Towards a More Comprehensive Tuning Model in Project Management

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Abstract

The increasing prominence of modern 'wicked' problems has highlighted the importance of effective tuning and coordination (Kettl, 2003; Pietrewicz, 2019; Hjelum & Lægreid, 2019; Peter, 2015). However, the unresolved managerial challenges associated with achieving effective tuning pose a significant obstacle (Christensen, Lægreid, & Rykkja, 2013; 2016). Thus, this study aims to develop a comprehensive tuning model for project management by creating and testing a novel tuning model. Drawing upon Mintzberg's (1991; 1992) theories and Espinosa, Lerch, and Kraut's (2004) 'integrated Framework of team coordination and performance' a novel tuning model is proposed. To evaluate the tuning model, a test case was used, employing design research within the framework of critical realism. The test case analysis revealed three key design criteria for an effective tuning solution: interdependence, hours intensity, and user-friendliness. Additionally, the test case produced an effectivity-matrix and selection-matrix for selecting the optimal tuning solution and finally a method to standardize within a dynamic context. In conclusion, the newly developed tuning model along with the effectivity-matrix, design criteria, and selection-matrix, offer practical assistance and insight for project managers seeking to understand, enhance, and evaluate tuning and coordination within their organization and projects. However, further testing and cross-validation of the tuning model is necessary.

Keywords: Tuning, Coordination, Project management, coordination mechanisms, coordination strategy, interdependence, Explicit coordination mechanisms, agile, tuning model, coordination model

Introduction

The surge in coordination and tuning issues can be traced back to the advent of the new public management paradigm, characterized by a decentralized, single-purpose, and fragmented government. This approach aimed to establish a more efficient, responsive, and accountable system. However, as public issues grow increasingly complex and multidisciplinary, challenges in coordination and tuning arise (Cejudo &

Michel, 2017; Musdah, Fattah, & Narwis, 2022). This can be accounted to the rise in what are commonly referred to as "modern wicked" problems (Head, 2022).

> *"Wicked problems often span a long time period, operate at multiple levels, have multiple conflicting solution directions, and involve multiple actors and stakeholders with conflicting positions."*

(Universiteit van Amsterdam, z.d.).

The growing complexity and need for multidisciplinary action stemming from these so-called ‘’wicked" problems, necessitates enhanced tuning and coordination within and across projects and organizations (Kettl, 2003; Pietrewicz, 2019; Hjelum & Lægreid, 2019; Peter, 2015). Meanwhile tuning and coordination have been understudied within the scientific community, with the bulk of the research focusing on competition and cooperation, and, more recently, on coopetition (Pietrewicz, 2019). This is evident, since the managerial challenges of effective tuning continue to be unresolved (Christensen, Lægreid, & Rykkja, 2013; 2016).

Therefore, this study aims to develop a more comprehensive tuning model for project management by creating and testing a novel tuning model. The research objective of this study is to develop a tool that enables project managers and organizations to effectively enhance tuning within their projects or organizations. For the study, a conceptual model has been created (see Figure 1: Conceptual model; collaboration, tuning and performance).

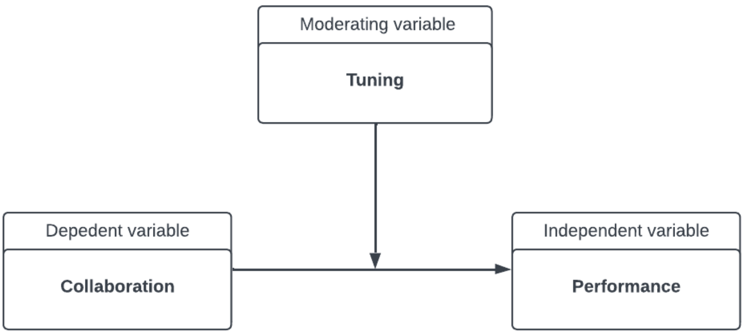

Figure 1: Conceptual model; collaboration, tuning and performance

This conceptual model is based on the ‘integrated framework of team coordination and performance introduced by Espinosa, Lerch, and Kraut (2004). They state that tuning has a direct relation with performance. However, in this study tuning is seen as a moderating variable between collaboration and performance.

Theoretical framework

Definition of tuning

Tuning finds its origin in the music world. Instruments had to be tuned to each other, that way the same note would have the same pitch. The goal of tuning is not to do the same thing, but rather to create a unified whole (Van Beuzekom & Van Berkel, 2020). Since then, the concept of tuning and subsequent coordination has found its place in a wide array of disciplines (Shamim, 2022). Pietrewicz's (2019) research provides one of the most recent overviews of the concept of tuning within literature (see Table 1: 'Definitions of tuning').

Author	**Definition**
Blau and Scott (1962)	Organization of individuals' efforts toward achieving common and explicitly recognized goals.
Thompson (1967)	The combination of parts to achieve the most effective or harmonious results.
Van de Ven, Delbecq, and Koenig (1976)	The integration or linking together of different parts of an organization to accomplish a collective set of tasks.
Malone and Crowston (1990)	The act of working together harmoniously.
Curtis (1989)	Activities required to maintain consistency within a work product or to manage dependencies within the workflow.
Frances, Levacié, Mitchell, and Thompson (1991)	Bring into a relationship otherwise separate activities or events, typically with the goal of increasing efficiency.
Malone and Crowston (1994)	Managing dependencies among independent activities.

