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The Influence of Hybrid Working in the Context of Agile Software Development within the Dutch Financial Sector

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ABSTRACT

The COVID-19 pandemic has accelerated remote working and working at the office. This hybrid working is an indispensable part of today's life even within Agile Software Development (ASD) teams. Before COVID-19 ASD teams were working closely together in an Agile way at the office. The Agile Manifesto describes 12 principles to make agile working successful. These principles are about working closely together, face-to-face contact and continuously responding to changes. To what extent does hybrid working influence these agile principles that have been indispensable in today's software development since its creation in 2001? Based on a quantitative study within 22 Dutch financial institutions and 106 respondents, the relationship between hybrid working and ASD is investigated. The results of this research show that human factors, such as team spirit, feeling responsible and the ability to learn from each other, are the most decisive for the success of ASD. In addition, the research shows that hybrid working creates a distance between the business organization and the IT department. The findings are valuable for Managers, HR professionals and employees working in the field of ASD as emphasizing and fostering Team Spirit, Learning Ability, and a Sense of Responsibility among team members can bolster the Speed of ASD.

Keywords: Agile Software Development, Hybrid Working, Agile success

INTRODUCTION

The Agile Manifesto was created in 2001 (Fowler & Highsmith, 2001). The main reason for creating the Agile Manifesto is that software development projects were often not delivered on schedule. The development processes were planned in advance, but then adjustments always had to be made as a result of changes or setbacks during the execution of the development process. Agile embraces these changes. Because by being open to these changes and working closely together with the customer, this delivers a better result. Agile is ultimately about delivering value for the end customer, which is anchored in one of the 12 agile principles: "Our highest priority is to satisfy the customer through early and continuous delivery of valuable software" (Fowler & Highsmith, 2001). Instead of working out everything in advance and deliver the software in one huge release using the traditional waterfall method, the workload is reduced into small workable deliveries with the Agile method on which adjustments can easily be made (Dyba & Dingsoyr, 2008). The transformation from traditional software development to Agile Software Development (ASD) delivers benefits that is recognized by developers (Williams, 2012). Advantages are, for example, a faster time-to-market and an increase in transparency and predictability (Olteanu, 2018).

In the Agile philosophy, intensive (close) cooperation is a key factor. At the top of the Agile Manifesto it says: "**Individuals and interactions** over processes and tools" (Fowler & Highsmith, 2001). This conflicts with Hybrid working that has been introduced in an abrupt way due to COVID-19. There are many advantages to hybrid working in terms of cost savings, sustainability, and work-life balance. But the effect on the way of collaboration and ultimately the performance of the IT organization is underexposed (Kazekami, 2020; Comella-Dorda, Garg, Thareja, & Vasquez-McCall, 2020) and therefore the research question to this study is:

To what extent does hybrid working influence the success of the agile software development?

In the next section we describe the theoretical background of this study. Second, the research method will be explained followed by a discussion of the findings and subsequently the conclusion and recommendations.

THEORETICAL PERSPECTIVES

According to several previously performed studies the success of ASD is determined by three dimensions: *People*, *Technology*, and *Organization* (Chow & Cao, 2008; Aldahmash, Gravel, & Howard, 2017; Misra, Kumar, & Kumar, 2005; Ephraim Bogopa & Marnewick, 2022).

In all these studies, the *People* dimension is seen as the most decisive dimension within ASD. Several sub-dimensions have been identified within the *People* dimension. Sub-dimensions like collaboration, communication and personal characteristics are seen as the most determining dimension for agile success (Tama, Jola da Costa Mouraa, Oliveiraa, & Varaião, 2020). In addition to the *People* dimension, the success of ASD is also determined by *Technical* and *Organizational* dimensions (Misra, Kumar, & Kumar, 2005). In addition, other studies show that remote working influences ASD (Russo, Hanel, Altnickel, & Berkel, 2021; Knoph, Berntsson Svensson, & Agren, 2022). Several preconditions for the successful design of hybrid working have been recognized. When these preconditions are applied properly, this leads to better results within ASD (Gratton, 2021; Shirmohammadi, Au, & Beigi, 2022).

