



**Leiden University**

**ICT in Business and the Public Sector**

The impact of Agile transformations on the competitiveness,  
financial performance and survivability of organizations.

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## Abstract

**Introduction** In today's highly competitive business environment, achieving and sustaining a competitive advantage is crucial for long-term success and survival. Organizations' internal resources together with their capabilities to react to environmental changes are considered important for creating and sustaining a competitive advantage. Agility is seen as such an intangible resource and capability, which organizations hope to achieve by undergoing an Agile transformation. Previous research showed positive effects of Agile transformation on internal performance, such as lead-time and employee satisfaction & engagement. However, there is currently a gap in empirical research on whether Agile transformations help organizations create the capabilities and internal resources that help them achieve competitiveness with subsequent financial success and long-term viability. This study aims to contribute to this knowledge by developing and testing a research model for the relationship between Agile transformation maturity, Agile mindset, internal organizational performance and competitiveness, financial performance and survivability.

**Methods** Based on existing literature, a research model for the relationship between Agile mindset, Agile transformation maturity, organizational performance and business performance has been constructed. Using existing theories and empirical evidence, this research model hypothesizes a positive influence of Agile mindset and maturity on competitiveness, financial performance and survivability through organizational performance. The model has been tested and improved using data collected in an international survey. Constructs have been measured using scales that have been developed and tested in previous studies. To measure the relationship between the constructs, correlation tests and PLS-SEM analysis have been performed.

**Results** With a total of 92 finished responses, the results suggest several changes to the original research model but show a positive influence of Agile mindset and Agile transformation maturity on competitiveness, financial performance and survivability through the organizational performance dimensions of customer-focused development and workflow reliability. Also, a weak direct effect has been measured for Agile portfolio maturity on competitiveness and Agile team maturity on financial performance. Agile mindset was found to be a stronger predictor for competitiveness, financial performance and survivability than Agile transformation maturity.

**Conclusions** Contributions were made by developing and testing a research model that showed the relationship between the Agile mindset, Agile transformation maturity, internal organizational performance and business performance. Adopting agile practices and the development of an Agile mindset within an organization showed to improve several internal organizational performance metrics of organizations, which improve the ability to respond effectively and easily to changing market conditions (competitiveness) and improve the financial performance and long-term viability of organizations.

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## 1 Introduction

In today's highly competitive business environment, achieving and sustaining a competitive advantage is crucial for long-term success and survival (Porter, 1985 [70]), and organizations' internal resources together with their capabilities to react to environmental changes are considered important for creating and sustaining competitiveness (Newbert, 2007 [62]; Sigalas et al., 2013 [86]). Organizational agility is seen as such an intangible resource and capability from which organizations can differentiate and improve their competitiveness (Asseraf & Gziny, 2022 [6]; Harraf et al., 2015 [38]). Organizations hope to achieve better organizational agility by undergoing an Agile transformation (Moe & Mikalsen, 2020 [60]).

Earlier research on the impact of Agile transformations on the performance of organizations reported benefits such as increased productivity, responsiveness, perceived product quality and employee satisfaction (Stettina et al., 2021 [94]; Laanti, 2010 [51]) but these reported benefits are often limited to the internal performance of the organization.

Although earlier studies make this suggestion (Asseraf & Gziny, 2022 [6]; Harraf et al., 2015 [38]), there is currently a gap in empirical research on whether Agile transformations help organizations create the capabilities and internal resources that help them improve their competitiveness, and achieve subsequent financial success and long-term viability. A broad adoption of Agile principles and Agile methods could potentially also diminish its rarity and make it a less valuable internal resource compared to the competition, making it mere a potential necessity for survival.

This resulted in the research question of this study: *How do Agile transformations influence the competitiveness, financial performance and survivability of organizations?*

Besides the gap in empirical research, that emerged from studies by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]), other rationale for this research comes from the increased popularity of Agile transformations, the spending on Agile transformations and the reported benefits and boundaries of Agile transformations:

As organizations strive to remain competitive and intend to handle the increased complexity of today's society, the use of Agile methodologies has become increasingly popular in recent years (Digital.ai, 2022 [1]; Doz & Dualipe, 2019 [29]). Agile methodologies have been reported to show improved collaboration, productivity, and product quality in single teams (Matharu et al., 2015 [57]). After the success stories of these Agile methodologies on single teams, organizations implemented these methodologies for larger projects that were handled by multiple teams across the organization (cross-team or program level) and eventually throughout the entire organization (enterprise or portfolio level) (Dikert et al., 2016 [28]).

A new industry arose, that specialized in helping organizations with their Agile Transformation. Larger organizations (>1000 employees) are spending hundreds of thousands to multiple millions of euros on their transformation (Stettina et al. 2021 [94]), possibly because the reported benefits of undergoing a large-scale Agile Transformation are significant. The most adopted large-scale agile framework SAAFe reports the following improvements they have seen in their own case studies on their website: Happier, more engaged employees (10-50%), increase in productivity (20-50%), faster time-to-market (30-75%) and improvements in quality (25-75%) (Scaled Agile, 2022 [12]). However vendors of frameworks, training and consulting can benefit from success stories, also academic literature reported benefits such as increased productivity, responsiveness, quality, workflow health and employee satisfaction

(Stettina et al., 2021 [94]) and increased transparency, autonomy, happiness, earlier detection of defects and an increased feeling of satisfaction (Laanti et al., 2010 [51]).

However, Agile transformations can be disruptive to an organization and may require significant changes to organizational structures and processes (Paluch et al., 2019 [68]) and to an organization's culture (Dikert et al., 2016 [28]). Besides the adoption of Agile methods that come with Agile transformations, the human side of agility has been identified as an important aspect of making an Agile transformation work. The Agile mindset within organizations is mentioned as a determiner of strategic agility and business performance (Eilers et al. 2022 [31]). Just adopting Agile methods is seen as a business capability that can be easily imitated by competitors, but a culture that is in line with the Agile mindset is an intangible resource where organizations can differentiate from competitors and increase their competitiveness (Asseraf & Gziny, 2022 [6]).

The reported benefits might suggest Agile transformations can benefit any organization. However, Doz & Dualipe (2019 [29]) suggest that Agile methodologies may not be suitable for every organization. They mention boundary conditions to Agile transformations, such as the ability to make the work or tasks more modular, top-down and bottom-up commitment and a cultural fit. Also, the specific goals and objectives of the organization, as well as its overall approach to business strategy, may influence the extent to which an Agile transformation is successful in improving performance. Although it is not often discussed in research, the strategic orientation of an organization might affect the expected gains from undergoing an Agile transformation. Research by Queiroz et al. (2018 [73]) shows a stronger link between agility and performance for organizations that differentiate through customer intimacy or product leadership than through operational excellence.

The contribution of this study is a perspective on Agile transformations across the levels of portfolio, programs and teams in the organization as a determiner of competitiveness, financial success and long-term viability. This study also explores the influence of factors such as Agile mindset, and contextual factors such as strategic orientation and boundary conditions of Agile transformations on these outcomes.

## 2 Literature Background

This section contains background information on large-scale Agile Transformations, boundaries for their success and implementation from literature and a literature background on the business performance dimensions (competitiveness, financial performance and survivability). The third section contains the results of a search in literature on the relationship between Agile transformations and business performance.

### 2.1 Agile transformations

#### 2.1.1 Background on large-scale Agile Transformations

Contingency theories are classes of behavioral theory that treat organizations as "open systems" that have to interact with their environment in order to be successful. Organizations have to adapt over time to fit changing circumstances. In the literature, a distinction is made between mechanistic and organic organizations (Sherehiy et al., 2007 [85]; Doz and Duadalupe, 2019 [29]) that was first mentioned by Burns and Stalker in 1961. Mechanical organizations use a hierarchical approach that is most efficient in organizations with many routine and repetitive operations. Organic organizations form whenever the circumstances are less predictive and are more informal, flat and decentralized. Research conducted by Hage and Dewar (1973) concluded that an organic design within organizations is more flexible, innovative and more capable of adapting to changing circumstances (in Sherehiy et al., 2007 [85]). This organic design is difficult to sustain as organizations grow and is something organizations hope to achieve by undergoing an Agile transformation (Moe & Mikalsen, 2020 [60]). Why particularly now organizations are undergoing an Agile transformation could be a combination of many changes in society. In a paper by Doz & Dualipe (2019 [29]) four main reasons are explained for this phenomenon: (1) The digital revolution made it easier for competitors to enter markets, reach customers and distribute their products. (2) The digital revolution means that almost every large company turned into a software company. (3) Increased complexity in today's society could be handled by a more agile way of working, where experimenting allows for rapid change in organizations which is necessary to respond to fast-changing circumstances. And (4) workforce wants to work at a place that works agile: a sense of purpose in a job is important together with an easier ability to switch jobs.

Agile methodologies, such as Scrum and Kanban, have been shown to improve collaboration, productivity, and product quality in single teams (Matharu et al., 2015 [57]). After the success stories of these Agile methodologies on single teams, organizations implemented these methodologies for larger projects that were handled by larger teams or multiple teams. However, implementing these Agile methods at a large scale can be challenging, as they require a significant shift in organizational culture and ways of working (Dikert et al., 2016 [28]). Organizations often apply larger-scale agile frameworks to help scale the agility in their organization.

Three of the most well-known large-scale agile frameworks are the Scaled Agile Framework (SAFe), Large Scale Scrum (LeSS), and the Spotify Model (Digital.ai, 2022 [1]). There are several studies that compare and explain these frameworks, such as Almeida & Espinheira (2021 [4]) and Alqudah & Razali (2016 [5]). The well-known frameworks are similar at the team level and commonly share practices like Scrum. The differences between these large-scale frameworks emerge when dealing with the complexities associated when scaling to a team of teams.

### 2.1.2 Boundaries to Agile transformations

Agile methodologies have become increasingly popular in the past years, with many major companies around the world adopting some form of agile approach in their operations. The success of industry leaders and the perceived benefits of working agile have led some to argue that it is a remedy to all organizational problems. However, in an article by Doz & Dualipe (2018 [29]) a discussion was made that indicates there are certain boundary conditions that can affect the success of an Agile transformation.

One factor mentioned by Doz & Dualipe that can impact the effectiveness of an Agile transformation is the nature of the tasks being undertaken. Modular and sequential tasks that can be broken down into smaller, individual efforts are more fit to the agile way of working. Also, routine and repetitive operations may be less suited to the agile approach and is likely to benefit less from it. The agile way of working may be more valuable for development efforts.

The availability of opportunities and talent is another boundary condition that was mentioned in the article. Agile methodologies require a rich enough set of options to pursue, as well as access to the necessary talent to complete the work. If there are too few opportunities for talent or the talent is scarce, it can become difficult to implement an agile approach effectively. According to the article, a lack of talent can cause competition for talent between teams even within the organization, which can hinder the success of an Agile transformation.

Other boundary conditions mentioned for the implementation of organizational agility have to do with the culture within the organization, namely the commitment of top management, and cultural compatibility to the Agile mindset. Without a strong commitment from top management, it may be difficult to achieve the necessary buy-in and support for an Agile transformation. However, not only commitment from top management but also bottom-up motivation is found to be necessary for a successful Agile transformation. General Electric's transformation is a well-known example of a failed transformation that was imposed by top management (Denning, 2019 [27]).

The evolution of an agile culture within the organization is mentioned in the article as one of the most important conditions to make a transformation work. Cultural compatibility with the Agile mindset is important for the success of an Agile transformation because it helps to ensure that the values and practices of the organization align with the Agile mindset since Agile methodologies involve a fundamentally different approach to work compared to traditional, hierarchical structures. Also, empirical research suggests the importance of the Agile mindset within an organization for organizational performance (Eilers et al., 2021 [31]; Asseraf & Gnizy, 2022 [6]).

## 2.2 Business performance dimensions

Competitiveness, financial performance and organizational survivability are all related concepts that are important to the success of a business. This section contains an exploration of the literature on these concepts, how they are measured in previous studies and what factors showed to influence them in previous studies.

### 2.2.1 Competitiveness

Firm-level competitiveness refers to a company's ability to compete effectively in its market. It is seen as a complex concept with many variables affecting it (Chuadhuri & Sougata, 1997 [18]). Newbert (2008 [63]) defines competitive advantage as the degree to which a company

is able to exploit opportunities and neutralize threats. However, Michael E. Porter, an authority on the subject of competition, uses the terms "competitiveness" and "competitive advantage" interchangeably (Porter, 1985 [70]), Sigalas et al. (2013 [86]) argue that the definition by Newbert (2008 [63]) better defines competitiveness than competitive advantage. Competitive advantage should in their view be defined as competitiveness relative to competition and competitiveness should be measured by an organization's ability to respond effectively to changing market circumstances, brought down to external opportunities and threats.

**Measuring competitiveness** Since competitiveness is a broad concept and there is no broadly accepted definition, measurement scales for competitiveness differ across studies. A study by Adomako & Tran (2022 [3]) measured competitiveness using a self-reported 5-item scale on how the organization is performing on several items in relation to the competition. Examples of these items are: "performance in the marketplace", "quality of products and services" and "quick response to market demands".

A study by Kianto et al. (2013 [46]) also measured competitiveness using a self-reported 5-item scale on how the organization is performing relative to its competition. Examples of items are: "success", "market share", "growth", "profit" and "innovation".

Chikan et al. (2022 [20]) developed a competitiveness index based on the theory of dynamic capabilities. The items that were used were adopted from the annual Hungarian competitiveness survey. The items in this survey have not been made public. The index proposed by Chikan et al. (2022) consists of measures labeled among the dimensions of quality, delivery, flexible servicing and adaptivity. This measurement scale has not been tested on new data.

A study by Sigalas et al. (2013 [86]) with the purpose to develop a measurement scale for competitiveness found a 4-item measurement scale for competitiveness. The scale intends to measure an organization's ability to effectively respond to opportunities and threats.

**Internal factors** Several key factors that determine an organization's competitiveness were found in literature. According to the resource-based view theory, an organization's resources and capabilities are important determinants of competitiveness. To lead to a competitive advantage, these resources should be valuable, rare, inimitable and non-substitutable (Barney, 1991 in Madhani, 2010 [56]). Both tangible and intangible resources could contribute to an organization's competitiveness.