Table 1: 'Definitions of tuning'

The definitions from Table 1: 'Definitions of tuning' can all be traced back to their origin from the music world. The best example of this is the definition by Malone and Crowston from 1990. According to Pietrewicz (2019), the successive definition by Malone and Crowston from 1994 is also the most used, but generally in an economic context (Boella & Van der Torre, 2006). However, the study is conducted within an organizational context. Within the field of management and organizational sciences, tuning is divided into two components (Van de Ven, Delbecq, & Koenig, 1976):

A. Organizing individual activities, and.

B. Achieving a general, collective, or mutually beneficial goal or interest.

In other words, it involves integrating and connecting dependencies within an organization to accomplish a collective set of tasks (Van de Ven, Delbecq, & Koenig, 1976). Bakker and Hardjono (2014, p. 157) provide a more comprehensive definition of tuning in their book "Horizontaal organiseren" (Horizontal organizing), which is used during the study and test case:

> *"The ability to align the different business units, processes, and employees that are interdependent and jointly responsible for value creation, without unnecessarily compromising flexibility and autonomy."**

*Translated from Dutch.

The above definition will be used during the research and test case because it is more encompassing than the definition by Van de Ven, Delbecq, and Koenig (1976).

Management of interdependence

The management of dependency, or interdependence, is done through coordination strategies based on coordination mechanisms (Pietrewicz, 2019). Interdependence can be defined as the extent to which the outcomes of one team are directly influenced by or dependent on the actions of another team (Victor & Blackburn, 1987).

Patterns of interdependence and coordination mechanisms can be interpreted differently. Classical organization theory focuses on managing task dependencies. This is the basis for the work of Thompson (1967), Van de Ven, Delbecq, and Koenig (1976), and Malone and Crowston (1990; 1994). This literature suggests that task dependencies can be managed through two coordination mechanisms: (task) programming or feedback. These are referred to as explicit coordination mechanisms (Espinosa, Lerch, & Kraut, 2004).

In contrast to classical organization theory, Espinosa, Lerch, and Kraut (2004) also focus on the context in which the task is performed when it comes to interdependence. They weigh task, team, and contextual variables, stating that "One size does not fit all" (Espinosa, Lerch, & Kraut, 2004, p. 17). They examine both explicit and implicit coordination mechanisms. Implicit coordination mechanisms are described by Wittenbaum and Stasser (1996) as the synchronization of team members' actions based on unspoken assumptions about what others in the team are likely to do. Espinosa, Lerch, and Kraut (2004, p. 10) add to the definition from Wittenbaum and Stasser (1996):

"Those mechanisms that are available to team members from shared cognition, which enable them to explain and anticipate task states and member actions, thus helping them manage task dependencies."

Implicit coordination mechanisms develop based on team cognition. Team cognition evolves through the way the organization utilizes explicit coordination mechanisms (Espinosa, Lerch, & Kraut, 2004).

Therefore, the focus was put on visualizing explicit coordination mechanisms. Espinosa, Lerch, and Kraut (2004) have visualized these two approaches in a framework (see Figure 2: Integrated Framework of Team Coordination and Performance from Espinosa, Lerch, and Kraut, 2004).

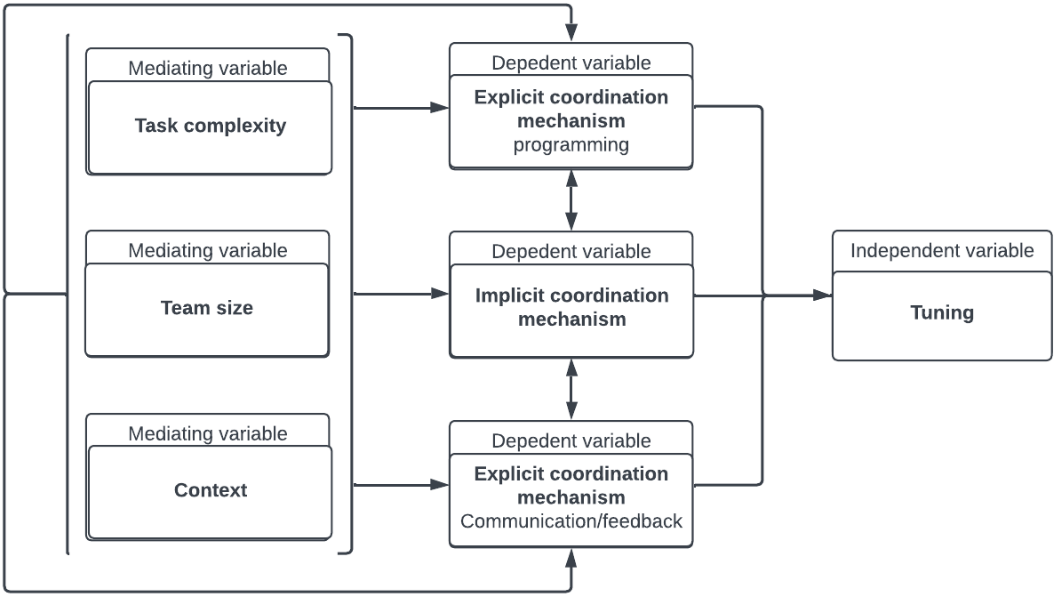

Figure 2: Integrated Framework of Team Coordination and Performance from Espinosa, Lerch, and Kraut, 2004

Mintzberg's (1991; 1992) 'typologies of organizations' align with the 'integrated Framework of team coordination and performance'. First off, Mintzberg adopts the same division for his explicit coordination mechanisms: feedback and programming. Coordination through feedback is based on the exchange of information to make necessary adjustments. Programming refers to coordination through formalization, where tasks and procedures are defined and planned. Mintzberg has added six coordination strategies to these two coordination mechanisms (see Table 2: 'Coordination mechanisms and the six coordination strategies (Kapteyn, 2001)').

