The Factors That Influence the Adoption of Tools That Improve the Agile Way of Working and Continuous Improvement at the Dutch Central Government

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Due to the changing technological possibilities of services, the demands that society places on the level of service provided by the Dutch Central Government (DCG) are changing rapidly. To accommodate this, the Dutch government is improving its processes in such a way that they become more agile and are continuously improved. However, the DCG struggles with the implementation of improvement tools that can support this. The research described in this paper aims to deliver key factors that influence the adoption of tools that improve the agile way of working and continuous improvement at the DCG. Therefore, a literature review has been conducted, from which 24 factors have been derived. Subsequently, 9 semi structured interviews have been conducted to emphasize the perspective of employees at the DCG. In total, 7 key factors have been derived from the interviews. The interviewees consisted of both employees from departments who already worked with tools to improve agile working and continuous improvement as well as employees from departments who haven't used such tools yet. An important insight based on this research is that the aims, way of working and scope of the improvement tools must be clear for all the involved co-workers.

Keywords: agile, development, continuous improvement, adoption, government

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1 Introduction

With an increasing amount of new technology available organizations need to be more agile when implementing this in their processes (El-Dardiry & Overvest, 2019). To enable agile working new methods and tools are developed to help organizations. There are several methods to facilitate agility, like Lean (SixSigma, 2022), SAFe (SAFe, 2023) and Scrum (Scrum.org, 2023). Continuous improvement is one of the basic principles of SAFe (Scaled Agile, 2022). Government organizations within the Netherlands also need to become more agile (CIO Rijk, 2019-2020). For the Dutch Central Government (DCG), the ICT advisory board has setup several guidelines to address governance and implementation of agile working methods (CIO Rijk, 2021). The DCG has addressed these developments and translated them into the deployment of methodologies that can further facilitate digitization and an agile way of working (Digitale Overheid, 2019). In the most recent version of the DCG strategic agenda 2021 (CIO Rijk, 2019), various strategic objectives are addressed for the coming years, where flexibility and developing in small steps are mentioned as important principles. This ensures faster results, less risk of major mistakes and room for adjustments where needed. Within the Dutch central government, several departments and executive bodies have (partially) replaced waterfall methods for an agile way of working (CIO Rijk, 2021).

Additional to agile working methods, there are improvement tools that can support in becoming and staying agile. Examples of improvement tools are the Agile Maturity Model (Patel en Ramachandran, 2009) and the 4-D Framework (Qumer en Henderson-Sellers, 2008). Within the DCG the directorate of information management of the Dutch Tax Authority (DTA) has developed its own improvement tool, tailor-made for the organization. The tool is called CiBia and is based on the principles and dimensions of continuous improvement and an agile way of working. The tool is intended to test a team, a team of teams and/or an entire IT-development chain for maturity on dimensions regarding agility and continuous improvement.

While many methods and improvement tools are available, adoption is still lacking. Implementation and use in organizations encounters many challenges that are often human related instead of technical (Gandomani and Nafchi, 2016). Miller (2013) identified several aspects that can act as barrier when implementing agile methods

and tools. First, communication is important to create a different mindset and culture. Second, management is often focused on daily operational problems instead of the need to change the way of working. Third, next to gaining management support it is also important to get employees and customers onboard. Fourth, adoption of an agile way of working doesn't occur overnight, it is imperative that experience is allowed to grow over time.

Dutch central government organizations are also struggling with the adoption of improvement tools, for example, at the Department of Infrastructure (Auditdienst Rijk, 2016). Similarly, CiBia is currently not widely adopted within the DTA. It is not clear due to what factors the adoption of CiBia is lacking.

Therefore, based on the above the following main research question is formulated:

Which factors influence the adoption of methods and tools that improve the agile way of working and continuous improvement by central government organizations?

The remainder of this paper is organized as follows; section 2 presents an overview of relevant literature followed by the research approach in section 3. Section 4 discusses the results and section 5 provides the conclusions, limitations, and recommendations for future research.

