

IMPACT OF SCRUM PRACTICE ON SOFTWARE DEVELOPMENT IN INDIVIDUAL AND TEAM PERFORMANCE DURING COVID-19 PANDEMIC

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ABSTRACT

Software development has always been an essential sector in companies that implement information technology, pandemic impacting how people manage IT projects. Scrum is one of the most used frameworks in Agile methodology commonly adopted in multiple companies as the concept has a robust way to track the task and people. This paper seeks to understand whether the implementation of Scrum will affect employee performance during the pandemic, either in individual or team aspects. The data was analyzed using inferential statistics and structural equation modeling. The questionnaire received 117 responses from scrum practitioners in Indonesia. Factor analysis supported the validity of the scales, and shows good coefficient of determination percentage for the impact of scrum practice on the perceived individual performance with 62% (majorly affected by self-determination and self-control) and perceived team performance with 71.1% (majorly affected by trust and communication).

Keywords: *Project Management, System Information, Agile, Scrum, Employee Performance*

1. INTRODUCTION

A pandemic is the spread of a widespread epidemic resulting from the spread of infection from person to person [1]. In late 2019, an unidentified coronavirus emerged from Wuhan, China, which caused the outbreak in many countries globally and is currently known as novel coronavirus 2019 [2].

Physical distancing is called for by all affected countries. Because of this restriction, employees in several companies cannot meet in person or make physical contact. So that many IT companies or those who implement IT choose to carry out the Work from Home (WFH) concept where employees carry out their work activities from home using the Internet or other telecommunication tools.

Using the Agile method using the Scrum framework is the best way to manage a project, especially in infrastructure and software development [3]. Based on “15th State of Agile Report” [4], The adoption of Agile methodology in companies worldwide in 2021 jumped to 86%

whereas in the previous year the adoption of Agile methodology was only 37% in 2020, it shows that scrum is the most widely used framework in implementing Agile methodologies. The application of Scrum is often carried out during a pandemic where flexibility and interactive feedback activities can provide an essential point in the development of software or information systems.

Employees are experiencing worry, dissatisfaction, and burnout as a result of the massive impact of the Covid-19 epidemic on their personal and professional life [5]. When left untreated, these emotions may have a negative impact on staff engagement and performance, resulting in poor job quality, blunders, and, in the long term, a company's ability to survive in these trying times.

According to a previous study [6], communication [6][7][8] and Trust [6][9][10] between one individual and his colleague may be used to assess the WFH concept during a pandemic and employee performance in virtual teams. However, as demonstrated in [11], the model currently lacks a separation between individual and

team performance context when describing employee performance; further development of the model might be enhanced by including factors of employee performance, such as fluctuating workload [12][13][14][15], leadership [16][17][18][19][20], self-determination [21][22][23][24] and self-control [25][26] were included to this study model, along with the adoption of scrum methodology [27] to those employee performance factors that telework [28] will improve. While many studies have looked at employee performance in general, few have looked into employee performance during disasters. There has been no recent research on the relationship between scrum adoption and employee performance during a pandemic. As a result, software businesses have little evidence on which to base their efforts to improve their employee's performance during this crisis in software development.

The purpose of this study is to see if implementing Scrum during a pandemic affects employee performance, if so, what are the influenced elements to either individual and team performance, and would teleworking enhance those elements. The study will also aid managers in making decisions and considering them while implementing IT/Software development initiatives and to enhance the process of developing an IT project.

The following is a breakdown of the paper's structure. In section 2, The past literature on the previous work is discussed and reviewed. Section 3 will focus on hypothesis development. The study topic and technique are described in section 4. Section 5 elaborates the results and discussion. Section 6 contains the limitation and further research. Finally, in section 7, the conclusion is presented.

2. RELATED WORK

The authors of this study conducted a literature review of employee performance models gathered from international publications, which served as the foundation for developing research models based on the factors needed to quantify employee performance levels in scrum practice. The following is a summary of prior research as well as an outline of the model based on related studies.:

Based on research published in a paper titled "Virtual Teams in Times of Pandemic: Factors That Influence Performance" [6], which

aims to provide information that can be used as a foundation for future research to develop strategies for implementing virtual work in post-pandemic work. The variables used in the study are "Task characteristics," "Virtual Team communication," "Leadership," "Cohesion," "Empowerment," "Trust," and "Performance," and it was discovered that using Agile methodology to develop work through virtual teams and distributing tasks among members from the start, being able to strengthen each member individually and in relation to others is very important in software development projects. Then there's the issue of leadership, which has a direct impact on virtual collaborators' confidence.