Coordination mechanism based on feedback	Coordination mechanism based on programming
Mutual adjustment	Standardization of the work processes
Direct supervision	Standardization of results
	Standardization of knowledge and skills
	Standardization of norms

Table 2: 'Coordination mechanisms and the six coordination strategies (Kapteyn, 2001)'

Secondly, Mintzberg considers the same input variables as Espinosa, Lerch, and Kraut (2004). Based on task complexity, team size, and context of the project, the project can best use certain coordination strategies (see Figure 3: 'Effectivity-matrix; Coordination strategies and when they're effective').

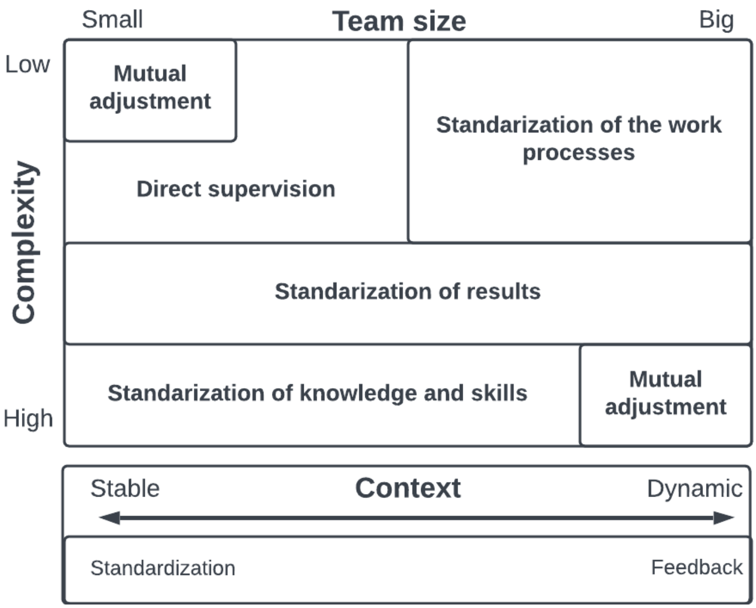

Figure 3: 'Effectivity-matrix; Coordination strategies and when they're effective'

The effectivity-matrix helps with deciding which coordination mechanisms and strategies are most useful within the context of an organization or project. The factors 'complexity' and 'team size' are visualized in the top matrix and the factor 'context' is visualized in the bottom matrix (see Figure 3: 'Effectivity-matrix; Coordination strategies and when they're effective').

When the theories of Mintzberg (1991; 1992) and the 'integrated Framework of team coordination and performance' by Espinosa, Lerch, and Kraut (2004) are combined, the following tuning model can be created (see Figure 4: Tuning model).

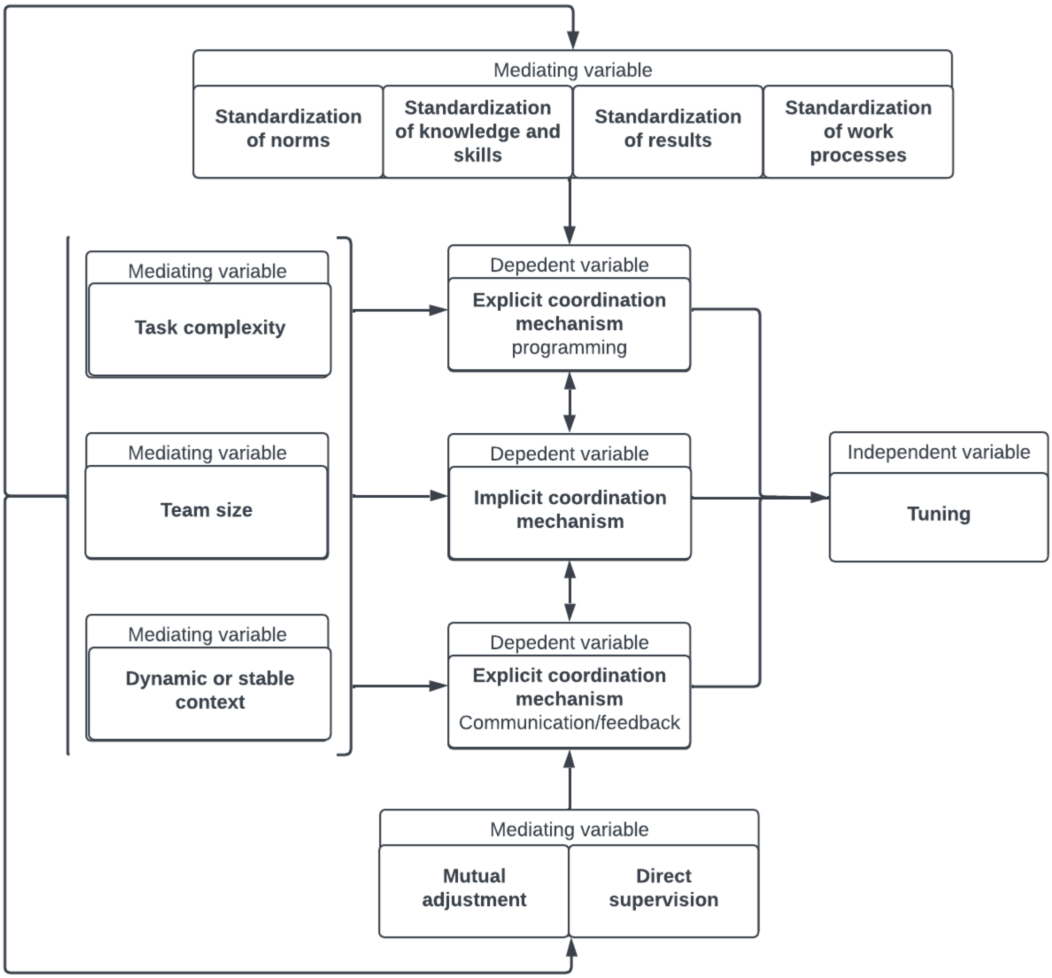

Figure 4: Tuning model

In contrast to the original model by Espinosa, Lerch, and Kraut (2004), the tuning model provides more practical guidance for project managers and the design research.