Tangible resources that have been identified by Madhani (2010 [56]) could be either financial (e.g. enough capital to invest in new technologies), physical (e.g. access to raw materials and distribution channels), technological (e.g. patents) or organizational (e.g. information systems).

Intangible resources could be either human (e.g. organizational culture), innovative (e.g. R&D capabilities to develop new products) or reputational (e.g. perceptions of quality of the product by customers). Some of these determiners for competitiveness were also empirically tested. Organizations that possess a culture that supports continuous improvements, creativity and innovation were found to score stronger on competitiveness (Zain & Kassim, 2012 [106]). Also, reputation was found to have a positive effect on the competitiveness of organizations (El-Garaihy et al., 2014 [33]), which was measured by the level of credibility, trust, reliability, and responsibility that the company demonstrates on a self-assessed scale.

Literature also mentions dynamic capabilities as a determiner of competitiveness (Zahra et al., 2006 [105]; Madhani, 2010 [56]). They refer to an organization's capabilities to adapt

and respond to changing market conditions, customer needs, and technological advancements by continuously developing and renewing its resources and capabilities (Zahra et al., 2006 [105]). There is also empirical evidence that dynamic capabilities enhance competitiveness. A study that questioned 200 research and technology organizations in Iran found that dynamic capabilities, consisting of sensing capability, seizing capability and reconfiguration capability, improve the competitiveness of organizations (Shafia et al., 2016 [84]). Apart from a multiple-case study that also showed a positive effect of dynamic capabilities on competitiveness (Breznik & Lahovnik, 2016 [15]), and a cross-sectional study focused on South-African SMEs (Adeniran & Johnston [2]), the empirical evidence for this relationship seems limited. Another study showed a positive effect of dynamic capabilities, also measured by sensing capability, seizing capability and reconfiguration capability on sales growth and financial solvency (Wilden et al., 2013 [102]).

**External factors** External factors that impact the competitiveness of organizations were found to be limited. A potential reason for this is that most external factors, like government regulations, economic conditions or social and culture factors apply to most competing organizations as well. An organization's competitive advantage could be affected by external factors compared to international competitors for whom these factors do not apply.

Environmental regulations imposed by the government were found to have a negative relationship with the international competitiveness of organizations (Dechezlepretre & Sato, 2017 [25]), but government regulations, such as trading policies could also protect and increase the competitiveness of organizations in that trade zone (Snievska, 2008 [92]).

### 2.2.2 Financial performance

Business performance refers to a company's overall success in achieving its business goals (Queiroz et al., 2018 [73]; Kim et al., 2011[47]). This includes both financial performance, such as profitability and revenue, and other indicators of business success such as market share. In research, business performance and financial performance are used interchangeably and are measured by the same variables. Queiroz et al., (2018 [73]) use the term business performance, consisting of profit growth, revenue growth, sales growth and market share growth. While another study using this scale uses the term financial performance (Kim et al., 2011 [47]). Because competitiveness and survivability could also be seen as measures of business performance, the term financial performance is used in this study.

**Measuring financial performance** Measuring financial performance can be done both by using financial data and by self-reported survey scales. The most used indicators for financial performance are profit and growth (Capon et al., 1990 [17]). Some studies use data on return on total assets and owner's equity (Johnson & McMahon, 2005 [42]). Measured scales for financial performance used in surveys include sales growth, profitability and sales growth and profitability relative to competitors (Powell and Dent-Micallef (1997) in Kim et al., 2011 [47]; Queiroz et al., 2018 [73]).

**Internal factors** In literature, several internal factors were found that could influence the financial performance of organizations. There are numerous studies on internal factors that influence an organization's financial performance. For the purpose of this paper, only a few studies relevant to the research topic are mentioned.

Process-oriented dynamic capabilities were found to have a positive effect on financial performance (Kim et al., 2011 [47]). Process-oriented dynamic capabilities are defined as "an



organization's competence to change existing business processes better than its competitors do in terms of coordination/integration, cost reduction, and business intelligence/learning". Also, process agility, which was defined as "the ability to detect and respond to opportunities and threats with ease, speed and dexterity", showed to have a positive effect on financial performance (Queiroz et al., 2018[73]).

Also, competitiveness and financial performance showed to be positively related in several studies. In a study conducted by Kianto et al. (2013 [46]), that measured financial performance by a self-reported measure for revenue growth/decline, competitiveness showed to have a moderate effect on financial performance. Competitiveness was measured using a self-reported scale for organizational performance relative to the competition. A study by Adomako & Tran (2022 [3]) also showed a positive effect of competitiveness on financial performance. This study measured financial performance by profitability, ROI and sales growth relative to the competition. Not all studies suggest that competitiveness leads to higher business performance (e.g. Coff, 1999 in Naidoo, 2010[61]).

**External factors** There are a multitude of external factors that could have an effect on the financial performance of organizations. These could be economical (e.g. interest rates and inflation), but even terrorist attacks are mentioned as reasons for poorer financial performance (Barton & Mercer, 2005 [9]). A meta-analysis across 320 studies on determiners of financial performance showed among others industry concentration, industry growth and industry barriers to have a positive effect on financial performance (Capon et al., 1990 [17]).

### 2.2.3 Survivability

Organizations going out of business due to failure is the ultimate mark of poor organizational performance. Organizational survivability refers to the avoidance of this, it refers to a company's ability to continue operating and achieving its goals over time (Sinha & Noble, 2008 [91]). In studies on the viability of organizations, a longitudinal dataset is used to determine whether or not organizations shut down over time. However, a construct developed by Naidoo in 2010 [61] and tested several years later with data on organizations that went out of business showed that also a self-assessed measure is reliable.

Competitiveness, financial performance and survivability can all be seen as measures of business performance. The relationship between these dimensions can be described as this: organizations need to be competitive in order to be profitable and achieve business performance (Sigalas et al., 2013 [63]; Porter, 1985 [70]), which is necessary for the long-term viability of an organization (Queiroz, 2018 [73]; Naidoo, 2010)[61].

## 2.3 The relationship between Agile transformations and business performance

A search in the literature did not result in finding studies on the relationship between Agile transformation maturity or Agile transformations and either competitiveness, financial performance and survivability. However, several studies mention organizational agility and an Agile mindset as organizational resources and capabilities that enhance an organization's competitiveness and performance.

According to Kettunen & Laanti (2008 [45]), Agile transformations have the goal to make organizations (1) faster and more responsive to change, (2) more productive and (3) create products with distinction and integrity. Agile transformations, when executed right, should



increase an organization's agility (Sarangee et al., 2022 [82]). Also, the development of an Agile mindset is an important aspect during an Agile transformation (Eilers et al. 2022 [31]).

However the lack of scientific literature on the relationship between Agile transformations and competitiveness, financial performance and survivability, there are several studies that argue a relationship between organizational agility and Agile mindset, two concepts that are mentioned to be developed when executing an Agile transformation right, and these three business performance indicators.

According to the resource-based view (RBV) of the organization, which is a widely accepted theory of perspective in the strategic management field (Newbert, 2007 [62]), "the exploitation of valuable, rare resources and capabilities contributes to a firm's competitiveness, which in turn contributes to its performance" (Newbert, 2008 [63]). In order to increase an organization's competitiveness, it must possess and exploit resources and capabilities that are valuable, rare, inimitable, and difficult to substitute. According to Asseraf & Gziny (2022 [6]) the Agile mindset is the starting point for "moving the agile needle" and achieving organizational agility, "the ability to respond quickly to shifts in markets". Organizational agility is seen as a valuable and rare intangible asset, internal resource and capability that is likely to contribute to an organization's competitive advantage. Also, Queiroz et al. (2018 [73]) see organizational agility as a resource that could help realize greater overall performance. They see agility as a resource that is heterogeneous, valuable, inimitable and difficult to substitute, which is according to the theory of resource-based view important for the performance of modern days organizations.

Besides the resource-based view theory, a few empirical studies were found on the effects of organizational agility on organizational performance. Two of these studies have been published quite recently (less than one year ago). Eilers et al. (2022 [31]) found that the Agile mindset has a positive effect on business performance, which was mainly measured as financial performance. Also, a mediating role was identified for strategic agility. Assaraf & Gnizy (2022 [6]), however, found no direct relationship between Agile mindset and performance, but an indirect relationship between Agile mindset and performance via marketing effectiveness. Clauss et al. (2019 [22]), found a strong direct effect of strategic agility on organizational performance, and mediating effects for business model innovation. Also, Queiroz et al. (2018 [73]) found a moderate relationship between process agility and business performance (measured as financial performance). All studies used different measures for organizational performance. Studies on the relationship between organizational agility and survivability and competitiveness have not been found.

### 3 Conceptual model

To answer the research question "How do Agile transformations influence the competitiveness, financial performance and survivability of organizations?" a conceptual model (Figure 1) has been developed that hypothesizes the interrelationships between these concepts. The concepts of Agile transformation maturity and Agile mindset are proposed to be related and to positively influence the internal performance of organizations. These six internal organizational performance dimensions are hypothesized to positively influence the business performance (external) of organizations. This conceptual model will be tested in this research.



Figure 1: Conceptual model

The conceptual model is partly based on existing literature. Links found in existing literature are displayed in Figure 2 and an explanation is given in Section 3.1.



Figure 2: Links in conceptual model supported by findings in previous studies. Corresponding studies to indicators in model (A-S) are displayed in Table 1

Table 1 shows which study is represented by which indicator in Figure 2 to support the

links in the model. It also shows the type of research. For links that have not been found in previous studies but are assumed in the conceptual model of this research, an explanation for this assumption is also given in Section 3.1.

Indicator	Link	Study	Type of study
A	Agile Maturity → Productivity	Stettina et al. (2021 [94])	Empirical
	Agile Maturity → Quality		
	Agile Maturity → Employee Sat & Eng		
	Agile Maturity → Responsiveness		
	Agile Maturity → Workflow Health		
B	Agile Maturity → Productivity	Poot et al. (2022 [69])	Empirical
	Agile Maturity → Quality		
	Agile Maturity → Employee Sat & Eng		
	Agile Maturity → Responsiveness		
	Agile Maturity → Workflow Health		
C	Agile Maturity → Customer Satisfaction	Eiler et al. (2022 [31])	Empirical
	Agile Mindset - Agile Maturity		
D	Agile Mindset - Agile Maturity	Laanti (2017 [50])	Theoretical
E	Productivity → Competitiveness	Baumann & Pintado (2013 [10])	Theoretical
F	Productivity → Financial Performance	Tangen, 2015 [98]	Theoretical
G	Productivity → Financial Performance	Hallowel (1996 [36])	Case study
	Employee Sat & Eng → Financial Performance		
	Customer Satisfaction → Financial Performance		
H	Quality → Competitiveness	Kannan & Tan (2005 [43])	Empirical
	Quality → Financial Performance		
I	Quality → Financial Performance	Kroll et al. (1999 [48])	Empirical
J	Quality → Financial Performance	Lakhal (2009 [53])	Empirical
K	Employee Sat & Eng → Competitiveness	Ramlall (2004 [74])	Theoretical
	Employee Sat & Eng → Financial Performance		
L	Employee Sat & Eng →	Kumar & Pansari (2016 [49])	Empirical
M	Responsiveness → Financial Performance	Stalk (1998 [93])	Theoretical
N	Responsiveness → Financial Performance	Bhatt et al. (2010 [14])	Empirical
O	Responsiveness → Financial Performance	Hult et al. (2005 [39])	Empirical
P	Customer Satisfaction → Financial Performance	Chi & Gursoy (2009 [19])	Empirical
Q	Customer Satisfaction → Financial Performance	Hallowel (1996 [37])	Empirical
R	Customer Satisfaction → Financial Performance	Yeung (2002 [104])	Meta-analysis
S	Mindset → Employee Satisfaction	Miler & Gaida (2019 [58])	Empirical
	Mindset → Workflow Health		
	Mindset → Customer Satisfaction		

Table 1: Literature supporting the links in the conceptual model

### 3.1 Foundations for conceptual model

The conceptual model (Figure 1) is supported by both findings and suggestions made in previous studies and the perception of the author. Section 3.1.1 contains an explanation for links between Agile transformation maturity and the metrics adopted from the internal performance framework proposed by Poot et al. (2022 [69]). Section 3.1.2 describes the suggested relationship between Agile transformation maturity and Agile mindset. Section 3.1.1 explains the relationship between the Agile mindset and the organizational performance dimensions and Section 3.1.4 explains the relationship between the organizational performance dimensions with business performance.

### 3.1.1 Agile transformation maturity and organizational performance metrics

The first link in the model is the link between Agile transformation maturity and the six organizational performance dimensions. This link has been established principally by research conducted by Poot et al. (2022 [69]), which includes a study on improvements mentioned in literature as a result of adopting Agile methods, which was also partially based on the work of Stettina et al. (2021 [94]). These improved metrics have been classified among one of these six organizational performance dimensions and this resulted in the development of an organizational performance framework. This framework was also tested and improved using new survey data by Poot et al. (2022 [69]). The results of the survey, in which respondents were asked to what extent their Agile transformations positively or negatively influenced these metrics, showed that Agile transformations positively influenced all of these dimensions.

Table 2 shows the results from previous studies by Poot et al., (2022 [69]) and Stettina et al. (2021 [94]). In both studies, the respondent was asked to assess how their Agile transformation had impacted these impact metrics. In the study by Stettina et al. (2021 [94]), the respondents were asked to do this on a zero to 100% scale. In the study by Poot et al. (2022 [69]) the respondent was asked to do this on a -100% to 100% scale. Both studies report improvements on all metrics as a result of an Agile transformation.

Impact Metrics	Poot (2022)	Stettina (2021)
<b>Productivity</b>		
Effectiveness of development	67.68	60.58
<b>Quality</b>		
Quality of the product	66.41	61.32
Earlier detection of defects	67.77	66.94
<b>Employee satisfaction</b>		
Fun at work	63.74	63.48
Collaboration	67.77	74.32
Transparency of dev.	66.78	70.13
Autonomy of dev. teams	65.58	63.48
<b>Responsiveness</b>		
Lead time per feature	63.74	63.48
<b>Workflow Health</b>		
Organized work	64.42	57.02
Planned work	65.22	55.56
<b>Customer satisfaction</b>		
Overall customer satisfaction	62.71	Not measured

Table 2: Perceived improvements by Agile transformations in percentages in previous studies.