In research done [29], a paper titled "The Distance Dilemma" was written with the goal of determining the best strategy to manage employees who utilize teleworking to improve their work performance. "Attitude toward telework," "Relationship with management," "Manager trust in teleworker," "Self-determination," "Peer monitoring," "Results-based incentive system," and "Job performance" are among the factors used in the study. Self-determination was found to be directly connected to work success in this study.

In the study [11], the authors published a paper titled "Critical Success Factors Affecting Project Performance: An Analysis of Tools, Practices, and Managerial Support," which attempts to investigate the success factors for project management. "Project Management Tools," "Project Management Practices," "Project Management Support," "Individual Performance," "Team Performance," and "Project Performance" are among the variables used in the study. According to his findings, all project management success criteria (Tools, Practices, and Support) are more responsive to individual member performance than to team and project performance.

The study [30] includes a paper titled "Impact of Employee Motivation on Employee Performance," which intends to demonstrate that employee motivation and performance have a strong and favorable link. The variables "Employee motivation," "Employee performance," "Intrinsic reward," and "Employee Perceived Training Effectiveness" are used in the study. Employee motivation has a link with employee performance, according to his research.

In the study [31], a paper titled "Determinants of employee engagement and their impact on employee performance" was written with the goal of identifying the primary determinants of

employee engagement, predictability of their ideas, and their impact on employee performance. The variables "Work environment," "Leadership," "Team and Coworker," "Training and Career Development," "Compensation," "Organizational Policies," "Workplace Well-Being," and "Employee Engagement" are used in the study. Where the study's findings reveal a clear and meaningful link between employee engagement and performance.

Several previous research variables were added to measure the hypothetical model used in the next study, including the Scrum Practice variable [27], which discussed the use of scrum practices in the application of teleworking in software development; adding the Workload variable, which was discussed in the paper [13], which discussed the relationship of the workload variable to performance; and finally, adding the Self-Control variable, which was discussed in the paper [32].

Previous research has looked at employee performance in general, only a few have looked at employee performance during disasters. There has been no recent research on the relationship between scrum adoption and employee performance during the pandemic. As a result, the software has little evidence to support their efforts to improve employee performance during this crisis in software development.

3. HIPOTHESIS DEVELOPMENT

3.1 Scrum

Scrum is an agile software development framework for managing product development that is iterative and incremental. Rather than following the traditional sequential development cycle, this strategy encourages teams to self-regulate by promoting close online collaboration among team members as well as face-to-face communication among required disciplines [33]. Therefore, the implementation of Scrum is correlated with the employee's work aspect (such as Communication, Trust between team members, Workload assigned, Project leadership, etc.). Hence, we state the following hypothesis:

H1: There is a significant relationship between Scrum Practice (SP) and Workload (WL).

H2: There is a significant relationship between Scrum Practice (SP) and Communication (CM).

H3: There is a significant relationship between Scrum Practice (SP) and Trust (TR).

H4: There is a significant relationship between Scrum Practice (SP) and Leadership (LS).

H5: There is a significant relationship between Scrum Practice (SP) and Self Determination (SD).

H6: There is a significant relationship between Scrum Practice (SP) and Self-Control (SC).

3.2 Telework

Telework refers to work done from a distant location (such as at home) that involves the use of information and communication technology to carry out work-related activities. Traditionally, working from home has been considered a way to achieve a balance between work and family because teleworking provides a flexible schedule and allows family members to stay in touch with their loved ones. When you work long hours, or more days per week, or are frequently distracted from home, your work-life balance may be negatively impacted. Due to this, teleworkers face the double challenge of balancing work and family obligations [34].

3.3 Workload

Workload is the total amount of work or job processing capacity of an individual that must be completed in a certain period [31]. Employee workload is a critical determinant of productivity at work. When the workload owned by employees is below the existing standard, it will cause laziness and allow them to be unemployed. And vice versa. When the workload is above the standard, there is a possibility that employees will experience being overwhelmed. Therefore, the workload has considerable implications for the performance of employees [12].