Research Design

To evaluate the effectiveness of the tuning model, a test case was conducted within the framework of critical realism, using design research (see Appendix A: 'Test case explained'). This approach allowed for the evaluation and improvement of the tuning model. The choice for design research was made because it is well-suited for solving wicked problems (Buchanan, 1992; Lub, 2022; Plomp & Nieveen, 2009). Secondly, design research is explicitly useful for understanding the deeper needs and ambitions of the end user (Lub, 2022). Finally, the formulation of the research question within the test case suggested a design research approach (Andriessen & van Turnhout, 2023).

Test case

To give substance to the design research, Heijnen's (2018) 'cycles of design research' were utilized, as it offers the flexibility to independently shape the design process (Figure 5: 'Cycles of design research visualized during the test case').

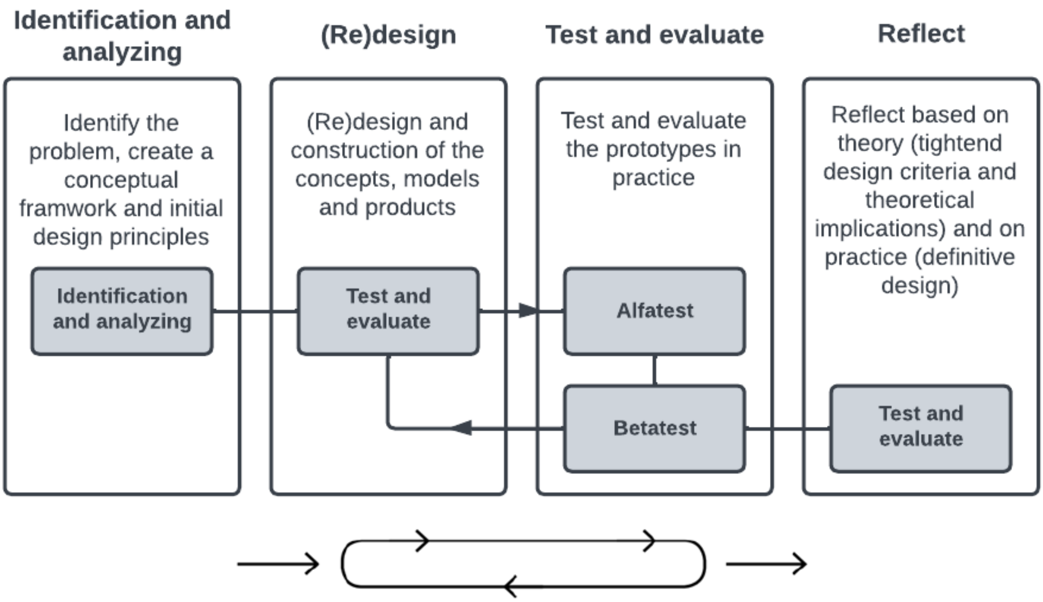

Figure 5: 'Cycles of design research visualized during the test case'

Phase one is the identification and analysis phase, where the practical problem is determined within the theoretical context, and the needs of stakeholders are identified (Dam & Siang, 2019; Heijnen, 2018; Smit, 2018). Phase two is the (re)design phase, where different solutions are developed in the form of artifacts. The design process is guided by design principles identified in phase one (Heijnen, 2018). The 1-10-100 approach is used. The 1-10-100 approach works through a funnel principle, progressing from as many ideas as possible to a final artifact in three steps (Stompff, 2018). Phase three is the testing and evaluation phase, where the chosen artifact is tested and evaluated (see Figure 6: Alfa and beta tests).

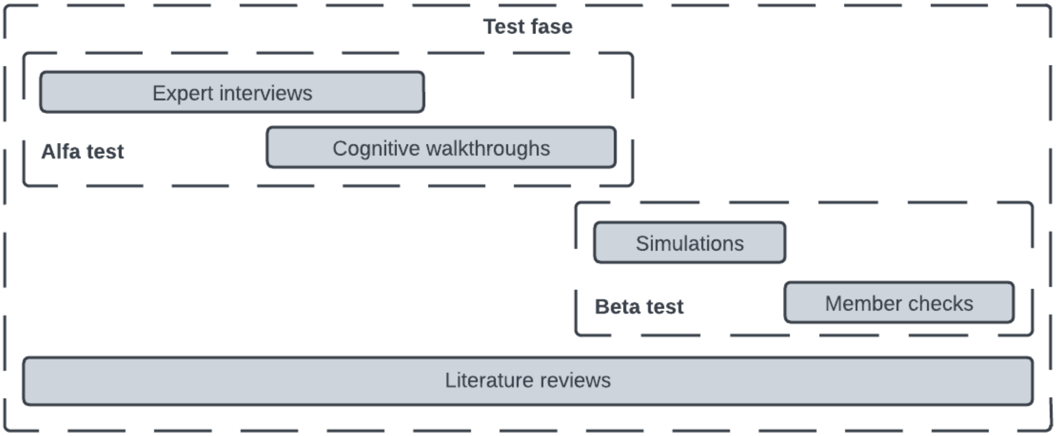

Figure 6: Alfa and beta tests

Phase four is the reflective phase, where the design research is concluded, and both practical and theoretical reflections take place (Heijnen, 2018).