A positive relationship between all different levels of Agile transformations maturity and the internal performance indicators mentioned in Figure 1, except customer satisfaction (not included in the study), has been shown in a previous study by Stettina et al. (2021 [94]). Notably, in the most recent study (Poot et al., 2022 [69]) the results are less convincing. Moderate positive correlations between Agile transformation maturity and internal performance metrics have been found but not for as many metrics as in Stettina et al. (2021 citestettina2021impact). For both these studies, the model proposed by Laanti (2017 [50]) has been used for measuring Agile transformation maturity. This model will be described in more detail in section 4.2.1.

In other research, among others "increased productivity", "enhanced process quality", "enhanced software quality", "improved customer collaboration" and "accelerated time-to-market" were mentioned as some of the major effects of adopting agile and lean (Rodriguez et al., 2012 [78]).

A moderate positive correlation between portfolio and program level maturity and customer satisfaction has been measured in Poot et al. (2022 [69]). Apart from Poot et al. (2022) minimum empirical research appeared to exist examining the relationship between Agile methods and customer satisfaction outside of software development. A review of the literature by Buresh (2008 [16]) found that there is limited evidence on the impact of agile approaches on customer satisfaction compared to plan-driven approaches.

Some other studies indicate a relationship between the adoption of Agile methods and customer satisfaction, which are likely to be adopted during an Agile transformation. Bamhauser-Sachse and Heibling (2021 [8]) conducted a meta-analysis of studies examining the relationship between agile software development methods and customer satisfaction. They found that agile approaches were associated with higher levels of customer satisfaction compared to plan-driven approaches, although the effect size was not as large as expected. A study conducted by Recker et al. (2017 [76]) also found a significant and positive relationship between agile software development methods and customer satisfaction. This study examined the use of Agile methods in multiple software development projects and found that agile approaches were associated with higher levels of customer satisfaction compared to traditional, plan-driven methods.

### **3.1.2 Agile mindset and Agile transformation maturity**

The relationship between Agile mindset and Agile transformation maturity has not been tested in previous research. The concepts of Agile mindset and Agile transformation maturity is hypothesized to be related. Laanti (2017 [50]) argues that Agile transformations are based on adopting a set of insights and means that describe the Agile mindset. The adoption of an Agile mindset within an organization is also mentioned as a determiner of making a transformation successful or not (Dikert et al., 2016 [28]). Even more so, some argue that agility is not a methodological approach, but is merely a mindset: "The Agile mindset is more important than any specific agile management methodology, process, system, platform, or organizational structure" (Denning in Eilers et al., 2022 [31]). This implies that Agile transformation should focus on developing an Agile mindset within an organization in order to be successful.

### **3.1.3 Agile mindset and organizational performance dimensions**

The research topic of Agile mindset is still relatively new, and there are not many studies conducted on the Agile mindset and its effect on the organization. Since the concepts of

Agile mindset and Agile transformations and Agile transformation maturity are assumed to be strongly related, the same relationships are hypothesized between Agile mindset and the organizational performance dimensions as exist between Agile transformation maturity and the organizational performance dimensions.

A study on the Agile mindset of effective teams identified several metrics from the organizational performance framework as being related to the Agile mindset (Miler & Gaida, 2019 [58]). The elements "attitude towards customer satisfaction and needs", "continuous improvements and learning", "increased collaboration", "predictability" and "transparency" from the framework are identified in a literature study as being elements related to the Agile mindset. These metrics have been mapped to the performance dimensions Workflow Health, Employee Satisfaction & Engagement and Customer satisfaction by Poot et al. (2022 [69]) and this supports the assumption made in the conceptual model that the Agile mindset has a positive relationship with at least these three dimensions.

For the relationship between the Agile mindset and Productivity, it is unclear how these two concepts relate. It likely depends on the context of whether an Agile mindset will make a team more productive. E.g. involving the customer in the development process might not always be necessary and could be a time-consuming process (Trischer et al., 2018 [100]). For products with a high degree of customization customer co-creation could lead to more effective development since there is more certainty the requirements are met when often communicating with the customer.

Although there is a lack of empirical evidence on this relationship, an Agile mindset will likely be related to Responsiveness since an Agile mindset emphasizes collaboration and customer involvement (Eilers et al., 2022 [31]), for which short feedback loops with the customer are preferable.

Also for the link between Agile mindset and Quality, there is no strong scientific foundation. However, when looking at elements associated with the Agile mindset, the quality of the product is likely to be better when there is an Agile mindset in place within an organization. Again, through short feedback loops with the customer, there is better alignment between the product and requirements, and errors with the product will be detected sooner in the development process. This will likely result in higher perceived product quality by the customer.

#### **3.1.4 Organizational performance dimensions and Business performance dimensions**

The second link in the research model is the link between the organizational performance dimensions and competitiveness, survivability and business performance. This link can be seen as a follow-up on the previous studies conducted by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]), that showed a positive relationship between Agile transformations and organizational performance. This research intends to measure how this affects the performance of the organization or parts of the organization in its market, its competitiveness, financial performance and survivability.

Although the relationship between Poot's organizational performance framework and business performance needs to be tested and is measured in this study, several links were found in the literature between the organizational performance dimensions from the framework and business performance dimensions (competitiveness, financial performance and survivability). Although these studies have measured similar concepts as the ones in this research model, the measurement scales used in those studies differ from the internal performance framework developed by Poot et al. (2022 [69]). Since the concepts are similar,

they are used as a foundation for the hypothesized relationship between the organizational performance framework and business performance.

There is found to be a lack of research on the relationship between the internal performance dimensions and an organization's survival. The strong relationship between competitiveness, business performance and survivability discussed in Section 2.2 might suggest a link with organizational survivability when there is a link with competitiveness and business performance.

**Productivity** Productivity is seen in literature as an important driver for competitive advantage and is strongly related to organizational performance (Tangen, 2005 [98]). Productivity is seen as a measure of how efficiently an organization's resources are used to produce output. Whenever organizations are able to achieve high levels of efficiency in the development process, cost and time savings could be gained which could lead to faster time to market. Fast time to market is arguably one of the elements that could help organizations to respond to opportunities and threats in their market with more pace (Baumann & Pintado, 2013 [10]), thus increasing their competitiveness (as defined by Sigalas et al., 2013 [86]).

In a case study on Southwest Airlines, Hallowel (1996 [36]) argued that their productivity is one of the main reasons for their financial success. Shorter aircraft turnaround times, which were achieved with fewer personnel and lower costs, together with a successful organizational culture led to higher levels of customer satisfaction, profit and market share.

**Quality** In literature, no direct evidence has been found for the relationship between product quality and competitiveness. Lakhal (2009 [53]) tested the hypothesis that "firms with high levels of quality products will have high levels of competitive advantage". The results of the study provided significant evidence supporting this hypothesis, suggesting that there is a direct relationship between quality and competitive advantage. A current product of high quality that provides a competitive advantage to the organization does not necessarily mean the organization is competitive. When the market conditions change, and the organization is not able to respond quickly and effectively, the competitive advantage that this product provides might become obsolete.

A meta-analysis of the relationship between Total Quality Management (TQM) practices and business results showed mixed results across studies (Sila & Ebrahimpour, 2005 [88]), but concludes that a majority of the studies showed positive relationships between TQM practices and business performance. A study by Kannan & Tan (2005 [43]) found positive relationships for "employee training in quality management and control" and "empower detection of defects" with market share and self-assessed competitiveness. No significant relationship was found for quality in product design and market share or competitiveness. This is not consistent with the findings of Kroll et al. (1999)[48], who found that a firm's relative product quality is related to its relative market share, with higher market share being an important indicator for business performance and this often implies a higher level of competitiveness.

**Employee satisfaction & engagement** In the literature, there is evidence supporting the link between employee satisfaction and engagement and an organization's competitiveness and financial performance. A review of existing theories of the effects of employee motivation on organizational performance by Ramlall (2004 [74]) argued that employee satisfaction and engagement are positively related to business performance, including competitiveness.



Committed employees are seen as the source of competitiveness since principally committed employees play a key role in making rapid change manageable. They are seen as more likely to be motivated and engaged, and willing to put in extra effort to help the organization cope with change in the market.

In a case study of Southwest Airlines, Hallowel (1996 [36]) found that employee satisfaction, productivity, customer satisfaction, and financial success are interconnected. Kumar and Pansari (2016 [49]) conducted a study examining the relationship between customer engagement, employee engagement, and firm financial performance. They found that higher levels of both customer and employee engagement were associated with higher financial performance, which was measured by market share, an increase in revenue and profit.

In addition to the negative internal effects as a consequence of employee turnover, such as a loss of knowledge and instability in teams, a study has shown that unplanned leave of an employee can have a total cost for the company of up to 150% of their annual salary (Ramlall, 2003 [75]). Organizations with non-satisfied employees that experience high turnover could experience high costs in hiring and/or training new employees.

It should be noted that the relationship between employee satisfaction & engagement and competitiveness is not always positive. A study by Silvestro (2002 [89]) found negative relationships between employee satisfaction and productivity, efficiency and profitability. The study was conducted on a large supermarket chain in the United Kingdom. Silvestro argued that the willingness to maximize profit, efficiency and productivity comes at the cost of the satisfaction of employees. The relationship between employee satisfaction and engagement and business performance is moderated by industry and organizational context. In some cases, such as in high-tech industries, employee satisfaction and engagement may have a greater impact on competitiveness than in other industries.

Overall, the literature suggests that there is a positive relationship between employee satisfaction and engagement and an organization's ability to respond quickly and effectively to changing market conditions. However, the relationship is complex and may be moderated by industry and organizational context.

**Responsiveness** There is also evidence suggesting that responsiveness is related to business performance. In *Time - The Next Source of Competitive Advantage*, published in the Harvard Business Review, author George Stalk (1988 [93]) argues that the ways the leading global companies manage time (in development, manufacturing, sales and distribution) are their most powerful sources that improve their business performance. In today's business environment, achieving a competitive advantage is a short benefit. An organization's quick responsiveness to changes in the environment is argued to be the only competitive advantage that last long. The article provides a case example of Atlas, a manufacturing company of industrial doors. At the time, Atlas provided lead times of more than four months less than their competitors and became the US market leader within ten years of its foundation. There seems to be a lack of current empirical evidence that supports the theory that shorter lead times result in increased competitiveness and financial performance.

However, for the link between customer feedback speed and business performance, there is more evidence. Bhatt et al. (2010 [14]) found that there is a strong positive relationship between responsiveness measured by the ability to make quick adjustments after customer feedback and financial performance. Flexibility and an organization's ability to generate and disseminate information were found to have an effect on an organization's responsiveness. Also results of research by Hult et al. (2005)[39] on the effect of responsiveness on organizational performance shows a positive effect of customer service responsiveness (mea-



sured by contact speed to customer service) and close customer relationships and financial performance in the automotive supplier sector.

Altogether the empirical evidence is thin, but it seems likely that higher levels of responsiveness in organizations could help improve their ability to respond to market opportunities and threats, which arguably leads to stronger competitiveness and stronger financial performance.

**Workflow health** Since Workflow health is a name given to the group of metrics by one of the authors of a preliminary version of the organizational performance framework (Stettina et al., 2021 [94]), this name is not used by other scholars. The underlying metrics are all adopted from previous studies and have been reported to be improved by adopting Agile methods, tools or principals (Poot et al., 2022 [69]). For most of the metrics, except for continuous improvement, there has no relationship been found with competitiveness or financial performance. Although improvements for all these seven metrics seem beneficial to the organization, most of these improvements seem too small to have an impact on high-level concepts such as the competitiveness or financial performance of the business unit/organization. It seems more likely that improvements in these metrics have a positive effect on other organizational performance dimensions (e.g. "makes work more planned" and "decreases number of days between commits" on the efficiency of development). This, in combination with a lack of literature on these relationships, the relationship between Workflow health and the business performance dimensions is not supported in the conceptual model.

Of all the seven metrics mapped under Workflow health, there is the most literature on the relationship between continuous improvement and competitiveness or financial performance. A study that did not publish the ways continuous improvement, nor competitiveness or financial performance was measured, found positive relationships for continuous improvement with competitiveness and financial performance (Zain & Kassim, 2012 [106]). Also, a study by Yasar et al. (2019 [13]) that used a survey among 384 manufacturing firms in Turkey for data collection found significant positive relationships between continuous improvement (measured by continuous product, process, marketing and management innovation) and financial performance (market share, ROA and profit). Brown (1997, in Zain & Kassim, 2012 [106]) argued that organizational survival today depends on an organization's ability to continuously innovate its processes. A literature review on continuous improvement mentioned that Toyota's capabilities for continuous improvement (Kaizen) were the main source of its sustainable competitiveness (Singh & Singh, 2015 [90]).

**Customer satisfaction** There is evidence in literature that supports the link between customer satisfaction and financial performance. There was no support found for the link between customer satisfaction and competitiveness, only that customer satisfaction could contribute to competitive advantage. A reason for the lack of theoretical support for the relationship between customer satisfaction and competitiveness could be that it is difficult to measure how current customer satisfaction could help an organization respond to opportunities and threats faster and more effectively, which is necessary to sustain a competitive advantage over time. There are two potential theories that could support a relationship between the concepts of customer satisfaction and competitiveness.

(1) Organizations with satisfied customers are likely able to understand and monitor the demands of their customers and offer products and services that fit these demands. When market conditions change, these organizations are assumably better suitable to offer products and services that fit new customer demands. (2) Research showed a positive relationship

between customer satisfaction and customer retention and loyalty (Halowell, 1996 [37]). This can help organizations with loyal customers retain its market position even when market conditions are changing.

Research on the relationship between employee satisfaction, customer satisfaction and financial performance by Chi & Gursoy (2009 [19]) in the hotel sector shows a positive effect of customer satisfaction on financial performance. Research by Halowel (1996 [37]) also supports this relationship with data collected on customers and companies in the US banking sector and shows higher profits for organizations with satisfied customers. A meta analysis on studies on the relationship between customer satisfaction and organizational performance concluded that there is a positive effect of customer satisfaction on profitability, but the returns are diminishing when increasing customer satisfaction (Yeung et al., 2002 [104]).