All these publications raised the question whether working remotely could have an influence on ASD. It was not without a reason that software development teams were always sitting close to each other in an organization. Short lines of communication, and a lot of direct contact is seen as a precondition according to the agile principles (Fowler & Highsmith, 2001). Based on this the premises has been formed that hybrid working has an influence on ASD. This expectation is based on the theory of agile development in which is clearly stated that interaction between people is a key factor. As mentioned earlier, the Agile Manifesto mentions "Individuals and interactions over processes and tools" (Fowler & Highsmith, 2001) and in the agile principles it is also stated that agile is about face-to-face contact and multidisciplinary collaborating teams. This is a principle that is very important for software development teams (Williams, 2012). Therefore, the research question in study is: *To what extent does hybrid working influence the success of the agile software development?* The research question contains three variables: Hybrid working, Agile software development and success (of agile working). Below, we will explain these three variables and how we explored the relationship between these variables.

Hybrid Working

In literature eight dimensions are revealed for the correct implementation of hybrid working. These dimensions can be divided in social dimensions (soft dimensions), such as having regular physical contact (Russo, Hanel, Altnickel, & Berkel, 2021), involving employees in making arrangements about hybrid working (Shirmohammadi, Au, & Beigi, 2022), having periodic digital contact moments (Gratton, 2021), and hard dimensions such as facilitating hybrid working in the form of tools (Olson & Olson, 2014), making financial resources available and creating office spaces (Deshpande, Sharp, Barroca, & Gregory, 2016).

The eight dimensions with related literature are shown in Table 1.

Nr.	Hybrid working	Source
1	Involving employees in deciding on hybrid working.	(Shirmohammadi, Au, & Beigi, 2022)
2	Create enough office spaces for moments of contact.	(Deshpande, Sharp, Barroca, & Gregory, 2016)
3	Facilitate tools to make distance work possible.	(Shirmohammadi, Au, & Beigi, 2022) (Olson & Olson, 2014) (Deshpande, Sharp, Barroca, & Gregory, 2016)
4	Use Cloud Solutions for a fast, safe, and secure environment.	(Comella-Dorda, Garg, Thareja, & Vasquez-McCall, 2020) (Anderson, Bieck, & Marshall, 2021)
5	Make financial resources available to allow employees to set up their home environment.	(Shirmohammadi, Au, & Beigi, 2022)
6	There is regular contact between manager and employee in which homeworking is discussed.	(Comella-Dorda, Garg, Thareja, & Vasquez-McCall, 2020) (Gratton, 2021)
7	There is periodic physical consultation to ensure team spirit.	(Shirmohammadi, Au, & Beigi, 2022) (Russo, Hanel, Altnickel, & Berkel, 2021)
8	There is periodic digital consultation to ensure team spirit.	(Olson & Olson, 2014) (Russo, Hanel, Altnickel, & Berkel, 2021) (Gratton, 2021)

Table 1: Dimensions of hybrid work

Agile Software Development

While early studies already indicate that the success of ASD is based on three dimensions: People, Technology and Organization (Chow & Cao, 2008; Aldahmash, Gravel, & Howard, 2017; Misra, Kumar, & Kumar, 2005; Ephraim Bogopa & Marnewick, 2022), this is only further confirmed by more recent studies which find that these dimensions still determine the success of ASD (Ghayyur, Ahmed, Ali, Razzaq, & Ahmed, 2018; Tama, Jola da Costa Mouraa, Oliveiraa, &

Varaiao, 2020). The relationship between these dimensions and ASD success is reflected in the widely used model of Misra, Kumar and Kumar (2005).

As can be seen in Figure 1, this model identifies 16 sub-dimensions.