Workload has a fairly large level of influence on a person's psychology; therefore, workload is often a human factor that has an impact on a person's performance decline [13]. Many researchers identify the factors that affect workload starting from work resources which are defined as representations of customers both in the form of physical and psychological conditions when they perform a task, then the consequences of work activities as well as organizational processes that

describe all protocols and procedures that must be followed as part of doing work activities [14]. Excessive workloads often lead to high levels of stress and general anxiety [15]. Hence, we state the following hypothesis:

H7: There is a significant relationship between Workload (WL) and Perceived Individual Performance (IP).

H13: There is a significant relationship between Workload (WL) and Perceived Team Performance (TP). One line space should be given above the sub section while no space should be given below the heading and text

3.4 Communications

In a physical location that is close together, team members often communicate more deeply than members located far away, which causes friction between them and, therefore, undermines team performance [6]. Communication is recognized as complementary to a process within the team because it allows the development and sustainability of other team processes that contribute to improving team performance, such as team coordination and monitoring [7]. As team members work towards a common goal, effective teamwork is characterized by productive communication and collaboration [8].

The communication media used by a virtual team also has a major influence on non-verbal information that can be used as a guide. Non-verbal information plays an important role in creating Trust and reducing conflict [35]. Open communication, as an instrument of effective human resource involvement that can be one of the instruments to increase the organization's chances of maintaining competitiveness [36], as stated in [37] that the success of a project is inextricably related to effective communication among stakeholders. Hence, we state the following hypothesis:

H8: There is a significant relationship between Communication (CM) to Perceived Individual Performance (IP).

H14: There is a significant relationship between Communication (CM) to Perceived Team Performance (TP).

3.5 Trust

It is a popular research topic to determine how, why, and under what conditions Trust develops. Results show that Trust positively impacts the success of Virtual Teams, part of the reason for its importance. Communication behavior, timely responses, open communication, and feedback influence Trust within the Virtual Team itself [6].

The literature written [9] reviewed that the latest definition of the use of a trust is "the willingness of one party to be vulnerable to the actions of another party based on the expectation that the other party will perform certain actions that are important to the trustee, regardless of the to monitor or control the other party". Later in the article [10] discuss that to achieve better goals, intensive cooperation is needed, which is made by the trust factor. Therefore Trust (Trust) is the cleanest factor in team performance. Hence, we state the following hypothesis:

H9: There is a significant relationship between Trust (TR) and Perceived Individual Performance (IP).

H15: There is a significant relationship between Trust (TR) and Perceived Team Performance (TP).

3.6 Leadership

The term leadership refers to the ability to lead others. According to the author, leaders can increase organizational efficiency by influencing the performance of their teams [16]. A leader influences the behavior of team members or employees because they are seen as a representative example of the organization and have the authority to evaluate the performance of their members or make decisions related to their promotion [17].

The use of Leadership alone can increase employee morale and produce job satisfaction [18]. Leadership has received great attention in a competitive business environment. Participative and supportive leadership styles have a strong and positive relationship with employee work performance so that it has a positive impact [19]. Leadership can affect organizational performance in two ways. First, Leadership can directly affect performance. Second, Leadership can indirectly affect performance through corporate social responsibility (Corporate Social Responsibilities) [20]. The attitudes and talents of senior leaders, who are often outside of yet responsible for the

development teams' performance, are the focus of Leadership [38]. Hence, we state the following hypothesis:

H10: There is a significant relationship between Leadership (LS) and Perceived Individual Performance (IP).

H16: There is a significant relationship between Leadership (LS) and Perceived Team Performance (TP).

3.7 Self Determination

The main focus of autonomy is on the need for people to have a will and initiate their actions, rather than being controlled and directed by others [21]. Self Determination is self-motivation to engage in the current workplace [22]. It is common for most individuals to perceive that they have the freedom to do things and act based on their desires, while under controlled motivation, they feel compelled to act in response to external pressures [23]. Self-determination is a determinant of motivation in taking action on an employee towards his work, which is often a favorable condition for the company where the effort and performance of an employee will tend to increase [24]. Hence, we state the following hypothesis:

H11: There is a significant relationship between Self Determination (SD) and Perceived Individual Performance (IP).

H17: There is a significant relationship between Self Determination (SD) and Perceived Team Performance (TP).

3.8 Self-Control

Self-control is needed to maintain focus in the world of work, to keep up with competing goals and irrelevant information, to stay afloat in the face of obstacles, and to compare the current state with the state of the desired goal [25]. According to [26], Self-control is the ability to control one's reactions, especially to bring them into line with ideals such as values, morals, and social expectations, as well as to support their pursuit of long-term goals. Based on "The Strength Model of Self Control" which was initiated by the journal, it is known that Self Control will decrease in the next experiment at a later date.