## 4 Research Methods

As described in Section 3, links between Agility transformation maturity, organizational and business performance can be made using findings from previous studies. Considering these findings, the relationships between these domains are expected to be positive. While a combination of findings of these studies shows an indirect positive effect of Agile transformations on the competitiveness, financial performance and survivability of organizations, further research is required to measure this effect in the context of Agile transformations, to answer the research question: *"How do Agile transformations influence the competitiveness, financial performance and survivability of organizations?"* and test the research model (Figure 3).

For a study on the effects of Agile transformations a study using longitudinal data would be preferable since the perceived payoffs to organizational change often do not happen instantly so the changes can only be measured over time. Collecting longitudinal data is a difficult and time-consuming process (Naidoo et al. 2010 [61]) and existing literature mentions cross-sectional data as a second best option for researching the effects of organizational change (e.g. Augusto & Coelho (2009) in Naidoo et al. 2010 [61]). For this study, a survey methodology has been chosen. This method allows multiple variables to be researched at the same time, which is a necessity when researching how Agile transformations influence the business performance of organizations. Also when considering the limited time and resources for this study a survey methodology is the best option to collect higher dimensional data from a larger sample.

To answer the research question and test the research model, the relationship between a certain level of Agile transformation maturity and Agile mindset and several organizational and business performance dimensions is measured. The rationale behind this is that this makes it measurable whether increased maturity relates to increased performance. Therefore the sample should exist of respondents who work in departments that are in different stages of their Agile transformation. The respondents should hold managing positions since they need to be aware of the current state of their business unit's Agile transformation and should have an overview of their business unit's and organization's performance. Examples of the target population are release train engineers, CIOs, product owners and portfolio managers. The selection of this sample has to happen in a way this sample represents the population and can be generalized (Section 4.3).

### 4.1 Survey design

For researching the impact of Agile transformations on the competitiveness and survivability of organizations, the interrelationships between these dimensions need to be measured. To measure these dimensions, constructs that have been used and tested in earlier research have been adopted. The content of these constructs, together with how they have been tested and in what context they have been used are described in Section 4.2.

When combining several measurement scales from different studies, it is often unavoidable that the survey items are in different formats, ranging from 5-point to 9-point Likert scales. To be more consistent, one scale has been chosen for the majority of the questions in the survey. For this survey, a 5-point Likert scale has been chosen. Research shows that a 5-point Likert scale has several benefits compared to a 7 or 9-point scale, however, the reliability is measured to be higher in 7-point scales (Colman et al., 1997 [23]).

Previous research that also employed a survey methodology and collected data among the same target group as this study, showed difficulties in collecting a sufficient number of

responses (Poot et al., 2022 [69]). Since 5-point scales showed to have an increased response rate in relation to 7 or 9-point scales, 5-point scales have been chosen for the design of the survey (Babakus & Mangold, 1992 [7]).

#### 4.1.1 Descriptive questions

At the beginning of the survey, the respondent is asked a few descriptive questions. The purpose of these questions is to assess the representativeness of the sample.

The question about job title/function is the only personal question in the survey. Furthermore, the respondent is asked to answer three questions about their organization or business unit, and one optional question. The purpose of the first question "What is your role/job title in your organization?" is to figure out whether a respondent contains enough information about the organization to give a reliable answer to the survey questions. This is an open question. To be able to answer the survey questions the respondent should be familiar with some terminology that is frequently used within the domain of organizational agility. The respondent should also have an overview of the performance of their own business unit/department. The next question collects the industry classification of the respondent's organization and has been adapted from Misra et al. (2009 [59]). The purpose of this question is merely to compare the demographics of the respondents to previous studies and find out if there are surprising differences or similarities. The data set is too small to be able to confidently assign certain changes in performance to an industry. This is also the case for the next question: "How many employees work at your organization?". The fourth descriptive question is there to collect the organization's name of the respondent. This question is optional since it might affect the respondent's anonymity. The purpose of this question is to be able to validate certain responses, e.g. check if the publicly available information on the size of the organization is similar to what the respondent reported in the survey.

## 4.2 Measurement instruments

The aim of this research is not to test a measurement model but to test the interrelation between the concepts proposed in previous sections. Therefore, for measuring the concepts in this study, existing measurement models for survey questions have been used. These measurement models all have been adopted, and sometimes adapted for use in the survey of this research. All of the adopted models have been used in organizational survey research before and have been reviewed and tested. For the use in this research, some phrases had to be changed to better fit the context or increase comprehensibility. In this Section, the origin and use of each of these models are discussed.

### 4.2.1 Agile transformation maturity

In order to determine the level of Agile transformation maturity of a respondent, the five-stage maturity model developed by Laanti in 2017 ([50]) has been used. This model includes three levels of maturity evaluation: at the portfolio level, the program level, and the team level of the organization or business unit. The stages of maturity within each of these levels range from "Beginner" to "World-Class," and are determined through self-assessment. The model is composed of a series of practices and capabilities associated with Agile transformations, and in order to reach a higher level of maturity on an organizational level, all practices and milestones from previous stages must be implemented and achieved.

What makes this model different from other maturity models is that it consists of both practices and milestones (achieved capabilities), whereas other models principally use prac-

tices to determine the stage of Agile transformation maturity (Laanti, 2017 [51]). In Laanti's model listed milestones were formed by goals listed by organizations that were going through an Agile transformation and can be seen as a desired level of organizational agility. When an organization meets a certain level, this means that both the Agile practices are in place and they have the desired capabilities and results. This makes this framework as opposed to other frameworks (e.g. Turetken et al., 2017 [101]; Norton, 2008 [65]), more suitable to measure Agile transformation maturity instead of the level of agile practice adoption.

A model by Turetken et al. (2017 [101]) prioritizes the principles and values of agile. The five levels of maturity are based on the most important aspects of agile, starting with collaboration at level one and progressing to include incremental development and efficiency at higher levels. The second dimension is made up of five categories representing different agile principles, such as human centricity, technical excellence, and customer collaboration.

As opposed to the model proposed by Laanti, the levels within the categories are defined by practices. The model by Turetken measures a team's maturity in adopting Agile practices. Since the model principally focuses on the maturity of the team and not on agile adoption throughout the entire organization, it was not suitable for adoption in this study.

The model that is displayed in Figure 3 has been used as a foundation for the model used in this research for getting a self-assessed overview of the respondent's organization's stage in their Agile transformation.

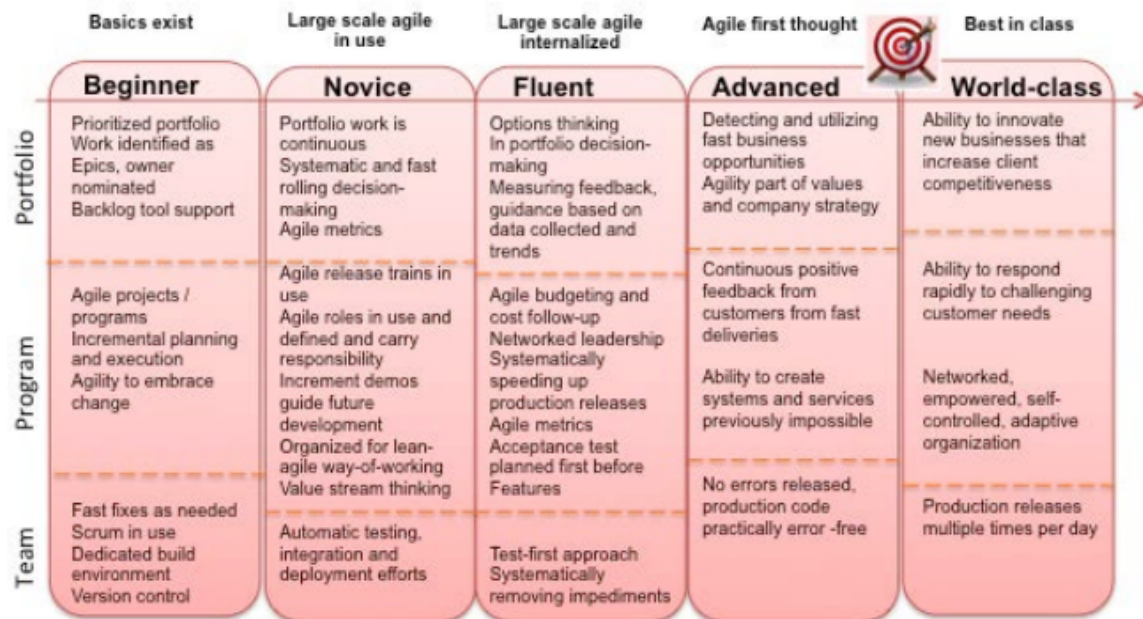


Figure 3: Agile Transformation Model by Laanti, 2017 [50]

The Agile transformation model was tested in a large client organization in the banking and insurance sector undergoing a SAFe transformation. The model was used to understand the current status of the transformation and make recommendations for next steps. It was well received because it explains the benefits of investing in agility in plain language. The model was tested through 42 interviews with 117 people, which took 350 working hours.

The model in Figure 3 has been developed in the context of software development. In this research, the impact of Agile transformations on the success of all types of business units is studied. On the first page of the survey, which contains the descriptive questions, the

question "Is IT/software development the main focus of your business unit or department?" is asked.

When the respondent answers "yes" to this question the original model is displayed on the next page. Two alterations have been made to the original model: (1) the visuals of the model have been changed with the purpose of increasing the readability and (2) the position in the model of several practices has been changed after validity tests and recommendations made in a thesis by Poot et al. (2022 [69]). The updated model can be found in the Appendix, where the survey questions have been added (Section 10)

The altered model for assessing Agile transformation maturity was modified in order to adapt it for use in respondent organizations where IT/software development is not the primary focus. This modified model was developed with input from two industry experts, who helped to rewrite certain practices in a way that would be applicable to other domains. The changes were primarily focused on the team level and the objective was to keep changes to a minimum.

The Agile transformation model adapted from Laanti (2017 [50]) has also been used in previous studies by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]). This study could be seen as a follow-up research of these studies.

#### **4.2.2 The Agile mindset**

Together with Laanti's Agile transformation maturity model, the Agile mindset measuring model from Eilers (2012 [31]) is being used as a measurement for the presence of an Agile mindset within the business unit/department. Based on data collected through interviews and a quantitative survey, the Agile mindset has been defined as "an individual's attitude within a dynamic work context that is expressed by positively evaluating continuous learning, transparent exchange with others, empowered self-guidance, and customer co-creation".

Agile mindset is a latent construct, meaning that it is not directly observable or measurable, and is measured through an indirect measurement with multiple items. The Agile mindset construct has been found to have four dimensions: (1) attitude towards learning spirit, (2) attitude towards collaborative exchange, (3) attitude towards empowered self-guidance, and (4) attitude towards customer co-creation.

The items in the survey are focused on measuring the Agile mindset of an individual. In the scope of this research, however, the focus lies on the examination of the level of presence of an Agile mindset within the business unit or department. The Agile mindset measurement scale constructed in Eilers et al. (2022 [31]) has been adopted and slightly adapted for this research. The focus has been shifted from the individual to the business unit by changing the measurement items to plural. This keeps the survey items as close as possible to the original and validated items while making them more useful for this study.

The Agile mindset measuring model has been constructed according to the construct mixology approach by Newmann et al. (2016 [64]). This approach uses a combination of existing and new elements and has been used in organizational science frequently. The scale has been tested on a sample of 449 practitioners and all the scale showed to be reliable with a Cronbach's alpha of 0.71 or higher.

#### **4.2.3 Strategic orientations**

In a study by Queiroz et al. (2018 [73]) on the impact of IT application orchestration on agility and performance, it was found that an organization's strategic orientation (operational excellence, product leadership, and customer intimacy) plays a moderating role in the relationship between IT application orchestration capabilities and agility. This indicates the



importance of considering contextual factors when researching the impact of Agile transformations on organizational performance. The specific goals and objectives of the organization, as well as its overall approach to business strategy, may influence the extent to which an Agile transformation is successful in improving performance. This measure is based on the strategy typology developed by Treacy and Wiersema (2007 [99]), which makes a distinction between firms that prioritize operational excellence and those that prioritize differentiation through product innovation or customer intimacy. Respondents were asked to distribute 100 points among the three categories of the Treacy and Wiersema (2007 [99]) typology: operational excellence, customer intimacy, and product leadership, with the majority of points going to the category that most closely aligned with the firm's self-identified strategic orientation. These are the definitions of the three items (by Queiroz et al., 2018 [73]):

- *Operational excellence* (business strategy that emphasizes efficiency and reliability, low cost, and end-to-end supply chain optimization)
- *Customer intimacy* (business strategy that emphasizes flexibility and responsiveness, customer service, and market-place management)
- *Product leadership* (business strategy that emphasizes creativity, product development, time to market, and market communications)

This measurement scale has been validated by among others Tallon (2007 [97]) and Queiroz et al. (2018 [73]).

#### 4.2.4 Internal performance metrics

The measurement framework used for measuring internal performance has been adopted from Poot et al. (2022 [69]). This framework (Figure 4) consists of 22 metrics that measure 6 performance dimensions, being Productivity, Quality, Employee satisfaction & engagement, Responsiveness, Workflow health and Customer satisfaction.

The construction of this framework has been done by an investigation of the most mentioned improvements of large-scale Agile transformations in scientific literature. The majority of these improvement points have been reported by Stettina et al. (2021 [94]), Laanti (2011 [52]) and Olszewska et al. (2016 [66]). After removing oddities and redundancies, practitioners and academics have been consulted to construct a final version. This framework has been tested by Poot et al. (2022 [69]) using new data collected using a survey and after a Principal Component Analysis a proposition for an updated final framework has been made, the framework displayed in Figure 4.