Research methods

Within the design research, various research methods were employed to collect data (see Table 3: 'Overview of research methods used in the four different phases'). More than two independent data collection methods were applied, which contributes to triangulation (Saunders, Lewis, & Thornhill, 2019). This enhances the internal validity and reliability of the research (Heijnen, 2018).

Research methods	**Identification and analyzing**	**(Re)design**	**Test and evaluation**	**Reflection**
Literature	X	X	X	
Individual interviews	X	X	X	
Group Interviews	X	X		
Member checks	X	X	X	X
Observations	X	X		
Cognitive walkthroughs			X	
Simulations			X	

Table 3: 'Overview of research methods used in the four different phases'

Literature Review

A literature review was conducted using primary, secondary, tertiary, and gray literature from the test case and scientific community. By establishing an explicit theoretical framework, an attempt was made to enhance external validity within the test case(Heijnen, 2018).

Individual And Group Interviews

Ten individual semi-structured interviews and five group interviews were conducted (see Appendix B: 'Respondent Overview'). The choice for individual semi-structured interviews is based on the importance of the respondents' experiences, the context in which it takes place, and the suitability for explanatory research (Saunders, Lewis, & Thornhill, 2019; Verhoeven, 2018). Cases, group, and individual interviews were chosen through purposive sampling, based on the insights of the researcher and stakeholders. Choices were made based on typical and critical cases. Typical cases were selected to provide an understanding of a typical situation, and critical cases were selected for their specific expertise (Saunders, Lewis, & Thornhill, 2019) Afterward, snowball sampling was employed to reach saturation. Saturation was reached after six individual and three group interviews.

Member Checks

Member checks were used to enhance internal validity (Heijnen, 2018). At least once every two weeks, member checks were conducted with the stakeholders. This also contributes to the reliability of the design research (Verhoeven, 2018). The collected data were also reviewed and verified by the stakeholders, supervising teachers, and end-users (four-eyes principle).

Observations

Observations were conducted based on primary and secondary observations. For the primary observations, the "observer as participant" approach was applied. Observations were recorded in the research logbook. For the secondary observations, information was obtained through the stakeholders. This data was recorded as primary observations in the research logbook.

Cognitive Walkthroughs

Cognitive walkthroughs were performed on the prototypes. A cognitive walkthrough is an evaluation technique in which the tester uses the prototype to perform representative tasks and identify potential issues (General Services Administration, z.d.). This method was used to test the artifact against the design criteria without involving end-users.

Simulations

Simulations were conducted using the different prototypes, including testing micro-interactions. The simulations were performed with end-users and served as a beta test. Micro-interactions are an evaluation technique that zooms in on specific interactions during the simulation (Shum, et al., z.d.). Both the simulation and micro-simulation were used to identify limitations and issues within the artifact.

Interpretation

Tuning model & key design criteria

The tuning model offered significant insight into which coordination mechanisms and strategies were utilized within the test case (see

Appendix C: 'Example insight tuning model test **case'**). The test case also revealed three key design criteria for designing a matching tuning strategy based on the insights of the tuning model. The three key design criteria are interdependence, hours intensity, and user-friendliness.

Interdependence

The artifact should provide insight into interdependence. All the respondents indicated that they had an insufficient understanding of the interdependency between the various district and regional teams. This aligns with the literature and the proposition by Malone and Crowston (1990), that without interdependence, there is nothing to coordinate and subsequently tune.

Hours Intensity

The artifact should have low hours of intensity. All the respondents mentioned that they had insufficient time. A respondent states: "It simply requires extra effort [tuning]. [...] Time is always [too] scarce, to fully engage in all kinds of tuning and coordination". This aligns with the emotionally perceived infinite consultation - 'you can fill your week with meetings' - and tuning within the test case and the wider playing field in which they operate (Gestel, et al., 2021; Kapteyn, 2001; Nelen, Van Wingerde, Bisschop, & Moerland, 2023). This can be attributed to the following impasse. To maintain an overview and encourage coordination among (sub)projects, a significant amount of tuning needs to take place. However, this leaves little time for executing the discussed actions (Flight, Bogaerts, Korf, & Siegel, 2010; Nelen, Van Wingerde, Bisschop, & Moerland, 2023).

User-Friendliness

When designing an artifact, user-friendliness, and acceptance are crucial. User-friendliness determines whether a product can be used and acceptance of the way it is used (Bevanan, Kirakowskib, & Maissela, 1991). Additionally, all respondents indicate that they consider user-friendliness important.

Estimating effectiveness

To estimate the effectiveness of the possible tuning solutions, a matrix was used to grade the solutions on three levels: good, neutral, and bad (see Table 4: 'Selection-matrix; estimation of the effectiveness of the possible tuning solutions').

Tuning solution	Interdependence	Hour’s intensity	User-friendliness
Solution #1	**Bad**	**Neutral**	**Good**
Solution #2	**Bad**	**Neutral**	**Good**
Solution #3	**Bad**	**Neutral**	**Good**

Table 4: ‘Selection-matrix; estimation of the effectiveness of the possible tuning solutions’

The matrix offers the possibility to easily weigh solutions based on the effectiveness of the tuning solutions. Other variables can be added to the matrix according to the needs of the organization or projects (see

Appendix D: ‘Example selection-matrix; test case’).