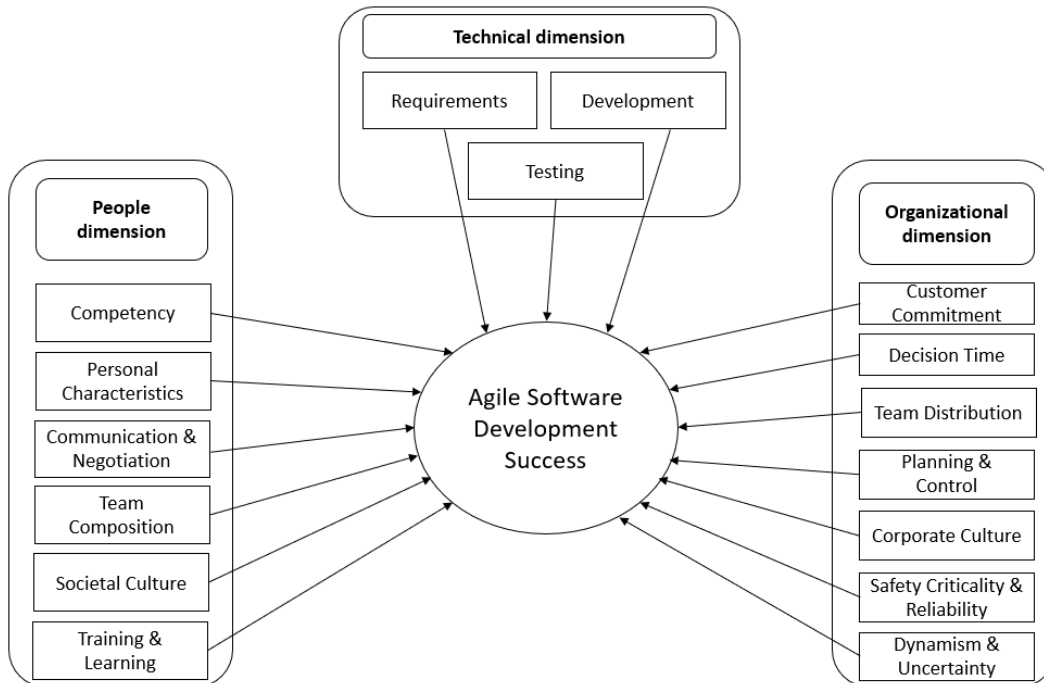


Figure 1: Dimensions of Agile Software Development (Misra, Kumar & Kumar, 2005)

To investigate to what extent hybrid working influences the 12 Agile principles, as described in the Agile Manifesto (Fowler & Highsmith, 2001), the 16 sub-dimensions have been mapped with these 12 principles. Table 2 shows which ASD sub-dimension belongs to which Agile principle as well as that all 12 principles are covered by the 16 sub-dimensions.

	Agile principles	ASD dimensions		
		People	Technical	Organization
1	Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.		Development	Customer Commitment
2	Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.		Requirements	Dynamism & Uncertainty
3	Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.		Development	Customer Commitment Decision Time
4	Business people and developers must work together daily throughout the project.	Personal Characteristics Communication & Negotiation		Team Distribution
5	Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	Societal Culture Personal Characteristics		Corporate Culture
6	The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	Communication & Negotiation		
7	Working software is the primary measure of progress.		Development Testing	
8	Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.			Planning & Control
9	Continuous attention to technical excellence and good design enhances agility	Competency	Requirements Development	
10	Simplicity--the art of maximizing the amount of work not done--is essential.		Requirements Development	
11	The best architectures, requirements, and designs emerge from self-organizing teams.	Team Composition	Requirements	Corporate Culture Safety Criticality & Reliability
12	At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.	Training & Learning Competency		

Table 2: Agile principles linked to ASD dimensions

Success of Agile Working

According to various studies, the success of agile working can be measured with three variables: Speed, Quality and Costs (Chow & Cao, 2008; Lishner & Shtub, 2019; Ephraim Bogopa & Marnewick, 2022; Sheffield & Lemétayer, 2013). It is important to find a good balance between these 3 variables. High speed can be at the expense of quality. A lot of focus on quality can come at the expense of speed. And finally, incurring high costs does not necessarily have to lead to higher speed and quality (Lishner & Shtub, 2019). Does hybrid working influence these factors?

Conceptual Model

In this study we try to determine if Hybrid working is influencing the relation between Agile working and the success of Agile (i.e. its outcome) therefore the conceptual model of Misra, Kumar, & Kumar (2005) is expanded (see Figure 2).