<b>Productivity</b> <ul style="list-style-type: none"> <li>○ Increases efficiency of development</li> </ul>	<b>Responsiveness</b> <ul style="list-style-type: none"> <li>○ Decreases lead time per feature</li> <li>○ Enables faster customer feedback</li> <li>○ Decreases customer service request turnaround time</li> </ul>
<b>Quality</b> <ul style="list-style-type: none"> <li>○ Improves quality of the product</li> <li>○ Enables earlier detection of defects</li> <li>○ Increases alignment between the product and requirements</li> </ul>	<b>Workflow Health</b> <ul style="list-style-type: none"> <li>○ Makes work more planned</li> <li>○ Decreases numbers of days between commits</li> <li>○ Increases releases per period</li> <li>○ Allows for continuous improvement</li> <li>○ Better dependency management</li> <li>○ Decreases amount of unexpected work</li> <li>○ Increases predictability</li> </ul>
<b>Employee Satisfaction &amp; Engagement</b> <ul style="list-style-type: none"> <li>○ Makes work more fun</li> <li>○ Makes work less hectic</li> <li>○ Increases autonomy of development teams</li> <li>○ Increases collaboration</li> <li>○ Increases transparency of development</li> <li>○ Decreases employee turnover</li> <li>○ Allows us to attract more employees</li> </ul>	<b>Customer Satisfaction</b> <ul style="list-style-type: none"> <li>○ Increases overall customer satisfaction</li> </ul>

Figure 4: Organizational performance framework by Poot et al., 2022 [69]

#### 4.2.5 Competitiveness

The measurement model for competitiveness has been adapted from Sigalas et al. (2013 [86]). This study aimed to develop a measurement scale for competitive advantage which was defined as "the difference between the competitiveness score of two companies" and subsequently developed a measurement scale for competitiveness. The rationale behind this scale is that competitive advantage is a current good and being competitive is a capability to get competitive advantages when market conditions change. The definition chosen by Sigalas et al. (2013 [86]) for competitiveness is "the above industry average manifested exploitation of market opportunities, neutralization of competitive threats and reduction of costs" (as adopted and adapted from Newbert, 2008 [63]).

The scales were developed by doing cognitive interviews with senior management executives and afterward, these scales were tested for reliability. As part of the research, a study with a sample of 268 senior managers was conducted, and Principal Component Analysis was used to assess the convergent validity of the measure. The updated model was then analyzed using an Exploratory Factor Analysis with a sample of 225 firms to assess the construct validity of the model and found that the results supported a one-factor solution. Also reliability tests have been conducted on the measurement scale, including Cronbach's alpha and the intra-class correlation coefficient. The measure was found to demonstrate good reliability. The results suggest that the newly developed measure of competitiveness is a valid and reliable tool for use in research on the concept. The final measurement model contains the following questions:

Over the past three years, your competitive strategy has allowed your business unit/department to:

1. Exploit all market opportunities that have been presented to your industry.



2. And exploit all these seized opportunities to their full potential.
3. Neutralize all competitive threats from rival firms in your industry.
4. And limit these threats to an acceptable minimum.

The mean value for these four items is used for the score for competitiveness (Sigalas and Papadakis, 2018 [87]).

#### **4.2.6 Survivability**

The measurement model for survivability was adapted from Naidoo (2010 [61]). It was originally used as a perceptual construct to measure the expected performance during the financial crisis in 2008 for small and medium consumer and manufacturing firms in China but can be generalized to other contexts since organizations are always handling some kind of crisis. The use of this perceptual construct was chosen for this research because it is difficult to collect data about organizations that have gone out of business and measure their Agile transformation maturity, Agile mindset or performance on organizational and business dimensions. Also, looking at diminishing financial performance is difficult to compare because of differences in accounting methods (Naidoo, 2010 [61]). A subjective measure of the respondent's perception of their organization's chances of survival allows cross-sectional research on a larger group of respondents. The questions that have been used in the survey are:

Think about the biggest crisis your business unit/department currently face for answering the next questions. Please select the extent to which you agree or disagree with each statement.

1. We will survive our current crisis.
2. We possess the ability to withstand the challenges of our current crisis.
3. We are in a good position to address the challenges currently experienced as a result of the crisis.
4. Sales volumes have decreased in the last months as a result of this crisis but sales will rebound back to pre-crisis level.

A factor analysis was conducted that showed the four items loaded reasonably well in the conceptualized factor, but the reliability of the construct was just below the recommended level of 0.70 for Cronbach's alpha (Naidoo, 2010 [61]). However, a few years later than the survey data was collected, the researchers tested the construct using a dummy variable, being the actual survival of those that took the original survey. This showed a strong correlation between the actual survival and the perceived survival chances answered in the questionnaire. This, in combination with a lack of alternative subjective measures for survivability, resulted in the adoption of this measure in the survey used for this research. The mean value of these four items is used for the score for survivability (Naidoo, 2010 [61]).

#### **4.2.7 Financial performance**

Financial performance could either be assessed using objective measures such as return on assets and net profit or subjective measures based on respondents' perceptions of performance

compared to competitors. Since the focus of this research is on business units, there is limited access to data on financial performance relative to competitors that are typically available in public sources. Besides this, self-reported scales to measure financial performance are easier to use for further analysis since they could give an image of the financial situation beyond public numbers. These numbers are often difficult to compare as a result of differences in accounting methods between organization and also between the same organization in multiple years (Naidoo, 2010 [61]). Therefore, a series of subjective measures have been used, which is similar to other research on business performance (e.g. Pansari, 2016 [49]).

To assess performance, a five-item scale based adopted from Querioz et al. (2018 [73]) has been used. This scale was based on a scale that was developed by Powell and Dent-Micallef (1997 [71]) that includes questions about market share, revenues, sales growth, and profitability in relation to competitors. Other studies that have employed this scale have found it to be reliable (Kim et al., 2011 [47]). In Queiroz et al. (2018 [73]), also objective performance data has been obtained in order to validate this measure of firm performance. The historical data on market share, revenues, sales growth and profitability correlates with the given answers to the questionnaire, which indicates that this construct is a valid measure for measuring business performance. The questions that have been used in this survey are:

To what extent do the following statements reflect the current situation in your strategic business unit/department?

1. We are more profitable than our competitors.
2. Our sales growth exceeds that of our competitors.
3. Our revenue growth exceeds that of our competitors.
4. Our market share growth exceeds that of our competitors.
5. Overall, our performance is better than our competitors.

#### **4.2.8 Questions for testing boundary conditions to the success of Agile transformations**

At the end of the survey, three questions have been added to test what could be potential boundaries to the success of an Agile transformation and its implementation. The first question has been established considering the proposed boundaries for the agile organization and the second and third question have been established considering the proposed perils of implementation of agility by Doz & Dualipe (2019 [29]) with the goal to test their theories. All three questions have a scale from 1 to 10 where 1 translates to "poor" and 10 translates to "excellent". These three supportive questions are constructed for this research and unlike the other measurement models have not been tested in previous studies.

The first question is: "How would you rate the ability within your organization to make the work more modular?". This question has been established to test the statement that the agile approach is best when the firm's output can be decomposed into modular, sequential tasks so that teams can be end-to-end (Doz and Dualipe, 2019 [29]).

The second question is: "How would you rate the commitment of higher management to your organization's Agile transformation?" This question has been established by the statement that a large scale Agile transformation restructures an organization in a way that, except from top management, the job of higher management changes and they need to be supportive

for the transformation to succeed (Doz and Dualipe, 2019 [\[29\]](#)).

And the third question is: "How would you rate the compatibility of your organization's culture to the Agile mindset?" This question has been established by the statement that the evolution of an agile culture is the most important condition to make a transformation successful.

### 4.3 Survey distribution

As mentioned in Section 4.1 the intended target group consists of managers that are employed in organizations that are undergoing Agile transformations. To reach this group two channels have been used to promote answering the online survey.

This research has been established with the help of Blinklane Consulting in the form of a research internship. This organization has supported a number of large organizations with their Agile transformation and their network has been used to distribute this survey. Potential respondents received an email from a contact from Blinklane in which they were asked to fill in the survey and share it with their team. This method of sampling is convenience sampling.

The second channel for survey distribution was the social media platform LinkedIn. Four different ways of promotion have been used, (1) general posts from the author, (2) posts in multiple groups focused on Agile transformations, (3) direct messaging of randomly selected people with certain job titles (e.g. release train engineer) and (4) direct messaging to people that responded to or liked one of the author's posts and polls within these agile groups. By trial and error, the last two methods proved to be the most effective. This sampling method is a combination of random sampling and convenience sampling.

An advantage of using multiple channels and multiple sample methods is the potential reduction of sampling error. Nevertheless, some potential risks could be identified. The first channel has a potential risk of selection bias since the impact of an Agile transformation could be different for organizations that have been supported by the same consulting firm compared to other organizations. A potential risk for survey distribution via social media is self-selection bias since respondents can decide for themselves if they want to participate. This could potentially result in more respondents at the extremes. Another disadvantage of promoting in specified groups on LinkedIn is that people that are part of these groups have a higher interest in the subject. This potentially leads to a non-response bias for managers that work in organizations where their Agile transformation did not have the desired outcome.

## 5 Results & Analysis

The time period for collecting the responses to the survey was from the beginning of August to the beginning of December 2022. In a period of approximately four months, a total of 131 responses were collected and of these responses, 94 have been fully completed. Two finished responses have been removed from the data set because they answered every question with the maximum score which can not be considered reliable given the mode of question, a disadvantage of sharing the questionnaire via social media platforms. The data set that has been used for further analysis consists of 92 data points. This results in a completion rate of 70,2 percent.

For analysis, the statistical tools JASP and SmartPLS have been used. In JASP, reliability tests, correlation tests, mediation tests, Exploratory and Confirmatory Factor Analysis have been performed. SmartPLS has been used for performing the Partial Least Squares - Structural Equation Model. Both statistical tools have been used in similar previous research and have been sufficiently tested for reliability against other tools (JASP, 2022 [34]; Queiroz et al., 2018 [73]; Eilers, 2022 [31]).

In this results section, the results of the questionnaire are shown and information is given about the mode of analysis to obtain these results. In Section 5.1 descriptive statistics are shown about the respondents and their organizations. In Section 5.2 the results of the correlation tests are shown. Sections 5.3, 5.4 and 5.5 contain confirmatory and exploratory factor analyses and the results of the PLS-SEM analysis which led to an updated research model. Section 5.6 shows the results of the reliability tests conducted on the measurement scales.

### 5.1 Descriptive statistics

At the beginning of the questionnaire, the respondent has been asked a few personal questions. The question about job title/function is the only question about the individual respondent in the survey (Section 5.1.1). Furthermore, the respondent is asked to answer three questions about their organization or business unit and one optional question. These questions include in which industry the organization operates (Section 5.1.2), the size of the organization (Section 5.1.3) and whether the main focus of their business unit is IT or other (Section 5.1.4). The geographical distribution of the responses in terms of locations of IP addresses are displayed in Section 5.1.5. Statistics on the distribution of Agile transformation maturity are displayed in Section 5.

#### 5.1.1 Role of respondent

The role of the participant within their organization was asked using an open-ended question. This resulted in a total of 63 different answers for the 92 responses. To make more sense of these answers, the data has been altered. Duplicates (with a different spelling) were merged, which resulted in 46 different job titles. All job roles were mapped to one of four categories, being: agile professional, project leader/manager, management and other. The distribution of job roles among the respondents can be seen in Table 3. This happened with the help of an industry expert with more knowledge about the exact meaning of a certain job title. 52 percent of the respondents had a job role in the agile domain, the largest group of respondents were scrum master (16.3%), agile coach (9.8%) and release train engineer (9.8%).

19.6 percent of the respondents have a job role in the project leader/manager domain, where the largest group was project manager (10.9%). 16.3 percent of the respondents have a job role that could be mapped as manager. Two respondents were c-level executives. 11.9 percent of the respondents have been mapped to the group "Other" and could not be mapped to one of the previous domains.

Agile professional	Project	Management	Other
Scrum master (16,3%)	Project manager (10,9%)	Manager (2,2%)	Business analyst (4,3%)
Agile coach (9,8%)	IT Project manager (2,2%)	Product manager (2,2%)	BDM (1,1%)
RTE (9,8%)	Delivery manager (1,1%)	Director (1,1%)	Developer (1,1%)
Product Owner (3,3%)	Program mngmt support (1,1%)	Director of digital (1,1%)	Production planner (1,1%)
Solution Architect (2,2%)	Program manager (1,1%)	Lead AI Hub (1,1%)	QA engineer (1,1%)
Agile transf. lead (2,2%)	Project delivery lead (1,1%)	Head product mngmt (1,1%)	R&D specialist (1,1%)
Agile transf. manager (1,1%)	Proj. delivery manager (1,1%)	Information manager (1,1%)	Sales (1,1%)
Agile delivery lead (1,1%)	Project lead (1,1%)	IT manager (1,1%)	UX designer (1,1%)
Agile delivery manager (1,1%)		CFO (1,1%)	Consultant (1,1%)
Area IT Lead & SM (1,1%)		CIO (1,1%)	
Enterprise agile coach (1,1%)		Operation manager (1,1%)	
IT Manager / Product Owner (1,1%)		Oper. senior executive (1,1%)	
PLM Consultant (1,1%)			

Table 3: Distribution of job roles (N=92)

### 5.1.2 Industry

The majority of the respondents are working in an organization that is mainly operating in the technology industry (29.3%) and the financial sector (18.5%). The energy sector contributes to 7.6% of the respondents and all other industries are represented by less than 6% in the questionnaire. These are: Industrials (5.4%), Public Sector (5.4%), Telecommunications (5.4%), Transport (5.4%), Aerospace (3.3%), Business Services (3.3%), Health Care (3.3%), Retailing (3.3%), Chemicals (2.2%), Motor Vehicles & Parts (2.2%), Hospitality sector (1.1%), Materials (1.1%) and Media (1.1%).

Table 4: Most occurring industries among respondents - cross study

Lim 2022 (N=92)	Poot 2021[69] (N=61)	Stettina 2018[94] (N=134)
Technology (29.3%)	IT (32.8%)	Software (21.6%)
Financial (18.5%)	Financial (26.2%)	Financial (17.9%)
Energy (7.6%)	Other (18.0%)	Professional services (15.7%)

The distribution of industries among respondents is similar compared to previous studies by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]). In all three studies, technology (or IT and software, which can also be categorized as technology) is the most common industry among their respondents. The second most common industry is financial for all studies.

### 5.1.3 Size of organization

The largest group of respondents were employed at an organization greater than 10,000 employees (42.4%), followed by 500 - 1,999 employees (19.6%) and 5,000 - 9,999 employees

(12.0%). The group of respondents that were employed at smaller organizations (10 - 499 employees) have been represented by 15.2 percent.