2 Literature Review

A systematic literature review has been conducted, according to the approach of Bell, Bryman and Harley (2022) with the goal to generate insights into factors previously found in research. Using the university's search engine HUGO as well as ResearchGate and Google scholar the following primary keywords were used to find relevant articles: *adoption, [critical success] factors, assessment, improvement tool, maturity,* and *model* in combination with the secondary terms *agile, lean, [continuous] improvement, SAFe, scrum.*

Based on the above 57 papers were retrieved. Each paper was scanned to determine the relevance:

- 19 papers described the specifications of improvement tools, self-assessments and/or maturity models and gave no interpretation on adoption or factors.
- 7 papers described practices of Lean and/or agile methodologies and did not provide interpretation on adoption or factors.
- 31 contained studies on adoption factors, of which 5 more were excluded because they did not fit the research direction, as described in Section 3. Finally, 26 papers were selected for the literature review of this study.

Several studies have examined factors of adoption for new methodologies. A study by Fryer et al. (2007) found 13 factors, retrieved from 24 papers that focused on continuously changing organizations. The *sponsorship and commitment of leadership*, an *environment with possibilities for employees to learn and develop*, the *involvement of employees in the continuous improvement process* are some of the collected factors from this research. The literature review of Rafi et al. (2022) contains 9 success factors from 69 studies. *Effective communication*, *customer feedback*, *learning and development of employees* are the three most important factors. The *purpose of the change*, *leadership vision*, *stakeholder management* and the *involvement of employees* are the essential factors mentioned in a study by Mohamad et al. (2022) and in a case study at a healthcare institution Rosa et al. (2021) concluded that the staff adoption increased after *knowledge transfer* sessions. *Support of c-level management* was also an important factor. The *involvement of employees and teams*, *learning and development*, and *involvement in decisions* were also important factors mentioned. Overall, the literature review performed for this study provided 24 factors. Table 1 shows each factor, how often it was mentioned, and whether it was determined to be an obstacle (O), an incentive (I) or (neither) (X). Factors L1-L5 were found to be the most important factors in literature. The criterion for this is that these factors have been mentioned more than 5 times in the literature as either incentives or obstacles. The references are detailed in appendix A.

Table 1: Factors related to the adoption of Agile methods

Factor code	Factor description	Total	O	I	X	Source
L1	Management commitment / leadership	**17**	12	5		4, 5, 9, 10, 11, 13, 17, 18, 19, 20, 21, 22, 23, 24
L2	Training & learning (team)	**9**	7	1	1	10, 11, 12, 18, 19, 20, 21, 22, 23
L3	Commitment / empowerment of employees	**8**	7	1		5, 6, 10, 11, 19, 20, 23
L4	Organization culture	**8**	5	2	1	9, 10, 12, 14, 17, 23, 24, 25
L5	Collaboration (in value chain)	**7**	5	1	1	3, 4, 6, 15, 17, 20
L6	Team formation fit	**6**	3	3		3, 17, 18, 19, 21, 24
L7	Employee involvement in process	**6**	3	3		5, 7, 11, 13, 16, 18
L8	(Un)willingness to change	**6**	2	2	2	3, 8, 10, 13, 20
L9	Costs & resources	**5**		3	2	1, 2, 5, 15, 20
L10	Effective process communication	**5**	3		2	5, 6, 7, 12, 19
L11	Experience/skills with model/tool	**4**	1	3		4, 20, 23, 24
L12	Vision/goal	**3**	1		2	2, 8, 12
L13	Transparency in method	**3**	2		1	1, 3
L14	Establishing mindset (for new method)	**3**	2	1		3, 9, 22
L15	Organization structure	**2**	2			17, 19
L16	Purpose of method	**2**		2		6, 16
L17	Quality of data & reporting	**2**	2			19, 21

Factor code	Factor description	Total	O	I	X	Source
L18	Method (mis)fit	**1**	1			10
L19	Method & process integration	**1**	1			19
L20	PDCA	**1**	1			5
L21	Problem-solving	**1**	1			11
L22	Eagerness for new tech/methods	**1**	1			25
L23	Employee attention	**1**	1			6
L24	Customer satisfaction	**1**	1			19
		103	64	27	12	

3 Research Methods

For this research, a qualitative approach has been used. First, a literature study was conducted as described above according to the methods as described by Bell, Bryman and Harley (2022). This resulted in a first list of factors that are related, either as success factor or barrier, to the adoption of methods and tools to enable agile working. Second, semi-structured interviews were conducted according to the 'nine questions-method' of Kvale (1996) and the use of 'the final-question that does not fit in any of these categories' by Treviño et al. (2014) Finally both lists of factors (from the literature study and from the interviews) are combined and compared.