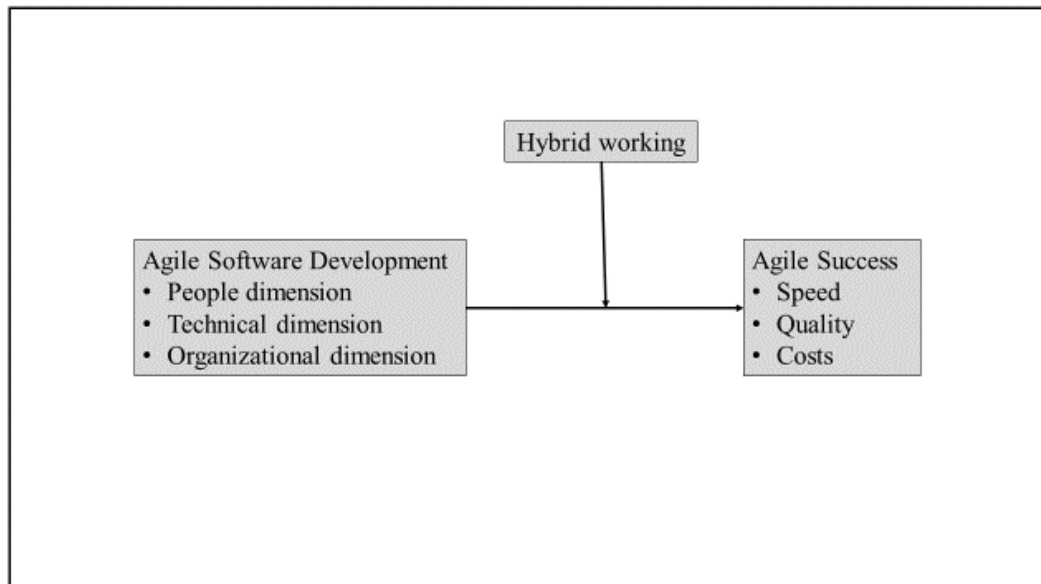


Figure 2: Conceptual model

METHOD

In this section the procedure to collect and analyze data is described as well as the validation of the scales to measure ASD, Agile success and Hybrid working.

Data collection and analysis

For the research, a quantitative questionnaire was used to collect data on the three dimensions of ASD, the three variables to measure Agile success, and Hybrid working. Respondents were asked about their experiences with hybrid working during ASD. The questionnaire consisted of 54 items related to the core elements of the conceptual model namely ASD (24 items), Agile success (6 items) and Hybrid working (11 items) as well as general questions to capture supporting variables such as gender, organization, and number of working hours per week. All items had five answer categories (for Hybrid working: 1 = strongly disagree, 5 = strongly agree; for ASD and Agile success: 1 = Very negative influence, 5 = Very positive influence) of which the respondents selected the degree to which they agreed or disagreed with the given statements. The questionnaire was distributed digitally within ASD teams in the financial sector in the period October 2022 to November 2022.

To coordinate this process, IT managers of the organizations that participated were consulted to distribute the questionnaire internally. In total 259 IT professionals were asked to participate in the study. Of these, 106 respondents completed the survey. This is a response rate of almost 41%. Of the respondents 66% were male, 34% female. The respondents were employed in 22 different financial organizations. The sample consisted of 10 different functions. Of the respondents, 45% go to the office one day a week or not at all. 50% of respondents had experience with some form of hybrid working before the COVID-19 outbreak.

To analyze the data, correlation- and regression analyses were performed to establish the relationship between ASD and Agile success, and the influence of Hybrid working on this relationship. The analyses were performed with SPSS 28 and Hayes Process macro V.4.1 (Hayes, 2020).