Newly found insights

Agile coordination strategy

During the test case, a discovery was made. The coordination mechanisms 'feedback' and 'programming' and the coordination strategies 'mutual adjustment' and 'standardization of knowledge and skills' are applied within the test case but are insufficient to achieve the desired level of tuning within the test case. However, according to Mintzberg, these are the ways to coordinate in the case of a large team size, high complexity, and dynamic context. Standardization of norms, outputs, or work processes is not feasible within the test case, due to the same complexity and dynamic environment. The research ‘Predictive, adaptive and hybrid approaches in projects; consequences for project management’ by Silvius-Zuchi and Silvius (2023) provided a possible design direction for the test case. They suggested that a predictive, traditional approach (waterfall) is less useful in a dynamic environment than an adaptive approach (Agile).

In conclusion, an agile coordination strategy for the work processes based on the coordination mechanism standardization can be used in a dynamic context with high complexity and a big team size (see Figure 7: ‘Effectivity-matrix; Coordination strategies and when they are effective; revised’).

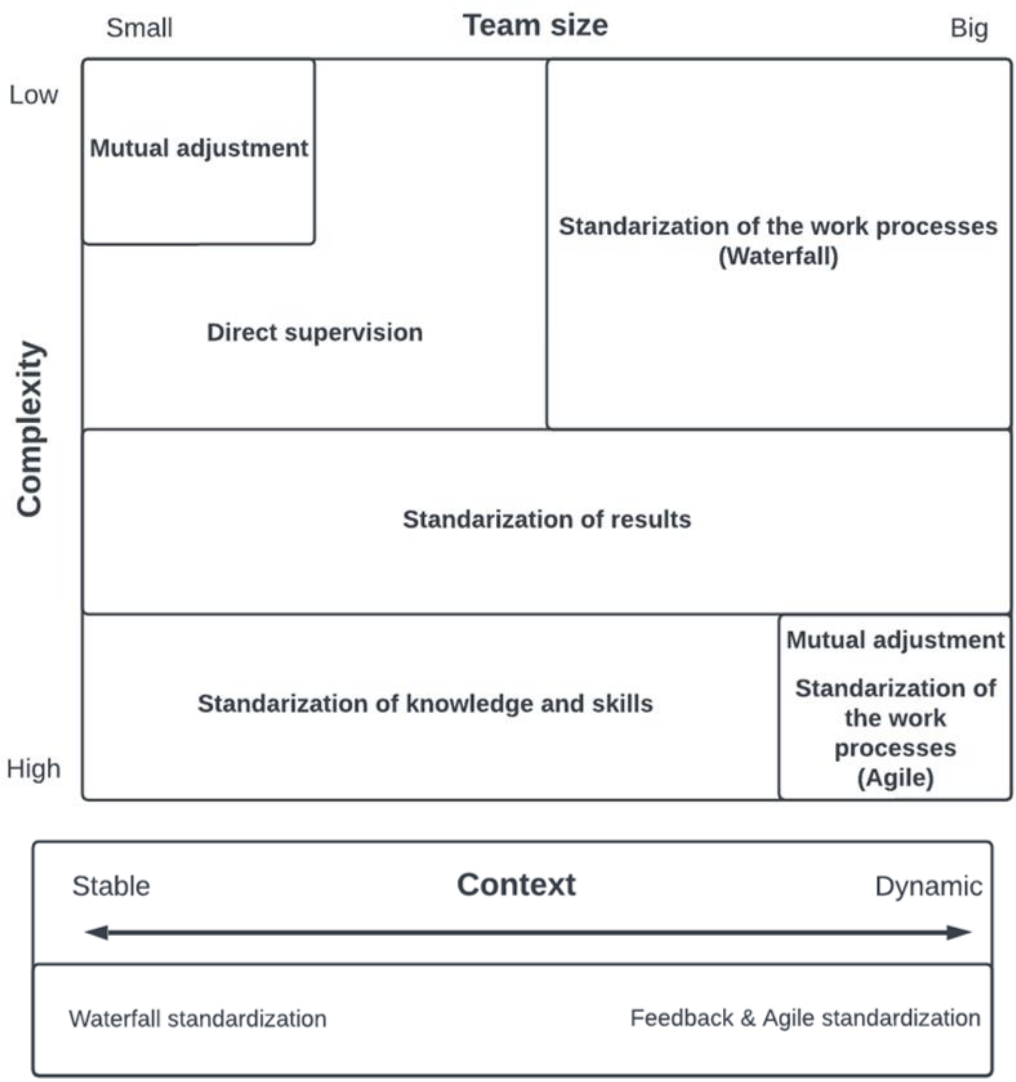

Figure 7: 'Effectivity-matrix; Coordination strategies and when they are effective; revised'

Conclusion & discussions

Conclusion

This study aimed to develop a more comprehensive tuning model for project management, providing project managers and organizations with an effective tool to enhance tuning within their projects or organizations. To evaluate and improve the effectiveness of the tuning model, a specific test case was conducted within the framework of critical realism, using design research.

The tuning model serves as a valuable tool for gaining an overview of the available coordination mechanisms and strategies. It enables project managers to understand which coordination mechanisms and strategies are currently being utilized within the organization and which ones are not (see Figure 4: Tuning model). This understanding empowers project managers and organizations to make informed decisions on enhancing the existing coordination mechanisms and strategies or incorporating new ones, based on the effectiveness of certain coordination strategies (see Figure 7: 'Effectivity-matrix; Coordination strategies and when they are effective; revised'). To give more substance to these new coordination strategies, the three key design criteria - interdependence, hours intensity, and user-friendliness - can be utilized. These design criteria provide guidance for implementing and designing a matching tuning strategy (see paragraph

Tuning model & key design criteria). Additionally, the matrix presented in Table 4: 'Selection-matrix; estimation of the effectiveness of the possible tuning solutions' aids in determining which coordination strategy aligns best with the organization's needs.