The sample size was not defined in advance. The researcher adopted the approach of Guest et al. (2006) and started the interviews and data collection until data saturation occurred. With this approach, the maximum is determined based on possible saturation of information rather than an impossible estimate of the correct number in advance. The researcher had 14 respondents available for interviews and saturation of information occurred with respondent 10.

The organizations in the DCG contributing to this study were selected based on participation in a national network that focuses on the exchange of continuous improvement methodologies and project management (De Gast, 2023). The DTA itself participates in this network. From that network, respondents were selected on a voluntary basis, who were contacted by the researcher for participation in this

study. The criteria used for the interview selection is that the respondents have knowledge of project-based working, continuous improvement and/or continuous improvement processes. Experience with agile working was not specifically included as a criterion, as not all organizations within the selection have experience with Agile working or have been through a transition to agile working. The same goes for the criteria of whether the organization has experience with improvement tools; not every organization and/or respondent has specific experience with improvement tools. Finally, we only selected participants (as shown in table 2) that worked for organizations that are part of the DCG.

Table 2: Overview interviewees

Participant	#years experience with Agile	Age category	#years in current role	Level of experience with improvement tools	Currently using tools?
DCG 1a DCG 1b[1]	2 1	50-55 50-55	7 10	Novice	Limited use
DCG 2	20	50-55	10	Expert	Actively using
DCG 3	20	46-50	5	Expert	Actively using
DCG 4	2	40-45	1,5	Novice	Not using
DCG 5	2	40-45	1	Novice	Not using
DCG 6	12	56-60	4	Expert	Actively using
DTA 1	15	40-45	6	Expert	Actively using
DTA 2	15	50-55	2,5	Expert	Actively using
DTA 3	10	40-45	5	Expert	Actively using

Following the approach of Bell, Bryman and Harley (2022) the interview analysis process consists of 5 steps:

- *Step 1:* Interviews: conducting semi-structured interviews with the respondents. The interview started with discussing the topic and the five most important factors found in literature.

[1] During this interview there were two participants present thus the outcome is analyzed as one interview

- *Step 2:* Transcribe the data: the recorded interviews are transcribed so they can be compared and analyzed.
- *Step 3:* Coding: This step is followed to code the transcribed interview text according to the first and second cycle (Saldaña, 2015)
    1. First coding step: descriptive coding. Quotations from the transcribed interview text are linked to a provisional code. The codes are linked to a factor. Figure 1 shows the schematic relationship between quotations, codes and factors.

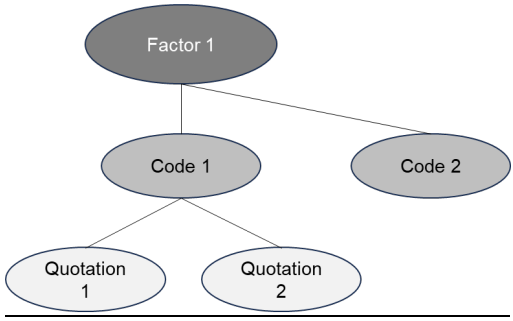

Figure 1: the schematic relationship between quotations, codes and factors
Source: Own

    2. Second coding step: refine, discover patterns. The quotations are analyzed and checked again. The coding is refined and standardized across the transcribed interview texts.
- *Step 4:* Analyze: for the analysis of the interviews, in addition to the detailed coding in step 3, the method of (Ryan & Bernard, 2003) is used to detect and define themes from the interviews, for example by paying attention to repetitions, metaphors, transitions from one to the other topic. In addition to the analysis of the interviews, the following data required for comparing the factors is stored:
    1. The factor code and description of the factor.
    2. The code/coding; this concerns the code that the researcher uses to indicate the connection between the underlying quotations.
    3. The quotations; this concerns the quotes from the interview to the test.
- *Step 5:* Tests: the elaboration of the results is tested with all respondents. The feedback from the respondents will be processed. After testing by the respondents and processing the feedback.

4 Results

In this section the outcomes of the analysis of the interviews are described and subsequently this is compared to the factors that were derived from the literature study.

As shown in table 2 there were 10 participants in the 9 interviews that were held: 3 persons worked for the DTA and 7 persons were employed by other organizations of the DCG. All DTA employees and the majority of the other participants had experience in using improvement tools. During the interviews the extent to which improvement tools are used by the participants was determined as well as within which organizations they are active, and which improvement tools were used specifically. Table 3 lists the improvement tools mentioned by the participants, including the number of times these tools were mentioned during the interviews. Based on this it was determined that none of the organizations studied used an improvement tool unambiguously (based on explicit strategic or policy choices).