Validation

To validate the measurement of Hybrid working and the three dimensions of ASD and Agile success, a factor analysis was performed to analyse the construct validity of the items. For all separate dimensions, principal component analysis (PCA) didn't result in a one-factor solution. Table 2 shows the results. The eigenvalues were between 1.00 and 1.71, accounting for 85.23% to 49.87% of the explained variance. The factor loadings were between 0.852 and 0.309. This means that not all factor loadings can be considered as being significant (Hair et al, 1998). The reliability of some scales was not confirmed by Cronbach's alpha value of 0.700 or more (cf. Nunnally and Bernstein, 1994).

Construct	Nr. of items	Nr. of Factors	Eigen value	Explained variance	Factor loading (Max.)	Factor loading (Min.)	Chronbach's Alpha
Hybrid working	11	4	1.00	64.40	.767	.467	.729
Agile working People dimension	10	2	1.09	49.87	.817	.309	.815
Agile working Technical dimension	5	2	1.10	65.13	.633	.329	.468
Agile working Organizational dimension	9	3	1.14	60.42	.729	.458	.719
Agile success Speed dimension	2	1	1.48	73.92	.739	.739	.637
Agile success Quality dimension	2	1	1.53	76.27	.763	.763	.688
Agile success Costs dimension	2	1	1.71	85.23	.852	.852	.821

Table 2: Factor analysis and reliability

RESULTS

The section presents the correlation and regression analysis between the themes 'Hybrid working', 'Agile working' and 'Agile success' within ASD teams in the Dutch financial sector. However, before we discuss the quantitative analyses, there are several striking results from the descriptive analysis to highlight. In general, the Dutch financial sector scores high on the preconditions set for hybrid working. The influence of hybrid working on the success factors of ASD are as followed:

People factors:

- Almost 50% of the respondents experienced a positive influence of hybrid working on motivation.
- Over 50% of the respondents experienced a negative influence of hybrid working on the effectiveness of communication and on team spirit.
- Overall, according to the respondents, the most negative influence of hybrid working was experienced on People factors. Six out of ten statements resulted in a negative score for 30 to 50% of the respondents.

Technical factors:

- Almost 40% of the respondents experienced a negative influence of hybrid working on obtaining the right requirements for software development.

Organizational factors:

- Almost 30% of the respondents experienced a positive influence of hybrid working on monitoring and control by management.
- Over 40% of the respondents experienced a negative influence of hybrid working on the approachability of the ASD team.

Correlation analysis

To present the results of the correlations and regression analyses between ASD, Agile success and Hybrid working, we first checked that all the variables were not skewed in their distribution. The correlations between (the dimensions of) ASD, Agile success and Hybrid working is shown in Table 3. Hybrid working has a significant correlation with the ASD dimensions *People* and *Technical* and with the Agile success variables *Speed* and *Quality*. There is a strong correlation (above 0.5) between the ASD dimension *People* and Agile success variable *Speed* and between the ASD dimension *Technical* and Agile Success variable *Quality*. Overall, all the dimensions of ASD have a significant correlation (Cohen, 1992) with the Agile success dimensions, with values between .198 and .561.

	Hybrid working	Agile working People dimension	Agile working Technical dimension	Agile working Organizational dimension	Agile success Speed dimension	Agile success Quality dimension	Agile success Costs dimension
Hybrid working		.265**	.211*	.144	.218*	.214*	.007
Agile working People dimension	.265**		.635**	.670**	.561**	.299**	.198*
Agile working Technical dimension	.211*	.635**		.555**	.396**	.521**	.264**
Agile working Organizational dimension	.144	.670**	.555**		.474**	.329**	.288**
Agile success Speed dimension	.218*	.561**	.396**	.474**		.458**	.372**
Agile success Quality dimension	.214*	.299**	.521**	.329**	.458**		.346**
Agile success Costs dimension	.007	.198*	.264**	.288**	.372**	.346**	

Table 3: Correlations between Hybrid working, Agile working and Agile success (P<0.01)**

Regression analysis

Figure 3 shows the relationship between ASD and Agile success. The significant (standardized) regression (beta) coefficients are represented by the one-way-directed arrows in the figure. A regression analyses was performed (method Stepwise) for each dimension of Agile success as dependent variable, with the three dimensions of ASD as independent variables.