Continuing to work on a difficult problem requires self-control to overcome negative feelings and the desire to quit, so people who work long

hours on problems are assumed to have a greater capacity for self-control. The amount of Self Control given to the initial task was the only factor associated with subsequent changes in performance [32]. Hence, we state the following hypothesis:

H12: There is a significant relationship between Self Control (SC) and Perceived Individual Performance (IP).

H18: There is a significant relationship between Self Control (SC) and Perceived Team Performance (TP).

3.9 Employee Performance

Employee Performance can be interpreted as a response in the form of behavior that reflects what the employee has learned or the type of training the employee has received; it includes the results of mental and psychological abilities [39].

Employee performance, customer happiness, competitive advantage, and other quality standards are used to assess performance. The organization's performance and its index are critical because they assess how successfully, effectively, and efficiently the organization is carrying out its mandate [40]. Measurement of employee performance can be from the point of view of an individual or group where the two points of view may differ from one another. Therefore, the performance of employees will determine the level of success of the work they face.

3.10 Adoption of Scrum on Telework (Telework Scrum) and the relationship to Employee Performance

In the literature written [27], adapting the use of Scrum to telework has its advantages and disadvantages because the transparency of Scrum makes it possible to know what work is being done by the Scrum team, but communication is often not synchronized, so it will be difficult to know someone is busy or not. Not especially against teams that have large numbers. The concept of self-organization within teams, which is one of the key features of the Scrum method, in conjunction with the experience of team members, enables successful Scrum implementation in a telework environment.

Telecommuting, often known as telework, is the use of telecommunications technology to allow employees to do their work or obligations from home, following their employment agreement. Because of the rising demand on businesses to

decrease costs and boost staff productivity, telecommuting as a business practice has risen dramatically. Telecommuting appears to be a viable option for meeting the demands of good time management. The new method to controlling effective working hours, on the other hand, not only helps companies to better align labor resources with varied client demands but also enhances employee performance [28]. Hence, we state the following hypothesis:

H19: Telework adoption affects the effect of Scrum Practice (SP) on Workload (WL).

H20: Telework adoption affects the effect of Scrum Practice (SP) on Communication (CM).

H21: Telework adoption affects the effect of Scrum Practice (SP) on Trust (TR).

H22: Telework adoption affects the effect of Scrum Practice (SP) on Leadership (LS).

H23: Telework adoption affects the effect of Scrum Practice (SP) on Self Determination (SD).

H24: Telework adoption affects the effect of Scrum Practice (SP) on Self Control (SC).

4. RESEARCH METHODOLOGY

In evaluating the performance of the Scrum team during a pandemic, several variables and hypotheses were obtained and have been reviewed from the results of the literature study which was then used as the basis for the hypothetical model built in the study referring to the problems studied. The list of items used; some are derived from past study [10][20][41][42][43][44][45][46][47][48]. This hypothetical model will later be tested using data obtained from the distribution of questionnaires that have been prepared.

The population in this study was the software development team from companies that adopted Scrum during the Pandemic. For the technique used in sample collection, the researcher uses a cluster sampling technique where data about the total number of Scrum members in each company during a pandemic cannot be obtained or is not available. Using this technique, the researcher distributed a random survey of employees/team members within a scrum team during a pandemic that researchers were able to reach out to.

The study will utilize a Likert Scale to collect study samples. A Likert scale is a group of assertions (items) that are presented for a true or hypothetical event. On a metric scale, respondents were asked to rate their degree of agreement with the preceding assertions (items) from strongly disagree to strongly agree.

5. FINDING AND DISCUSSION

After a total of 117 response has been received, the Structure Equation Modelling is implemented. By using this method, the causal relationship can estimate and test by conducting a mixture of statistical data and qualitative assumptions. The research uses the Partial Least Square method to test the relationship established.

5.1 Demographic

The majority of respondents we got are male (71%), whereas the remaining 29% are Female, with the major range of age within 25-40. Participant locations are varied in Indonesia which most of them are hail in Jakarta (46%), and 62% of them are coming from technical developer roles in Scrum Team Member.