Table 3: overview of methods & tools in use in organizations

Target group	Number of improvement tools in use	Specification improvement tools
DCG	4	Jira (4) PDCA (1) Obeya (1) SAFe Maturity Assessments (1)
DTA	5	Jira (3) CIBIA (3) Kanban (1) Obeya (1) SAFe Maturity Assessments (1)

JIRA is a software package from Atlassian (Atlas.ti, 2023). The software incorporates several tools for improvement, such as KANBAN boards. CIBIA is the improvement tool of the DTA and challenges in adopting this tool was one of the reasons this study was conducted (Bronsgeest & Hofman, 2023). Obeya is an

improvement tool supporting Lean principles, where the term visual management room is also often used (Aasland & Blankenburg, 2012). Kanban is a methodology for structuring processes around software development delivery (Ahmad & Oivo, 2013). Withing the SAFe methods there are maturity models that can be used as tool, such as the Agile Maturity Assessment (ScaledAgile.com, 2023). PDCA stands for plan-do-check -act (Respondent RO1, 2023) and on this method a self-developed process and report is in use in the organization of one of the participants.

From the semi-structured interviews, it is established that two different groups can be defined. First, a group of participants who work within an organization that has not yet undergone an agile transition and where there is virtually no or little experience with the use of improvement tools. Second, a group of participants who work at an organization that has already undergone an agile transition or is currently in transition and where there is ample experience with the use of improvement tools.

Table 4: overview of factors at DCG and DTA

Code	Factor Description	DCG	DTA	Total
F1	The usefulness and necessity of metrics of improvement tools	12	7	19
F2	Adopt standards in improvement tooling and practices	7	12	19
F3	The impact of culture and governance on the use of improvement tools	10	7	17
F4	Fit for purpose of the improvement tool	8	9	17
F5	Structure of the organization	8	0	8
F6	Training and empowerment for use of improvement tools	7	0	7
F7	The role of leadership in using improvement tools	3	3	6
F8	Bottom-up approach to using improvement tools	3	3	6
F9	Connection to organizational goals	0	4	4
F10	The need for using an improvement tool	3	0	3
	Total	**61**	**45**	**106**

As is shown in table 4 there are 10 unique factors derived from the interviews. The table shows the number of times each factor was mentioned by participants working for respectively the DTA or other organizations within the DCG. Furthermore, the first seven factors were found the most important based on the criteria that a factor was mentioned at least 10 times across all interviews or were specifically mentioned as either obstacle or incentive more than 5 times.

The interview analysis identified what factors were cited as obstacle or incentive related to the adoption and use of an improvement tool for agile working and continuous improvement. Table 5 shows the number of quotations we found, where column X shows the number of times a factor was discussed but in a neutral manner.

Table 5: Quotations mentioning factors as obstacle, incentive or neutral

Code	Factor Description	O	I	X
F1	The usefulness and necessity of metrics of improvement tools	22	9	4
F2	Adopt standards in improvement tooling and practices	4	6	2
F3	The impact of culture and governance on the use of improvement tools	17	3	0
F4	Fit for purpose of the improvement tool	20	8	3
F5	Structure of the organization	0	13	0
F6	Training and empowerment for use of improvement tools	0	8	0
F7	The role of leadership in using improvement tools	12	5	3
F8	Bottom-up approach to using improvement tools	2	5	0
F9	Connection to organizational goals	2	1	2
F10	The need for using an improvement tool	0	3	0

Based on the analysis it seems that factors F1, F3 and F4 are mostly seen as obstacles. Regarding ***the usefulness and necessity of metrics of improvement tools*** (F1) interviewees stated for example that "*Improvement tools are used for scoring and not for improving*"[2] and *"We suffer from judgment in the scores of improvement tools"*. However, this

[2] All quotations are translated from Dutch

factor can also work as an incentive because *"It helps if we can distinguish between the metrics of the line and the chain"*.

The impact of culture and governance on the use of improvement tools (F3) is often found to be an obstacle as the following statements make clear: *"We are dealing with a culture of tempering and patronizing, which means nothing changes"*, *"We have a culture in which we continuously want to launch new improvement plans"* and *"There is a fear woven into the culture to adjust standards and thus maintain potential for improvement"*.