In conclusion, the newly developed tuning model, along with the effectivity-matrix, design criteria, and selection-matrix, offer practical assistance in understanding, implementing, and evaluating coordination mechanisms and strategies within projects and organizations.

Discussion

First step & suggestions for future research

Firstly, this research is pioneering in nature and represents an early stage of research. Sudman (1983) argues that in the initial stages of design research, lower quality of respondents can be justified when developing hypotheses and measurement procedures for the first time. This study should be considered an initial step toward a broader understanding of tuning. Consequently, further testing and cross-validation of the tuning model is necessary to ensure its robustness and validity.

Mutual adjustment & Agile standardization

According to Mintzberg (1991; 1992), 'mutual adjustment' is the right coordination strategy for situations within a high complexity, big team size, and dynamic context. However, in the test case, it has been found that relying solely on mutual adjustment is not sufficient. One possible explanation for this result is that if the coordination strategy of 'mutual adjustment' lacks support, it can become incapacitating.

The research findings suggest that standardization of the work processes through agile provides the possibility of standardizing the work processes within a high complexity, big team size, and dynamic context. Consequently, agile standardization of the work processes can offer appropriate support for the coordination strategy of 'mutual adjustment.' This finding contradicts Mintzberg's (1991; 1992) organizational typologies. Nonetheless, this aligns with the researcher's expectations and the study conducted by Silvius-Zuchi en Silvius (2023) on predictable, adaptive, and hybrid approaches in project management.

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Appendix

Appendix A: 'Test case explained'

The tuning model is tested within an organization in the Netherlands whose main objective is to establish a unified government against organized crime. This organization is split geographically (district teams) and based on knowledge (regional teams). The organization is visualized in Figure 8: 'Organizational chart – test case'.

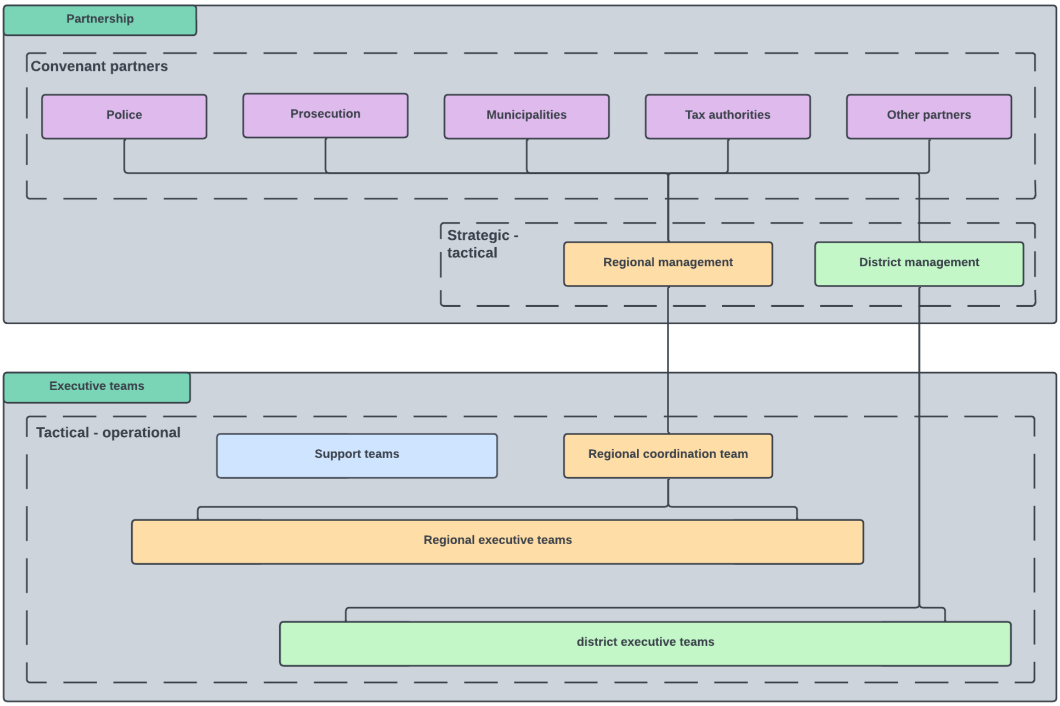

Figure 8: 'Organizational chart – test case'

The organization operates with a large and growing team size, encounters high complexity, and operates within a dynamic context. Consequently, the organization faces challenges in tuning and coordinating its work internally and externally.

Appendix B: 'Respondent Overview'

#	Function and corresponding team
1	Employee support team

2	District project leader
3a 3b	Operations Coordinator
4	Regional project leader
5	Employee support team
6a 6b	District program leader
7	Regional program manager
8	Regional project leader

Table 5: 'Respondent overview individual interview'

#	Date	Representative for
99	DPM-meeting (18/1/2023)	District project leaders - Eight regional project leaders
98	Focus group tuning (21/2/2023)	District and regional project leaders - 24 District and regional project leaders
97	DPM-overleg (21/3/2023)	Regional project leaders - Eight regional project leaders
96	Quarterly meeting (11-5-2023)	Simulation
95	Quarterly meeting (15-5-2023)	Simulation

xx	Member checks	District project leader and regional program leader

Table 6: 'Respondent overview group interview and simulations'

Appendix C: 'Example insight tuning model test case'

The coordination mechanisms 'feedback' and 'programming' and the coordination strategies 'mutual adjustment' and 'standardization of knowledge and skills' are applied within the test case but are insufficient to achieve the desired level (circled in blue in Figure 9).