5.2 Measurement Model

Validity testing is conducted by using Convergent validity and Discriminant validity. In the Convergent Validity measurement, the values for the loading factor and average variance extract (AVE) are captured, Where the measuring instrument or indicator used a variable must have a loading factor of more than 0.7 so that the measuring instrument can be declared valid to measure the measured variable, when the value of the loading factor is less than 0.7 then the indicator or measuring instrument must be removed from existing models. The loading factor results in the first phase are shown that eight items have a loading factor number less than 0.7, which needs to be removed from the model. Those items are coming from variable Workload (4 Items), Leadership (1 Item), Self-Control (2 Items) and Perceived Individual Performance (1 Item). Therefore, second testing was conducted, which showed all indicators are valid for loading factor testing. The AVE number on a variable must exceed 0.5, where the measured variable can be said to be valid. The AVE value of the model after doing the loading factor testing shows that all

variable holds an AVE value of more than 0.5, which conclude the Convergent Validity of the Model is valid.

Table 1: Validity and Reliability Final Test Result

Variable	Item	Loading factor	Cronbach's Alpha	CR	AVE
SP	SP1	0.828	0.893	0.921	0.700
	SP2	0.777			
	SP3	0.885			
	SP4	0.861			
	SP5	0.828			
ET	ET1	1.000	1.000	1.000	1.000
WL	WL5	0.908	0.638	0.843	0.729
	WL6	0.796			
CM	CM1	0.848	0.899	0.926	0.714
	CM2	0.747			
	CM3	0.828			
	CM4	0.890			
	CM5	0.904			
TR	TR1	0.865	0.935	0.947	0.720
	TR2	0.832			
	TR3	0.825			
	TR4	0.844			
	TR5	0.843			
	TR6	0.882			
	TR7	0.849			
LS	LS1	0.854	0.893	0.921	0.702
	LS2	0.788			
	LS3	0.935			
	LS5	0.841			
	LS6	0.760			
SD	SD1	0.770	0.838	0.885	0.608
	SD2	0.777			
	SD3	0.711			
	SD4	0.810			
	SD5	0.826			
SC	SC1	0.757	0.868	0.868	0.622
	SC3	0.783			
	SC4	0.802			
	SC6	0.811			
IP	IP1	0.745	0.880	0.909	0.626
	IP2	0.858			
	IP3	0.762			
	IP4	0.824			
	IP5	0.805			
	IP7	0.745			
TP	TP1	0.785	0.898	0.929	0.768
	TP2	0.891			
	TP3	0.913			
	TP4	0.908			

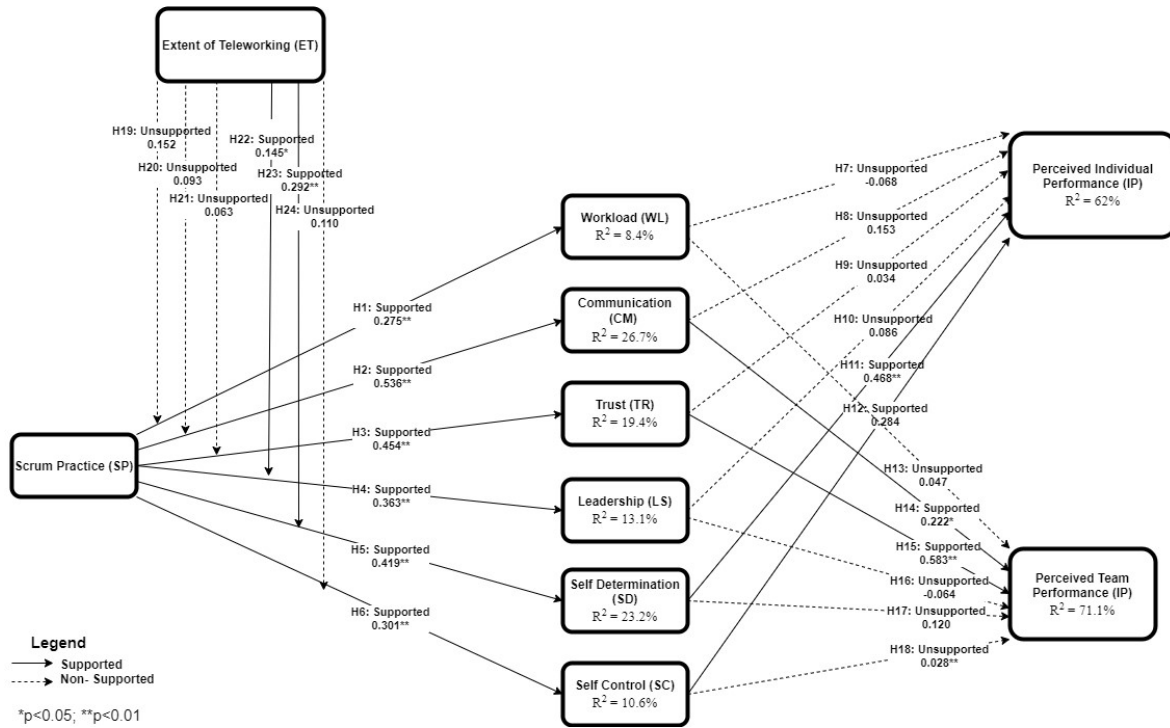
In the measurement of Discriminant validity, the value of the Fornell Larcker Criterion and Cross loading will be seen where the

