**	,392**	,460**	,454**	1	
8 Job Satisfaction	0,044	0,077	,328**	,412**	,548**	,218*	,407**	1
Notes. *p < .05, **p < .001								

Table 1. Correlations of the variables

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