At the same time, according to Mintzberg, these are the right coordination strategies for situations with a high complexity, big team size, and dynamic context. Standardization of norms, outputs, or work processes is not yet used within the test case (circled in red in Figure 9). Because standardization of norms, outputs, or work processes as coordination strategies is not feasible within the test case due to the same complexity and dynamic environment.

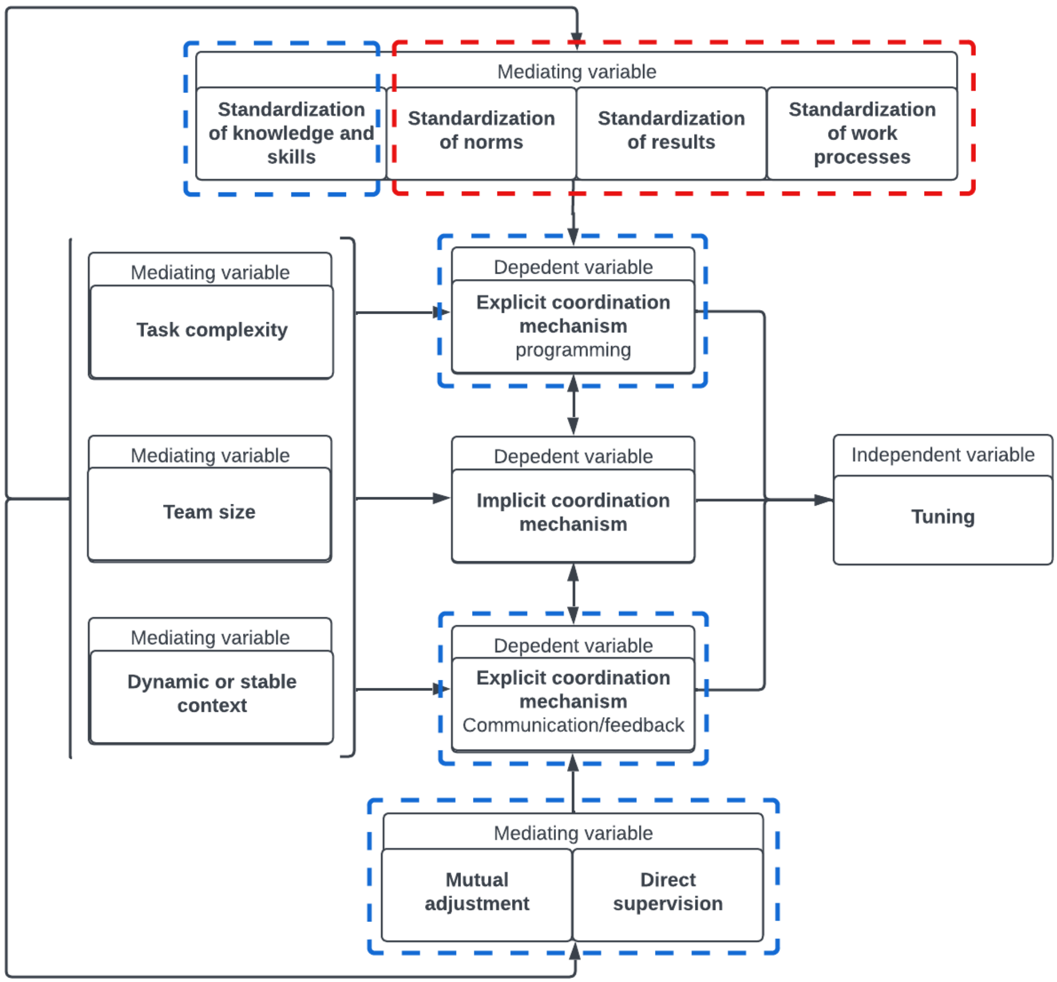

Figure 9: 'Tuning model with used coordination mechanisms and strategies circled blue and used red'

Based on Figure 9, it becomes apparent that standardization of norms, outcomes, or work processes emerges as the sole alternative with a high complexity, big team size, and dynamic context. This presents a creative gap, as standardizing work in a dynamic and complex environment proves challenging.

The research by Silvius-Zuchi and Silvius (2023) provides a potential design direction. They argue that in dynamic environments, an adaptive approach is more effective than a predictive approach. Consequently, it is crucial to develop an Agile coordination strategy based on the coordination mechanism of standardization.

Appendix D: 'Example selection-matrix; test case'

Ideas	Interdependence	Hour's intensity	User-friendliness	DevOps & Agile
Internal agreements	**B**	**G**	**N**	**G**
Buddy system	**B**	**G**	**G**	**G**
Social map	**N**	**G**	**G**	**N**
Tuning meetings	**N**	**B**	**N**	**G**
DTO-Dashboards	**G**	**N**	**G**	**G**
Portfolio management	**N**	**N**	**N**	**N**
Commanders' intent	**B**	**G**	**G**	**N**
Decision tree	**B**	**G**	**G**	**N**
Manual	**B**	**N**	**N**	**B**
Checklist	**B**	**N**	**N**	**B**
Daily podcast	**N**	**B**	**G**	**G**
Quarterly meetings	**N**	**G**	**G**	**G**

Table 7: 'Example selection-matrix; test case'