For the OLS regression model applied, the potential problem of multicollinearity was investigated by computing VIF factors for each predictor in the regression

model. Although in some cases correlations between independent variables were relatively high, VIF factors in none of the models exceeded 5 – a commonly applied rule of thumb (Hair et al., 1998).

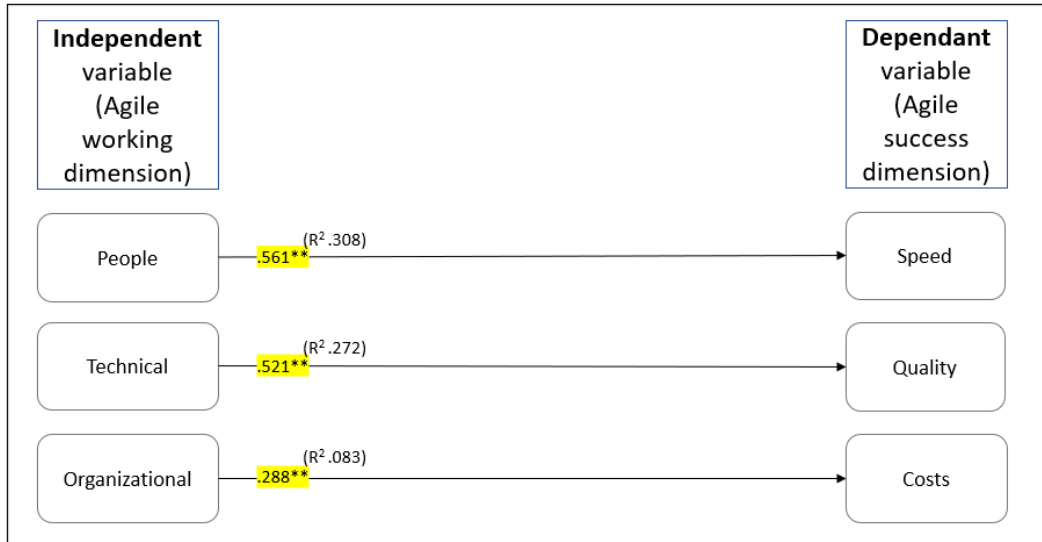


Figure 3: Significant regression between Agile working and Agile success (< .01)**

The linear regression analyses show that there are three significant relationships between the dimensions of ASD and Agile success. The analysis shows that there is a significant relationship between *People* and *Speed* ($\beta = .561$, $p = <0.001$). The explanatory variance is 31.4% ($F_{47,646}$, $df = 105$, $p = <0.001$). On *Quality*, the *Technical* dimension shows a significant relationship ($\beta = .521$, $p = <0.001$). The explanatory variance is 27.2% ($F_{38,823}$, $df = 105$, $p = <0.001$). The *Organization* dimension has a significant relationship with *Cost* ($\beta = .288$, $p = <0.001$). The explanatory variance here is relatively low, 8.3% ($F_{9,391}$, $df = 105$, $p = <0.003$).

A multiple linear regression analysis (step-wise) was performed with the individual items of the *People*, *Technical* and *Organizational* dimension respectively as independent variables and the Agile success dimensions *Speed*, *Quality* and *Cost* respectively as dependent variables. Table 4 shows the results of these analyses.

Agile success dimension	Agile working dimension							
Dependant variable	Independent variable	Predictors (influence of hybrid working on)	Beta	Sig	Adjusted R2	F	df	p
Speed	People				38,6	21,355	102	<.001
		Question 2. (Team spirit)	.335	<.001				
		Question 10. (Training & Learning) (Learning ability)	.249	.004				
		Question 3. (Personal Characteristics (Feel responsible))	.243	.008				
Quality	Technical				29,4	14,183	102	<.001
		Question 15. (Approval on software)	.393	<.001				
		Question 12. (Changing requirements)	.222	.012				
		Question 11. (Getting the correct requirements)	.172	.048				
Costs	Organizational				5,1	5,56	104	.020
		Question 18. (Team distribution)	.225	.020				

Table 4: Regression analysis between ASD and Agile success.