Table 5: Organization sizes among respondents - cross study

Lim 2022 (N=92)	Poot 2021[69] (N=61)	Stettina 2018[94] (N=134)
>10,000 (42.4%)	5,001 - 20,000 (26.2%)	>50,000 (38.1%)
500 - 1,999 (19.6%)	20,001 - 50,000 (22.9%)	1,001 - 5,000 (23.9%)
5,000 - 9,999 (12.0%)	1,001 - 5,000 (19.7%)	<1,000 (19.4%)

Also in studies by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]) respondents that are employed at large organizations (>5,000) are most common.

#### 5.1.4 Focus on IT/software development (SD)

The respondent was asked to answer the question: "Is IT/software development the main focus of your business unit or department?". 63.0% of the respondents mentioned that they work in a department with IT/software development as their main focus and 37.0% answered that they do not.

Table 6 shows the means for Agile transformation maturity split by whether a department has its main focus on IT or other domains. As can be seen in the table, there are no clear differences between the two groups for Agile transformation maturity scores.

	Team maturity		Program maturity		Portfolio maturity	
	1	2	1	2	1	2
Responses	58	34	58	34	58	34
Mean	2.845	2.676	2.724	2.500	2.310	2.412
Median	3.000	3.000	3.000	2.000	2.000	2.000
Std. Deviation	0.970	1.093	1.152	1.212	1.173	1.282

Table 6: Means for Agile transformation maturity (one for "Beginner" to five for "World-Class") split by focus on IT or non IT, (1 = IT focus, 2 = other)

#### 5.1.5 Geographical distribution

The geographical distribution of responses shows that the survey has been answered in 31 different countries, with the majority of the respondents in The Netherlands (28), followed by India (14), the United States (6) and Germany (3), South-Africa (3) and Turkey (3). The other countries have been represented by one or two respondents. The survey has been answered from all six continents, where the majority of the responses came from the European continent (49). Determining the geographical location of the respondent happened using IP addresses that have been collected in the web survey. This method for location determination

is not always accurate and this section gives an indication of the geographical distribution of the respondents but will not be used in further analysis or for drawing any conclusions.

### 5.1.6 Transformation Maturity Model

In Table 7 the mean score for the maturity model by Laanti (2017 [50]) is displayed. Using the model the respondent could self-assess their organization's Agile transformation maturity. For this question a score of one means that the respondents estimate themselves at the "Beginner" level, two has been translated to the "Novice" level, three to "Fluent", four to "Advanced" and five to "World-Class". A score of 2.783, 2.641 and 2.348 for respectively team level maturity, program level maturity and portfolio level maturity means that the respondents were on average in between the "Novice" and "Fluent" level. For the team and program level the respondents scored on average closer to "Fluent" and for the portfolio level closer to "Novice".

N = 92	Team_maturity	Program_maturity	Portfolio_maturity
Mean	2.783	2.641	2.348
Median	3.000	3.000	2.000
Std. Deviation	1.014	1.173	1.208

Table 7: Scores for maturity model (one for "Beginner" to five for "World-Class")

The distribution between the different levels of Agile transformation maturity is displayed in Figure 5.

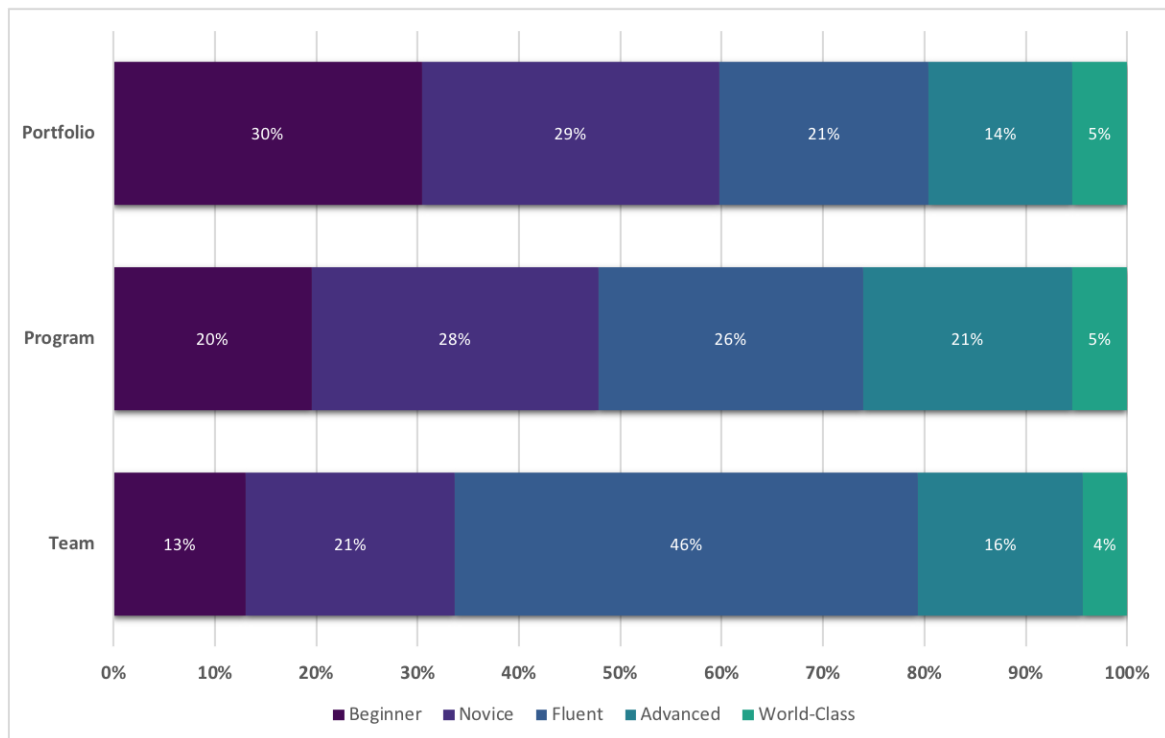


Figure 5: The distribution of maturity levels among respondents



Corresponding to the means in Table 7, the Agile transformation maturity is highest for the team level and decreases for the program level and the portfolio level. At the portfolio level, the largest group (30%) estimated their organization to be at the Beginner stage, followed by Novice (29%), Fluent (21%), Advanced (14%) and World-Class (5%). At the program level, 20% of the respondents estimated their organization to be at the Beginner stage, the largest group (28%) at the Novice level, followed by Fluent (26%), Advanced (21%) and World-Class (5%). At the team level, the largest group estimates their organization to be at the Fluent level (46%), followed by Novice (21%), Advance (16%), Beginner (13%) and World-Class (4%). The median respondent is at the Novice at the portfolio level and Advanced at both the program level and the team level.

## 5.2 Correlation tests

For the calculation of the correlations, Spearman's correlation coefficients ( $\rho$ ) have been used since the measurement scales are ordinal (Goss-Sampson, 2019 [34]). For the interpretation of the Spearman's correlation coefficient ( $\rho$ ) the categorization between the different correlation strengths that has been proposed by Dancy & Reidy (2007 [24]) has been used.

The right side of Table 8 shows the indicators for significance with their corresponding value that are used throughout the text in figures. In general, a p-score below 0.05 is considered statistically significant and means that there is a 95 percent probability that the null hypothesis is rejected and the results are not obtained due to random variation.

Spearman's rho	Correlation	Significance indicator	Meaning
>0.70	Very strong relationship	***	p < .001
0.40 - 0.69	Strong relationship	**	p < .01
0.30 - 0.39	Moderate relationship	*	p < .05
0.20 - 0.29	Weak relationship		
0.01 - 0.19	No or negligible relationship		

Table 8: The interpretation of Spearman's correlation coefficients ( $\rho$ ) by Dancy & Reidy (2007 [24])

### 5.2.1 Correlation tests for Agile transformation maturity, Agile mindset and performance dimensions

Table 9 contains the Spearman's correlation coefficients for the relations between the three levels for Agile transformation maturity, Agile mindset and the three performance dimensions. The strength of the relationship between the Agile mindset (AM), measured using the scale of Eilers et al. (2022 [31]), and the Agile transformation maturity determined using the model of Laanti (2017 [50]) differs from a moderate relationship at the team (0.308\*\*) and program (0.320\*\*) level to a strong relationship at the portfolio (0.464\*\*\*) level. The Agile mindset also correlates strongly with the performance indicators competitiveness (0.551\*\*\*), survivability (0.483\*\*\*) and overall business performance (0.625\*\*\*).

For determining the relationship between the Agile transformation maturity and the performance indicators a distinction has been made between the different levels in the model.

Team-level maturity has strong correlations with competitiveness (0.457\*\*\*), financial performance (0.625\*\*\*) and survivability (0.452\*\*\*). At the program level, there is a strong correlation with competitiveness (0.421\*\*\*) and moderate correlations with Financial performance (0.327\*\*) and with survivability (0.320\*\*). At the portfolio level, there is a strong correlation with competitiveness (0.583\*\*\*) and moderate correlations with financial performance (0.397\*\*\*) and survivability (0.333\*\*).

What comes to attention is that the Agile mindset correlates stronger with financial performance and survivability than the Agile transformation maturity and there is only a stronger correlation at the portfolio level with competitiveness.

Out of the three levels of Agile transformation maturity, the portfolio level correlates strongest with competitiveness and a higher maturity at the team level indicates a higher score for financial performance and survivability.

Variable	1	2	3	4	5	6
1. Team Maturity	–					
2. Program Maturity	0.647***	–				
3. Portfolio Maturity	0.602***	0.709***	–			
4. Agile Mindset	0.308**	0.320**	0.464***	–		
5. Competitiveness	0.457***	0.421***	0.583***	0.551***	–	
6. Business performance	0.463***	0.327***	0.397***	0.461***	0.625***	–
7. Survivability	0.452***	0.320**	0.333***	0.390***	0.483***	0.492***

\* p <.05, \*\* p <.01, \*\*\* p <.001

Table 9: Spearman's Correlations for maturity, mindset and performance dimensions

The moderate to strong correlations between Agile transformation maturity, Agile mindset and the business performance dimensions show that the concepts are related. Further analysis will be conducted to be able to say more about the relationship between these concepts.

### 5.2.2 The effect of strategic orientation

Several moderation tests have been performed in JASP using linear regression to test the moderating effect of strategic orientation on the relationship between the dependent and independent variables. The independent variable is the Agile transformation maturity stage determined by the Laanti model [50] and the dependent variables are the performance dimensions (competitiveness, survivability and overall business performance). During these tests, no significant moderating effect has been found for any of the strategic orientations on the relationship between the dependent and independent variables.

Strategic orientation	Team	Program	Portfolio
Operational Excellence (N=33)	2.689	2.600	2.289
Customer Intimacy (N=28)	2.972	2.944	2.389
Product Leadership (N=33)	2.816	2.526	2.421

Table 10: Means for transformation maturity per strategic orientation (one for "Beginner" to five for "World-Class")

In Table 10, the means for Agile transformation maturity show that organizations with a focus on customer intimacy and product leadership as their strategic orientation are on average further developed in their Agile transformation maturity. To compute these means the scales have been mapped to a number (one for "Beginner" to five for "World-Class").

Organizations with customer intimacy and product leadership as their main strategic orientation also score higher on average on the business performance indicators than organizations with operational excellence as their main strategic orientation. This can be seen in Table 11. The means have been calculated by translating the scores to integers (one is "Strongly agree", two is "Slightly agree", three is "Neither agree nor disagree", four is "Slightly agree" and five is "Strongly agree") and taking the mean of the answers to each question.

Strategic orientation	Comp.	Surv.	Financial Perf.
Operational Excellence (N=33)	3.29	3.88	3.24
Customer Intimacy (N=28)	3.35	3.98	3.59
Product Leadership (N=33)	3.70	4.04	4.08

Table 11: Means for overall performance indicators per strategic orientation (one for "Beginner" to five for "World-Class")

A correlation test has been conducted between the strategic orientations and the internal performance metrics. An interesting correlation found was the negative correlation between the strategic orientation "Operational excellence" and perceived quality (-0.322\*\*). Furthermore, there are no significant relations between any strategic orientation and any internal performance metric.

Variables	Operational exc.	Customer intimacy	Product leadership
Portfolio mat - Comp.	0.629***	0.530***	0.608***
Program mat - Comp.	0.400**	0.509**	0.511***
Team mat - Comp.	0.448**	0.467**	0.337*
Agile mindset - Comp	0.570**	0.459**	0.397*

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

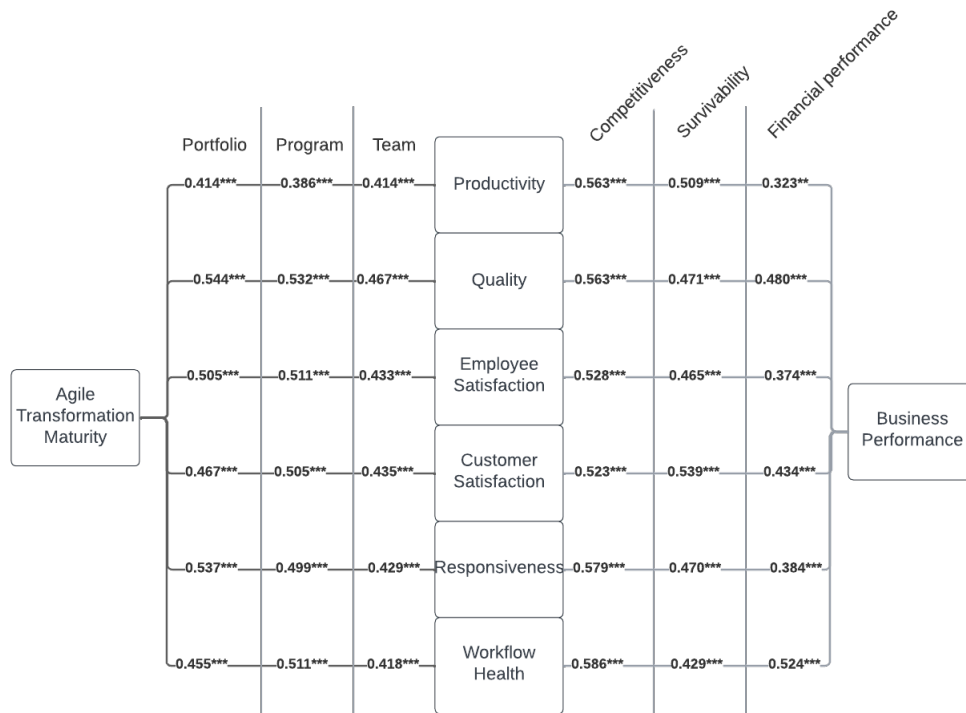
Table 12: Spearman's rho for correlations Agile transformation maturity and mindset - competitiveness, split by strategic orientation.