correlation value between a variable and another variable is seen and calculated. In the Fornell Larcker Criterion, the correlation value of a variable against itself cannot be smaller than the correlation of that variable to other variables. The model is showing that either Fornell Larcker Criterion and Cross loading testing results can tell that the model is fulfilling the expected valid result in Discriminant validity measurement.

Reliability testing is carried out to test whether the hypothesis is reliable or effective for use in the model. Reliability testing is done by looking at the value of composite reliability and Cronbach's alpha. Composite Reliability does not assume equality between measures with the assumption that the indicators have the same weight. Composite Reliability pays more attention to individual reliability, referring to different external loads of indicator variables. The upper bound for Composite Reliability should be the same as any other measure of reliability, and a score of 0.6 to 0.7 would indicate construct reliability well [49]. In reliability testing, it must show that the resulting Cronbach's Alpha value exceeds 0.6, then the variable can be said reliable [50]. Therefore, the reliability testing conducted and showing that all the variable holds Composite Reliability more than 0.7, as the Cronbach Alpha is showing more than 0.6, the **Table 1** concludes the research model is valid and reliable.

5.3 Structural Model

In estimating the structural model, R^2 , P-value and Path Coefficient were used for inferring the causal relation and model. This study employee performance which has been categorized into two variables are Perceived Individual Performance (IP) and Perceived Team Performance (TP), **Figure 1** shows the R^2 of 62% for Perceived Individual Performance and 71.1% for Perceived Team Performance. Therefore, the models were assessed by looking at T-Statistics and Path Coefficient by implementing Bootstrapping algorithm with 5000 resampling iterations.



The study models explain the variation in the employee performance determinants variable such as Workload/WL ($R^2= 8.4\%$), Communication/CM ($R^2= 26.7\%$), Trust/TR ($R^2= 19.4\%$), Leadership/LS ($R^2= 13.1\%$), Self-Determination/SD ($R^2= 23.2\%$) and Self-Control/SC ($R^2= 10.6\%$). The model shows that the implementation of Scrum Practice (SP) is statistically positive and significant towards the determinants of employee performance variable, which are shown on the **Table 2** Thus confirming the Hypothesis of H1, H2, H3, H4, H5 and H6. The model Shows that Perceived Individual Performance are statistically positive and significant explained by Self-Determination ($\beta= 0.468$, $p < .01$) and Self-Control ($\beta= 0.284$, $p < .01$), not by Workload ($\beta= -0.068$, $p > .05$), Communication ($\beta= 0.153$, $p > .05$), Trust ($\beta= 0.034$, $p > .05$) and Leadership ($\beta= 0.086$, $p > .05$). Thus, conclude that H11 and H12 are confirmed whereas hypothesis H7, H8, H9, H10 were rejected. The model Shows that Perceived Team Performance are statistically positive and significant explained by variable Communication ($\beta= 0.222$, $p < .05$) and Trust ($\beta= 0.583$, $p < .01$), not by Workload ($\beta= 0.047$, $p > .05$), Leadership ($\beta= -0.064$, $p > .05$), Self-Determination ($\beta= 0.120$, $p > .05$) and Self-Control ($\beta= 0.028$, $p > .05$). Thus, conclude that H14 and H15 are

confirmed whereas hypothesis H13, H16, H17, H18 were rejected.