The results show that three items (Team Spirit, Learning Ability and Feeling Responsible) are the most decisive within the *People* dimension for *Speed*. This model gives an explanatory variance of 38.6% ($F = 21.355$, $df = 102$, $p = <.001$). In addition, the regression model shows that three items (Software development, Varying requirements, Correct requirements) are the most decisive within the *Technical* dimension for *Quality*. This model gives an explanatory variance of 29.4% ($F = 14.183$, $df = 102$, $p = <.001$). Only one item (Team positioning) is seen as a predictor within the *Organizational* dimension for *Costs*. The model gives an explanatory variance of 5.1% ($F = 5.56$, $df = 104$, $p = .020$). From the results of the linear regression analysis, it can be stated that:

Speed

- The People dimension is most decisive for the Speed of ASD. From the results, Team spirit, Learning ability (sharing information) and Feeling responsible are the most decisive.

Quality

- The Technical dimension is most decisive for the Quality of ASD. Obtaining the right requirements and dealing with changing requirements are the most decisive.

Cost

- The organizational dimension is to a lesser extent decisive. The team positioning is seen as the most determining factor. There is a very low explanatory variance here.

Regression analysis (with hybrid working as a moderating factor)

To show whether the extent to which the conditions of hybrid working are applied influences the success of ASD, a regression analysis was performed. The degree of hybrid working is used as a moderating factor. To perform this analysis, the method of Hayes Process macro V.4.1 (Hayes, 2020) was used. This method makes it possible to measure whether the degree of hybrid working affects the relationship between the independent and dependent variable. The result of the moderating regression model (model 1, confidence level 95) can be seen in Table 5. This shows that hybrid working has no significant moderating effect on the relationship between ASD en Agile success (X = average of hybrid working). The interaction value of hybrid working is not significant with a $p > 0.05$.

Agile success dimension	Agile working dimension	Hybride working				
Dependant variable	Independant variable	Moderating variable	Beta	F	df	p
Speed	People	X	-.065	0,066	102	0,797
	Technical		.549	2,137	102	0,147
	Organizational		-.463	1,359	102	0,246
Quality	People	X	.029	0,020	102	0,889
	Technical		-.376	2,265	102	0,135
	Organizational		-.011	0,001	102	0,972
Costs	People	X	.104	0,168	102	0,683
	Technical		.146	0,183	102	0,670
	Organizational		-.142	0,144	102	0,705

Table 5: Regression analysis between ASD and Agile success with Hybrid working as moderator

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

In this study, we explored the complex interplay between Agile Software Development (ASD), Hybrid working, and the success factors within ASD teams in the Dutch financial sector. Our research was grounded in the principles of Agile development, which emphasize the pivotal role of individuals and interactions. These principles were challenged by the sudden transition to Hybrid working, a shift triggered by the unprecedented circumstances of the COVID-19 pandemic. The overarching question was whether Hybrid working influenced the success of ASD, which has long been rooted in close-knit, collaborative teams.

The research showed that the Dutch financial sector scores high on the preconditions set for hybrid working and that hybrid working is applied on a large scale. In addition, the research shows that hybrid working is really a must have, given the enormously positive influence on the motivation of the employees. But the research also shows that hybrid working affects, in a way, the core elements of the agile development method. It affects the collaboration between Business and IT to quickly respond to the needs of the customer. In addition, there seems to be a distance between Business and IT. This is reflected, for example, in the fact that obtaining the right requirements from the business organization is less easy.

Overall, our findings show that:

1. **Hybrid Working Dynamics:** Within the Dutch financial sector, Hybrid working demonstrated nuanced impacts. It significantly influenced People and Technical dimensions of ASD, particularly in terms of motivation, communication effectiveness, and the ability to obtain accurate requirements for software development. However, organizational factors, such as team positioning, showed a relatively lower impact.
2. **ASD and Agile Success:** The study reaffirmed the importance of People, Technical, and Organizational dimensions within ASD. Notably, Team Spirit, Learning Ability, and Feeling Responsible emerged as pivotal elements significantly contributing to the Speed of ASD. Obtaining the right requirements and managing changing requirements were identified as crucial factors influencing the Quality of ASD. However, the organizational dimension showed limited influence, particularly in terms of costs.
3. **Moderating Role of Hybrid Working:** Interestingly, our study did not find a significant moderating effect of Hybrid working on the relationship between ASD and Agile success. This implies that the fundamental principles of Agile development, particularly those related to people and interactions, remain resilient even in the face of Hybrid working arrangements.