Spearman's correlations for Agile transformation maturity and Agile mindset with competitiveness (Comp. in Table 12) split by strategic orientation shows moderate to strong correlations for each strategic orientation group. The differences in correlation coefficients between the groups is minimal and not constant across all organizational levels and Agile mindset.

### 5.2.3 Correlations between Agile mindset & maturity, impact dimensions and business performance

Figure 6 shows the Spearman's correlation coefficients for the relationships between Agile transformation maturity, the six internal organizational performance dimensions (adopted from Stettina et al. (2021 [94]) and Poot et al. (2022 [69]) and the three business performance measures (competitiveness, survivability and financial performance). For calculating these scores, the mean of the internal performance metrics that have been grouped under a dimension has been used.

This Figure shows that the concepts of Agile transformation maturity, internal organizational performance and business performance are at least moderately related with a significance of  $p < 0.05$ . This is a prerequisite for conducting PLS-SEM analysis (Section 5.5), which shows in more detail how this relationship works. In Table 13, the correlation scores are displayed for every individual metric. On the higher level, all relations are moderate or strong correlations and all of them are significant to the 0.001 level except for Productivity-business performance, which is significant to the 0.05 level. The weakest correlations are across all levels of Agile transformation maturity and Productivity (team 0.414\*\*\*, program 0.386\*\*\* and portfolio 0.414\*\*\*).



\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Figure 6: Correlations between Agile transformation maturity, internal and external performance indicators

Table 13 shows the correlations between Agile transformation maturity at the portfolio,

program and team level, Agile mindset and various organizational performance metrics, as well as the performance dimensions of competitiveness, survivability and financial performance. The strongest correlations on the left side of the table exist between portfolio and program maturity and the metric "alignment between product and requirements" ( $0.532, p < .001$  and  $r = 0.531, p < .001$ ), program maturity and "customer satisfaction" ( $r = 0.505, p < .001$ ) and team maturity and "quality of the product" ( $r = 0.477, p < .001$ ). The Agile mindset correlates strongest with "pride in the results accomplished" ( $r = 0.548, p < .001$ ) and weakest with "degree to which work is planned" ( $r = 0.324, p < .001$ ). The weakest correlations have been measured between portfolio maturity and fun at work ( $r = 0.303, p < .001$ ), program maturity and number of days between commits ( $r = 0.357, p < .001$ ) and team maturity and handling unexpected work ( $r = 0.262, p < .01$ ).

The strongest correlations on the right side of the table for each performance dimension are between the metric "ability to attract employees" and competitiveness ( $r = 0.577, p < .001$ ), "customer satisfaction" and survivability ( $r = 0.457, p < .001$ ), and "the degree to which work is planned" and business performance ( $r = 0.434, p < .001$ ). The weakest correlations on the right side of the table for each performance dimension was measured between the metric "fun at work" and competitiveness ( $r = 0.315, p < .05$ ), "number of days between commits" and survivability ( $r = 0.193$ , not significant) and "fun at work" and "ability to cope with the amount of work" and business performance ( $r = 0.186$  &  $0.179$ , not significant).

<i>Portfolio maturity</i>	<i>Program maturity</i>	<i>Team maturity</i>	<i>Agile mindset</i>	Dimension Metric	<i>Competitiveness</i>	<i>Survivability</i>	<i>Financial performance</i>
				<b>Productivity</b>			
.433***	.427***	.449***	.509***	Efficiency of development	.533***	.435***	.236**
				<b>Quality</b>			
.436***	.502***	.477***	.377***	Quality of product	.412***	.364***	.338***
.484***	.383***	.390***	.472***	Detection of defects	.575***	.387***	.464***
.532***	.531***	.401***	.536***	Alignment between product and requirements	.480***	.460***	.413***
				<b>Employee Satisfaction &amp; Engagement</b>			
.339***	.409***	.335**	.367***	Fun at work	.315**	.269**	.186
.438***	.421***	.297**	.548***	Pride in results accomplished	.415***	.407***	.279**
.379***	.423***	.365***	.417***	Ability to cope with amount of work	.362***	.332**	.179
.382***	.357***	.434***	.406***	Autonomy of dev. team	.426***	.457***	.315**
.451***	.446***	.347***	.507***	Collaboration	.459***	.398***	.348***
.377***	.388***	.303**	.366***	Ability to retain employees	.454***	.403***	.381***
.457***	.445***	.382***	.491***	Ability to attract employees	.577***	.471***	.391***
				<b>Responsiveness</b>			
.471***	.397***	.394***	.537***	Lead time per feature	.547***	.352***	.285*
.461***	.503***	.347***	.480***	Customer feedback speed	.444***	.436***	.299**
.493***	.421***	.399***	.442***	Customer service request turnaround time	.492***	.418***	.373***
				<b>Workflow Health</b>			
.348***	.377***	.344***	.324***	Degree to which work is planned	.452***	.278**	.498***
.340***	.345***	.325***	.403***	Number of days between commits	.460***	.193	.339***
.422***	.408***	.413***	.506***	Capabilities for continuous improvement	.519***	.455***	.446***
.369***	.458***	.294***	.428***	Dependency management	.477***	.245*	.336**
.363***	.380***	.262*	.466***	Handling of unexpected work	.374***	.345***	.326**
.396***	.489***	.375***	.465***	Predictability of delivery	.489***	.366***	.405***
				<b>Customer Satisfaction</b>			
.467***	.505***	.453***	.426***	Overall customer satisfaction	.523***	.539***	.434***

\* p < .05, \*\* p < .01, \*\*\* p < .001

Table 13: Correlations for maturity - internal performance metrics - performance outcomes



#### 5.2.4 Correlations organizational performance metrics and business performance dimensions

In Figure 7, Figure 8 and Figure 9, the Spearman's correlations coefficients are displayed for the relationship between the internal organizational performance metrics (OPM) and the organizational performance dimensions, competitiveness, survivability and business performance. These bar charts visualise the same information that is displayed at the right side of Table 13 in the previous section.



Figure 7: Correlations between OPM and competitiveness

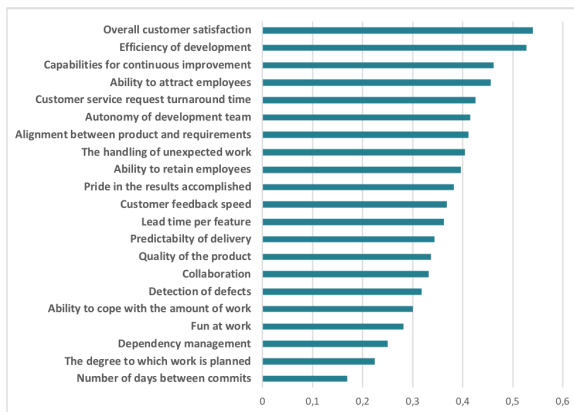
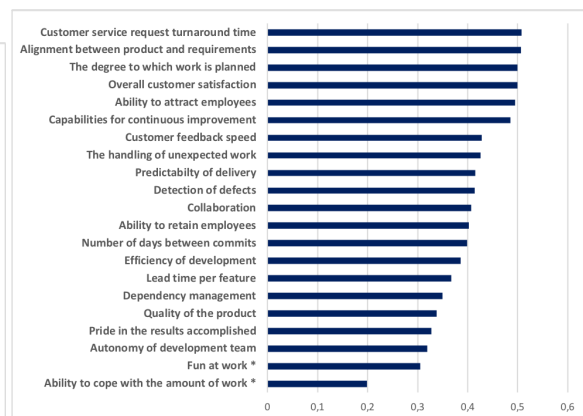


Figure 8: Correlations between OPM and survivability



(\* = not significant)

Figure 9: Correlations between OPM and financial performance

Overall, out of the three organizational performance dimensions "competitiveness" has the strongest correlation with almost all of the internal performance metrics, except "the degree to which work is planned" which correlates strongest with "financial performance" and "overall customer satisfaction" that correlates strongest with "survivability". Across all three dimensions, the metrics "overall customer satisfaction", "ability to attract employees", "capabilities for continuous improvement" and "detection of defects" have the strongest correlations. All these four metrics belong to a different organizational performance dimension, being respectively Customer satisfaction, Employee satisfaction & engagement, Workflow health and Quality.

The metrics "fun at work" and "ability to cope with the amount of work" have the weakest

correlation across the three business performance dimensions. Both these metrics belong to the internal performance dimension Employee satisfaction and engagement. The metrics with the largest differences in correlation coefficient for the three performance dimensions are "number of days between commits" (difference between competitiveness and survivability), "lead time per feature" (difference between competitiveness and financial performance) and "efficiency of development" (difference between competitiveness and business performance).

**Competitiveness** Overall, the relationships between the internal performance metrics and competitiveness are the strongest compared to the other performance dimensions (survivability and business performance). The IPMs that have the strongest correlation with competitiveness (Figure 7) are "ability to attract employees", "detection of defects" and "lead time per feature". The weakest links are with "fun at work", "ability to cope with the amount of work" and "the handling of unexpected work". Notably, the metric "lead time per feature", one of the strongest correlations for competitiveness, has one of the weakest correlation coefficients with survivability and financial performance.

**Financial performance** The IPMs "The degree to which work is planned", "detection of defects" and "capabilities for continuous improvement" showed the strongest correlations with financial performance in the data. Notably, the metric "the degree to which work is planned" has one of the weakest links with survivability. The weakest correlation scores that were found in the data for Financial performance were "ability to cope with the amount of work" and "fun at work". These correlations were also found to be insignificant.

**Survivability** The internal performance metrics that correlate strongest with survivability are "overall customer satisfaction", "overall job satisfaction" and "efficiency of development". All of these rank relatively high among the other performance dimensions. The weakest links are "number of days between commits", "Dependency management" and "fun at work".

### 5.2.5 Interrelationship of business achievement constructs

The relationship between the business achievement constructs, being competitiveness, financial performance and survivability is displayed in Table 14. The Spearman's correlation coefficient between competitiveness and financial performance is 0.625, between financial performance and survivability 0.492 and between competitiveness and survivability is 0.483.

Variable	Competitiveness	Financial performance	Survivability
1. Competitiveness	–		
2. Financial performance	0.625***	–	
3. Survivability	0.483***	0.492***	–

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 14: Spearman's Correlations for competitiveness, financial performance and survivability

Previous studies found that competitiveness has a positive effect on financial performance which has a positive effect on an organization's chance of survival (Section 2.2). To test this theory for our data, a mediation analysis has been performed in the Structural Equation Modelling (SEM) analysis module in JASP.

For mediation, "(1) the relationship between the independent variable and the mediator must be significant, (2) the mediator and the dependent variable must be significantly related, (3) the relationship between the independent and dependent variables without considering the mediator must be significant, (4) relationship between independent and dependent variable must become smaller or no longer significant when the mediator is taken into account" according to Baron & Kenny (1986) and Holmbeck (1997) in Eilers et al. (2022) [31].

As can be seen in Table 15, the mediator financial performance meets these criteria for the relationship between competitiveness and survivability in this data set.

	Effect size	Sign.
<b>Direct effects</b>		
Comp – > Surv	.187	.053
<b>Indirect effects</b>		
Comp – > FPerf – > Surv	.200	.002
<b>Total effects</b>		
Comp – > Surv	.387	.001

Table 15: Results of mediation analysis on business achievement constructs

### 5.2.6 Questions for testing agile boundary conditions

In a paper by Doz and Guadalupe (2019 [29]), several boundary conditions are discussed that could limit an organization's fit to the agile way of working and the outputs of an Agile transformation. All correlations are positive and of moderate to strong strength and significant to the 0.001 level.

The weakest correlation has been measured between the Agile mindset and compatibility of organizational culture with the Agile mindset ( $r = 0.308$ ). The strongest correlation has been measured between competitiveness and compatibility of organizational culture with the Agile mindset ( $r = 0.644$ )

	<i>Portfolio mat.</i>	<i>Program mat.</i>	<i>Team mat.</i>	<i>Agile mindset</i>	<i>Competitiveness</i>	<i>Survivability</i>	<i>Business perf.</i>
How would you rate the ability within your organization to make work more modular?	.495*	.474*	.429*	.427*	.554*	.411*	.458*
How would you rate the commitment of higher management to your organization's Agile transformation?	.422*	.456*	.308*	.320*	.595*	.417*	.389*
How would you rate the compatibility of your organization's culture to the Agile mindset?	.569*	.608*	.413*	.308*	.644*	.521*	.427*

\* $p < 0.001$

Table 16: Correlation table for the questions for testing agile boundary conditions

### 5.3 Factor analysis for the internal performance metrics

To test the correctness of the conceptual model, factor analysis can be performed. The advantage of this analysis is that not only the current model can be tested but also suggestions for improvements can be made that better fit the data.

The internal performance metrics used to measure the internal performance dimensions have been adapted from a framework by Poot et al. (2022 [69]). This framework is displayed in Figure 4 in Section 4.2.4 The proposition made in Poot et al. (2022 [69]) has been based among others on the performance metrics used in Stettina et al. (2021 [94]) and those were adopted from Laanti et al. (2011 [52]). In this research, this internal performance framework has been used to measure several organizational performance dimensions for Agile transformations. To figure out to what extent the intended constructs in the model are measured by the underlying metrics, thus to test the validity of this measurement model, a confirmatory factor analysis has been conducted in JASP (Suhr, 2006 [96]).

For conducting a confirmatory factor analysis, each factor has to be measured by at least 2 metrics. This is not the case for Productivity and Customer Satisfaction. Since all the factors in the model are individual factors, the test could also be done for the remaining four intended factors, being Quality, Responsiveness, Employee Satisfaction & Engagement and Workflow Health. The Chi-Square test has a p-value of below .001. However, for models with a large degrees of freedom (df) value, this is frequently the case and other tests should be conducted for the determination of a model's fit (Kenny, 2015 [44]). The Comparative Fit Index (CFI) of the factor analysis with the data from this research is 0.880. Any number below 0.9 is considered to be a bad fit (Kenny, 2015 [44]). The Tucker-Lewis Index (TLI) is 0.859 and again 0.9 is the cutoff point for being a well fitted model (Kenny, 2015 [44]). The root mean square error of approximation (RMSEA) is 0.110 and 0.1 is considered to be a maximum score for a well fitted model (Maccallum et al., 1996 [55]).