Table 2: Hypothesis Test Result

Variab le	Path Coefficient	Standar d Deviation	T- Statist ics	p- valu e	Result
H1	0.275	0.097	2.835	0.005	Significant
H2	0.536	0.084	6.342	0.000	Significant
H3	0.454	0.087	5.247	0.000	Significant
H4	0.363	0.091	4.000	0.000	Significant
H5	0.419	0.080	5.219	0.000	Significant
H6	0.301	0.101	2.974	0.003	Significant
H7	-0.068	0.080	0.855	0.392	Insignificant
H8	0.153	0.085	1.789	0.074	Insignificant
H9	0.034	0.099	0.345	0.730	Insignificant
H10	0.086	0.074	1.160	0.246	Insignificant
H11	0.468	0.078	5.987	0.000	Significant
H12	0.284	0.076	3.741	0.000	Significant
H13	0.047	0.061	0.776	0.438	Insignificant
H14	0.222	0.099	2.228	0.028	Significant

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H15	0.583	0.086	6.744	0.000	Significant
H16	-0.064	0.061	1.040	0.298	Insignificant
H17	0.120	0.062	1.932	0.053	Insignificant
H18	0.028	0.078	0.355	0.723	Insignificant
H19	0.152	0.101	1.502	0.133	Insignificant
H20	0.093	0.097	0.965	0.335	Insignificant
H21	0.063	0.097	0.649	0.517	Insignificant
H22	0.145	0.067	2.179	0.029	Significant
H23	0.292	0.094	3.115	0.002	Significant
H24	0.110	0.098	1.131	0.258	Insignificant

The extent of Teleworking assessed as a moderating variable for affecting the relationship between Scrum Practices and the determinants of the Employee Performance, and the results show that the Extent of teleworking strengthen the effect of Scrum Practice on Leadership ($\beta = 0.145$, $p < .05$) and Self-Determination ($\beta = 0.292$, $p < .05$). Thus, conclude that H22 and H23 are confirmed, whereas hypotheses H19, H20, H21, H24 were rejected. Scrum is an agile software development framework for managing product development that is iterative and incremental. Rather than following the traditional sequential

5.4 Managerial Implication

The Research purpose is to define the impact of Scrum practice on Employee performance in pandemic time. Therefore, the result of this study is expected to become an insight and reference for the managerial decision for the company or the software development industry. Employee performance will determine the quality of works and help the business to run smoothly, which improves the business process and services to cater the customer needs.

The study shows that individual performance is impacted by self-control and self-determination, which the management decision to improve the self-control such as reducing the continuation of work as its one of the variables that continue to replenish [34], it could be achieved by implementing ice-breaking session in a daily stand-up ceremony as one of scrum practice ceremony and much other activity to stabilized employee self-control. Self-determination is an individual treatment triggered by self-motivation, as the

managerial decision was only able to nurture rather than force the determination aspect to the employee. As for the Team performance is directly impacted by Trust and Communication between the entire Scrum Team, the scrum practice always demands transparency within a task assignment and progress based on a working program, Trust was enabled as long as the scrum practice was continuously implemented. The scrum practice ceremony, such as Daily stand up or Sprint Review, always gave the platform for communication between scrum teams.

Another implication, according to our finding, such as teleworking decisions where the scrum team was not physically met can be implemented to strengthen the Leadership and individual self-determination in the adoption of scrum practice, for the increase in leadership aspect could happen because of the teleworking help company to apply some tracking regulations which helps to improve the leadership decision, but the increase of Leadership won't affecting the employee performance, neither from individual or team aspects, but possible to strengthen the team motivation. The decision to implement telework in the implementation of Scrum practice was an option for strengthening the individual who has determination in work. The decision to implement telework was usually triggered by the time flexibility of doing some tasks, and the decision to implement telework became an option for strengthening the individual who has determination in work. Finally, this research aids general readers in gaining information and understanding of performance determinants and processes in general practice.

6. LIMITATION AND FURTHER RESEARCH

There are some limitations within this study, based on the goal of the research which provide information that enhance employee performance in regard the implementation of Agile methodology using Scrum framework of an IT or Software Development Project. First, we are aware that this study was using statistical inferential which the items of some variables are needed to be enhanced as well as the relation between hypothesis that needs further development. Second, the determinant variable of employee performance that this study uses is only able to cater 62% for perceived individual performance and 71.1% for the perceived team performance, which the remaining elements of the determinant variable to

be further emphasized and developed for future research. Third, the dependent variable for employee performance the study used was the perceived performance assessment variable, thus leaving a further opportunity for future research to implement another technique (such as an interview or the combination of qualitative and quantitative) to elaborate on the employee performance variable.