The research shows that the People factors are one of the most decisive factors for the success of ASD. This is in line with an earlier study that has been done on this subject by Tama, Jola da Costa Mouraa, Oliveiraa, & Varaião (2020). In addition, the research shows that working remotely has a lot of influence on communication. 50% of respondents experience a negative impact on the effectiveness of communication. A similar effect has been found by Ghani, Lim, Hasnain, Ghani, & Imran Babar (2019). That hybrid working has a very positive influence on motivation supports the literature that looked at the work-life balance and productivity of the employees (Kazekami, 2020; Shirmohammadi, Au, & Beigi, 2022). However, one of the disadvantages of hybrid working that previous research

has shown is losing contact with colleagues (Ipsen, van Veldhoven, Kirchner, & Paulin Hansen, 2021). The research results show that hybrid working has a negative impact on collaboration between business and IT and on team spirit. The study's results have practical implications for organizations navigating the terrain of Hybrid working within Agile frameworks. Emphasizing and fostering Team Spirit, Learning Ability, and a Sense of Responsibility among team members can bolster the Speed of ASD. Additionally, addressing challenges related to obtaining accurate and stable requirements is vital for maintaining the Quality of ASD outcomes.

LIMITATIONS AND FURTHER RESEARCH

Several limitations within this study warrant consideration and present avenues for future research. Firstly, the sample size is a significant limitation, hindering the generalizability of the study's results. The disparity in response rates across sectors, particularly the lagging participation from the banking sector, further complicates the representation of the entire Agile Software Development (ASD) landscape. Additionally, the request to list the employer (company) name likely contributed to the high dropout rate, highlighting a challenge in obtaining sensitive information in organizational research contexts.

Another limitation arises from the choices made in the factor analyses. The 11 questions about hybrid working have been reduced to 1 factor. However, the Varimax Rotation resulted in 4 factors which suggests complexity within the hybrid working domain. This could be investigated in a follow-up study. The same applies to the agile working factors (People, Technology and Organization). These all resulted in 2 or 3 underlying constructs. In addition, a few items did not meet the communality value of 0.500. The reason for this may be that there is quite a lot of diversity of agile success factors within the 3 themes. Technology alone already has 3 completely different functions: Requirements, Development and Testing. These have been reduced to 1 construct but are completely different disciplines and are often carried out by different people.

The research was conducted broadly on all agile success factors. The factor analysis and the regression analysis have shown that zooming in on certain specific components can be of great value. Deepening on, for example, the theme "People factors" or even deeper into an individual success factor "Team spirit" could be a good follow-up study. Moreover, this study lacked an investigation into the degree of agile working, an omission that could have illuminated the relationship between hybrid and agile practices. Understanding the interplay between these dimensions

might offer valuable insights into the adaptability of ASD teams in different hybrid work scenarios.

Furthermore, the study's focus on Agile success metrics—Speed, Quality, and Cost—revealed a weak link between Agile working and Costs. This discrepancy prompts inquiries into how changes in team performance might impact overall project expenses, considering variables like increased IT delivery costs versus savings related to reduced office space and commuting expenses. Future research endeavors could delve into these limitations. Exploring specific components within hybrid working might unveil the core drivers of agility within hybrid models. Additionally, a more granular examination of agile working components and their financial implications could provide nuanced insights. A comparative study analyzing organizations embracing varying degrees of agile practices within hybrid environments could shed light on the intricacies of these hybrid-ASD dynamics.

While this study advances our understanding of hybrid working's impact on ASD, the identified limitations underscore the need for nuanced, context-specific investigations. Addressing these limitations in future research could refine our comprehension of the intricate relationship between hybrid working, agile practices, and success within the evolving landscape of software development.

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