Finally looking at the ***fit for purpose of the improvement tool*** (F4) it was found that although it could help when it is "*in line with the organization's objectives"* more often it is found to be an hinderance as *"There is no follow-up from the coaches once we have done a CiBia scan"* and *"Our method of implementing improvements is too separate from CiBia"*.

The most contributing factor regarding the adoption of tools seems to be (F5) ***Structure of the organization*** as *"You want to create the same mindset together"*, *"Empowering employees is essential"* and it should enable to *"Share knowledge with the same focus"*.

Comparisons

Table 6: Comparison of factors - literature versus interviews

Factor Description	Code interviews	Code literature
The usefulness and necessity of metrics of improvement tools	F1	
Adopt standards in improvement tooling and practices	F2	
The impact of culture and governance on the use of improvement tools	F3	L4
Fit for purpose of the improvement tool	F4	L17
Structure of the organization	F5	L16
Training and empowerment for use of improvement tools	F6	L2/L3
The role of leadership in using improvement tools	F7	L1

In table 6 we compare the top 7 factors derived from the interviews to those found in literature, the majority overlaps although there are two new factors (F1 and F2).

Besides comparing the findings from the interview versus the literature we can also compare the two groups that are defined: (1) the participants whose organizations have not yet gone through an agile transition and where there is little or no experience with improvement tools and (2) those whose organization has gone through an agile transition or is in transition and where there is ample experience with the use of improvement tools. Table 7 shows the comparison between these groups.

Table 7: Group comparison

Group	Factors	# Quotations
1	Training & empowerment (L2, L3, F6)	13
	Structure of the organization (F5)	8
2	Fit for purpose of the improvement tool (F4)	25
	The usefulness and necessity of metrics of improvement tools (F1)	29
	Adopt standards in improvement tooling and practices (F2)	16
	The role of leadership in using improvement tools (L1, F7)	16
	Culture & governance (L4, F3)	11

Based on the comparison we can see that the group that has not gone through an agile transition rates factors as the structure of the organization, receiving training and being empowered as being the most important when implementing and adopting tools to enable an agile way of working. For those that have already experienced such a transition, factors related to the specific tool to be used such as its fit for purpose, the adopted standards and usefulness of related metrics are becoming important. Even though this means that the group in which the organization finds itself influences which factors are deemed more relevant this does not mean that a factor relevant to group 1 is not mentioned by group 2 and vice versa.

5 Conclusions

In this study, we investigated the factors influencing the adoption of methods and tools aimed at improving agile ways of working and continuous improvement within government organizations, with a specific focus on the Dutch Central Government. Our analysis encompassed a synthesis of literature and presents empirical data gathered through semi-structured interviews. The findings reveal that both organizational readiness and tool-specific considerations play an important role. It is evident that while many methods and tools are available, their adoption within government entities, including the DCG, faces substantial challenges, largely attributed to human factors rather than technical impediments.

Our study identified several factors that influence adoption, with a notable emphasis on the structure of the organization, the fit-for-purpose nature of the improvement tool, and the impact of organizational culture and governance. Importantly, factors such as training, empowerment, and alignment with organizational objectives emerged as critical determinants of adoption success. Comparisons between organizations that have undergone agile transitions and those that have not underscore the differential importance placed on various factors, highlighting the dynamic nature of adoption dynamics within differing organizational contexts. Furthermore, our findings suggest that organizations should use a holistic approach encompassing both top-down structural changes and bottom-up empowerment initiatives as both are essential for fostering a conducive environment for the adoption of agile methodologies and improvement tools.

Overall, this study contributes to the growing body of knowledge surrounding agile transformation within government organizations, offering insights into the multifaceted nature of adoption processes, and providing valuable guidance for practitioners and policymakers alike. However, it is essential to acknowledge the limitations of this study. First and foremost, only 10 persons were interviewed to cover various organizations of the DCG. While this provided a first insight into the research topic more data needs to be collected to generalize the findings. Furthermore, not all participants to this study (and their organizations) have a clear understanding of what is understood by agile working and what it means to try to continuously improve working processes. Even though questions were asked to get a better understanding of the context within the organization of the interviewee, we

should be careful in comparing the outcomes as the perceptions of the participants might not fully fit with reality.

Future research could expand upon these findings by conducting a quantitative study, with specific questions about adoption factors. Within this research, the factors were studied within the Dutch Central Government. However, future research outside the DCG can provide an additional view on the factors found in this study.

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