Lastly, the study was taken in a single country (Indonesia), which constrains the generality of employee characteristics. The future study was intended to collect data from a variety of nations and working cultures, as well as the addition of variables that would strengthen the discovery element of employee performance in a pandemic.

7. CONCLUSION

This research has conducted PLS-SEM analysis using SmartPLS software [51] in a total of 117 Scrum practitioners, which includes the inner and outer models testing, as this study intends to highlight the influence of scrum practice on employee performance in pandemic times. The research infers that the adoption of scrum practice was affecting self-determination and self-control, which is the determinant of individual performance and another implication state that the scrum practice also affects Trust and communication, which determine the team performance aspect. Another empirical finding shows that the extent of teleworking is strengthening the adoption of scrum practice in Leadership and self-determination.

Finally, this work offers a piece of valuable information for industries that implement IT projects in pandemic times to help to decide project management methodology in software development

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Appendix:

Table 3: List of Variable Item

Construct	Items	Reference
Scrum Practice	My company adopts the Scrum methodology in its software development well.	[48]
	My team conducts daily meetings according to the concept of implementing Scrum.	[48]
	My team conducts Sprint Planning according to the concept of implementing Scrum.	[48]
	My team conducts a Sprint Review according to the concept of implementing Scrum.	[48]
	My team has a complete role according to the concept of implementing Scrum (there are Scrum Master, Scrum Member and Product Owner).	[48]
Extent of Telework	How often do you work from home (Work From Home) in a month	N/A
Workload	The task given to me is not very demanding on mental activity (e.g., thinking, deciding, calculating, remembering, searching)	[41]
	The tasks assigned to me were not very physically demanding.	[41]
	The task given to me is not very demanding on my work speed (not much pressure on time).	[41]
	I don't have to work very hard to complete all the work I'm given.	[41]
	The task given to me is enough to make me comfortable, happy, and relaxed	[41]
	I feel the task assigned to me is quite light	[41]
Communication	Communication with fellow team members can be done easily	[47]
	Communication with the project manager (Scrum Master) can be done easily	[47]
	I receive timely information to do my job	[47]
	The communication makes me feel like I'm in a team	[47]
	The team members I have are great communicators	[47]
Trust	I believe the team members will successfully fulfill their duties	[10]
	My team members are qualified so as to create an effective team performance	[10]
	I can trust the expertise of team members	[10]
	I believe I can get help easily from team members	[10]
	I believe my team members are willing to share any resources (Information, time, etc.) they have with other members at any time.	[10]
	Team members can trust each other and support each other to come up with different ideas and suggestions	[10]
	Team members respect each other's emotions and ideas	[10]
Leadership	My manager motivates team members to be key players in the team.	[20]
	My manager respects my personal needs. (Such as: not disturbing on holidays or leave)	[20]
	My manager leads by example (setting an appropriate example).	[20]
	My manager challenges me to set high goals for myself (high-performance expectations).	[20]
	My manager inspires others with his future plans.	[20]
	My manager challenges me to think out-of-the-box in solving problems.	[20]

Self Determination	I can make decisions and actions based on my own thoughts	[42]
	I have a life goal that I want to achieve.	[42]
	I feel satisfied when I can solve a problem.	[42]
	I believe I have full power over the choice of solutions to solve the problem.	[42]
	I feel like I can determine which problem to solve first.	[42]
Self Control	I can easily break bad habits	[43]
	I make decisions that make me comfortable	[43]
	I'm good at resisting temptation	[43]
	I don't make decisions right away that I regret later	[43]
	I'm not easily distracted	[43]
	I always think before doing something	[43]
Perceived Individual Performance	I managed to plan my work to finish on time.	[44]
	I focus on what I have to achieve in my job.	[44]
	I can separate the main problems and side problems at work.	[44]
	I managed to do the job assigned to me well, effectively and efficiently.	[44]
	I took the initiative to start a new task after completing my previous task.	[44]
	I try to keep my work skills up-to-date	[44]
	I actively participate in work meetings.	[44]
Perceived Team Performance	The team can complete the project on time	[45]
	The team can produce quality products	[46]
	Teams can produce working products on demand	[46]
	Stakeholders are happy with the team and the resulting product	[46]