Measurement	Value
Comparative Fit Index (CFI)	0.880
Tucker-Lewis Index (TLI)	0.859
Root mean square error of approximation (RMSEA)	0.110

Table 17: Fit indices and RMSEA for confirmatory factor analysis on the internal performance dimensions measurement model.

In conclusion, the proposed organizational performance framework exceeds several thresholds to be a good fitted model to the data. Exploratory factor analysis has been conducted to investigate if the framework fits better to the data when alterations in the framework are made. The results of this factor analysis are displayed in Table 18 and show multiple differences from the original framework. As suggested in Stevens (1992 [95]), the minimum factor loading was set to 0.40. A variable should correlate to no more than 75 percent of the factors and the mean uniqueness score should be below 0.4 (Samuels, 2017 [81]), which is the case for this data set.

All variables for measuring Quality correlate together to Factor 1, together with "efficiency of development", "lead time per feature" and "overall customer satisfaction". Factor

2 contains a combination of metrics formerly categorized among Employee satisfaction & engagement. Factor 3 consists of the variables "ability to attract employees" which was previously categorized among Employee satisfaction & engagement and the variables "customer feedback speed" and "customer service request turnaround time" which were factorized to Responsiveness. The fourth factor consists of the variables "degree to which work is planned", "number of days between commits" and "predictability of delivery" which were previously categorized among Workflow health. A new proposition for an internal organizational performance framework is discussed in Section 5.3.1.

	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Efficiency of development	0.546				0.232
Quality of the product	1.081				0.200
Detection of defects	0.709				0.363
Alignment between product and req.	0.623				0.316
Fun at work		1.020			0.322
Pride in results accomplished	0.469	0.581			0.270
Ability to cope with the amount of work		0.502			0.452
Autonomy of development team		0.788			0.375
Collaboration		0.848			0.183
Ability to retain employees		0.401			0.373
Ability to attract employees			0.692		0.214
Lead time per feature	0.401				0.489
Customer feedback speed			0.762		0.315
Customer service request turnaround time			1.105		0.122
Degree to which work is planned				0.901	0.357
Number of days between commits				0.604	0.447
Capabilities for continuous improvement					0.338
Dependency management					0.421
Handling of unexpected work					0.473
Predictability of delivery	0.414			0.479	0.319
Customer satisfaction	0.855				0.228

Table 18: Factor Loadings for the internal performance metrics from an exploratory factor analysis

### 5.3.1 Updated internal performance framework

Based on the data of this study, the results for a confirmatory factor analysis (Section 5.3) show that the internal performance framework proposed by Poot et al. (2022 [69]) does not fit as a model to the collected data in this study. This means that the categorization of the internal performance metrics to the performance dimensions needs further investigation. Based on the results of an exploratory factor analysis (Table 5.3) an updated organizational framework has been constructed. This framework is displayed in Table 19.

The goal of the exploratory factor analysis is to get a better understanding of how the measured variables are related and what is the underlying factor that connects them. Lead by common properties, the author of this paper has assigned names to these factors to give more meaning to them. When giving names to factors, the name should represent a combination of the underlying metrics.

**Factor 1: Customer-focused development** The metrics assigned to factor two are all related to how efficient and effective the development process is, which seems related to Productivity and delivering customer value. Tangen (2005 [98]) mentions that often, a single focus on efficiency of development is the case when determining productivity, but efficiency

<p><b>Factor 1</b> <i>(Customer-focused development)</i></p> <p>Efficiency of development</p> <p>Quality of the product</p> <p>Detection of defects</p> <p>Alignment between product and requirements</p> <p>Lead time per feature</p> <p>Overall customer satisfaction</p>	<p><b>Factor 2</b> <i>(Employee Satisfaction &amp; Engagement)</i></p> <p>Fun at work</p> <p>Pride in the results accomplished</p> <p>Ability to cope with the amount of work</p> <p>Autonomy of development team</p> <p>Collaboration</p> <p>Ability to retain employees</p>
<p><b>Factor 3</b> <i>(Reputation)</i></p> <p>Customer feedback speed</p> <p>Customer service request turnaround time</p> <p>Ability to attract employees</p>	<p><b>Factor 4</b> <i>(Workflow reliability)</i></p> <p>The degree to which work is planned</p> <p>Number of days between commits</p> <p>Predictability of delivery</p>

Table 19: Proposed update internal performance framework, with the proposed new names in brackets

of development is nothing without effectiveness of the development. Whenever the quality of the product is high and the product is aligned with what the customer required, the development has been more effective. When development efforts have been efficient, the product is of quality and the defects have been detected early, strong product development capabilities are present. Customer satisfaction could be another way of determining the quality of the development since a goal of development is delivering value to the customer. A study by Jahanshahi et al.( 2011 [41]) showed a strong relationship between "customer satisfaction" and "product quality".

**Factor 2: Employee satisfaction & engagement** The metrics assigned to the third factor all belonged to the dimension Employee satisfaction and engagement before. This assignment seems fit to the metrics, since all these metrics emphasize a positive work environment.

**Factor 3: Reputation** The relationship of the metrics assigned to the third factor could be explained by a positive public image as a result of good customer feedback speed and customer service request turnaround time. Although a positive reputation of the organization was found to have a significant role in employee attraction and retention (Irshad et al., 2014[40]), these metrics seem less related. Further research is necessary to further investigate this factor.

**Factor 4: Workflow reliability** The three metrics assigned to the fourth factor are related to the predictability of the work and planning skills of the agile team. "The degree to which work is planned" is measuring the extent to which the development team is following



a structured and planned approach to their work, "number of days between commits" measures the frequencies of code commits (or intermediate delivered results outside of software development) and "predictability of delivery" measures how well the team meets the planning. All three metrics seem to be related in a way that if a team possesses a combination of the three, their workflow is reliable.

## 5.4 Update on the research model

As a result of the new factorization of organizational performance dimensions and a mediation analysis that showed a mediation for the relationship between competitiveness and survivability (Section 5.2.5 through financial performance and the newly proposed factors (Section 5.3.1) an updated research model has been developed (Figure 10).

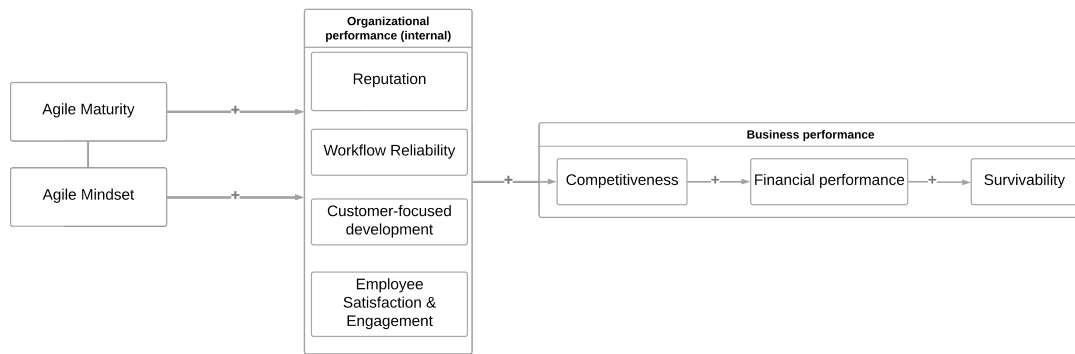


Figure 10: Updated research model

## 5.5 Testing the research model

Previous research suggests that partial least squares (PLS) is an appropriate analysis technique for analyzing research models that includes previously developed constructs (e.g. Queiroz et al., 2018 [73]; Eilers et al., 2022 [31]; Russo, 2021 [79]). PLS is a structural equation modeling (SEM) technique that uses a principal component-based method of analysis. By considering both the observed and latent variables, PLS can identify the underlying relationships between the predictor and the predicted variables, even when there are complex or correlated relations (Ringle & Da Silva, 2015 [77]). For conducting this analysis, the tool SmartPLS 4 has been used.

The results of the PLS-SEM analysis are displayed in Table 25 for the direct relationships and in the Appendix (Table 25) for the indirect relationships, and the results that are statistically significant together with the adjusted  $R^2$  are displayed in Table 20 and Table 21 and later also in the final model that resulted from the analysis (Figure 11 in the Discussion section). In the Appendix (Figure 13 and 14) also visualizations of the test results are displayed.

	Original sample (O)	Sample mean (M)	(STDEV)	P values
Agile mindset ->Competitiveness	0,129	0,128	0,091	0,155
Agile mindset ->Customer-focused dev.	0,405	0,429	0,092	0,000
Agile mindset ->Employee satisfaction	0,401	0,420	0,110	0,000
Agile mindset ->Portfolio mat.	0,386	0,406	0,115	0,001
Agile mindset ->Program mat.	0,310	0,324	0,110	0,005
Agile mindset ->Team mat.	0,306	0,321	0,115	0,008
Agile mindset ->Financial perf.	0,035	0,038	0,102	0,732
Agile mindset ->Reputation	0,379	0,402	0,100	0,000
Agile mindset ->Survivability	0,105	0,123	0,096	0,274
Agile mindset ->Workflow reliability	0,300	0,327	0,116	0,010
Competitiveness ->Financial perf.	0,533	0,533	0,112	0,000
Customer-focused dev. ->Competitiveness	0,315	0,300	0,144	0,029
Employee satisfaction ->Competitiveness	-0,207	-0,207	0,128	0,104
Portfolio mat. ->Competitiveness	0,242	0,237	0,099	0,014
Portfolio mat. ->Customer-focused dev.	0,153	0,143	0,121	0,206
Portfolio mat. ->Employee satisfaction	0,112	0,098	0,174	0,520
Portfolio mat. ->Financial perf.	-0,025	-0,028	0,123	0,836
Portfolio mat. ->Reputation	0,211	0,196	0,123	0,088
Portfolio mat. ->Survivability	-0,027	-0,022	0,153	0,859
Portfolio mat. ->Workflow reliability	0,065	0,045	0,134	0,629
Program mat. ->Customer-focused dev.	0,177	0,173	0,108	0,101
Program mat. ->Employee satisfaction	0,252	0,247	0,150	0,093
Program mat. ->Financial perf.	-0,083	-0,083	0,142	0,559
Program mat. ->Reputation	0,194	0,188	0,114	0,087
Program mat. ->Survivability	0,012	-0,005	0,156	0,938
Program mat. ->Workflow reliability	0,342	0,340	0,113	0,002
Team mat. ->Customer-focused dev.	0,211	0,203	0,091	0,020
Team mat. ->Employee satisfaction	0,068	0,070	0,109	0,532
Team mat. ->Financial perf.	0,256	0,258	0,124	0,038
Team mat. ->Reputation	0,041	0,040	0,122	0,738
Team mat. ->Survivability	0,273	0,269	0,144	0,059
Team mat. ->Workflow reliability	0,060	0,061	0,127	0,636
Financial perf. ->Survivability	0,382	0,389	0,108	0,000
Reputation ->Competitiveness	0,134	0,162	0,186	0,472
Workflow reliability ->Competitiveness	0,256	0,250	0,120	0,033

Table 20: The results from the PLS-SEM for all the direct relationships. All the significant paths are marked in orange. For stronger path coefficients, the color orange has been displayed in a darker tone.

The path coefficients are the relationships among latent variables, and they range between -1 and 1. An increase of one unit for the independent variable is expected to result in an increase of the path coefficient for the dependent variable. PLS itself does not support significance testing, therefore bootstrapping with 5000 sub-samples has been applied, which is a statistical method that creates randomly selected sub-samples from the sample data and uses each one of them to generate estimations for the population's parameters (Russo, 2021 [79]).

The  $R^2$  measures the prediction by the proportion of which a predicted variable's variance is predicted by the predictor variable. Because the predicted variable's  $R^2$  increases with the number of predictor variables, Table 21 shows the  $R^2$  adjusted to the number of predictors per variable. It is generally accepted that the prediction variance  $R^2$  should be at least higher than 0.19 to be accepted (Chin, 1998 [21]) and the  $R^2$  of each of the predicted variables in the analysis is higher than 0.19. To test the predictive quality for each of the predicted variables, a blindfolding technique has been applied to measure Stone Geisser's  $Q^2$ .  $Q^2$  is used to measure the predictive accuracy of relationships in a model. For relevant predictions,

the  $Q^2$  should be larger than 0 (Chin, 1998 [21]), which is the case for all predicted variables in the PLS analysis (Table 21).

Predicted variable	$R^2$ adjusted	$Q^2$
Reputation	0.39	0.31
Workflow reliability	0.28	0.24
Customer-focused development	0.46	0.35
Employee satisfaction & engagement	0.37	0.27
Competitiveness	0.49	0.33
Financial performance	0.37	0.31
Survivability	0.28	0.16

Table 21: Variance and accuracy coefficients

As can be seen in Table 20 and in Figure 11, the PLS analysis only partly supports the updated research model (Figure 5.4). Each level of the Agile transformation maturity framework is a predictor of at least one variable, team maturity for Customer-focused development ( $\beta = 0.212$ ,  $p < 0.019$ ) and financial performance ( $\beta = 0.257$ ,  $p < 0.038$ ), program level maturity for Workflow reliability ( $\beta = 0.341$ ,  $p < 0.002$ ) and portfolio maturity for competitiveness ( $\beta = 0.243$ ,  $p < 0.014$ ).

The Agile mindset, as measured with the scale developed by Eilers et al. (2022 [31]) was found to be a predictor for the organizational performance dimensions Workflow reliability ( $\beta = 0.317$ ,  $p < 0.010$ ), Customer-focused development ( $\beta = 0.430$ ,  $p < 0.001$ ), Reputation ( $\beta = 0.391$ ,  $p < 0.001$ ), and Employee satisfaction & engagement ( $\beta = 0.418$ ,  $p < 0.001$ ).

Out of the organizational performance dimensions only Workflow reliability ( $\beta = 0.257$ ,  $p < 0.033$ ) and Customer-focused development ( $\beta = 0.316$ ,  $p < 0.029$ ) were found to have significant effects on competitiveness. The organizational performance dimensions of Reputation and Employee satisfaction & engagement were found to have insignificant effects on competitiveness ( $\beta = 0.134$ ,  $p = 0.472$  for Reputation and  $\beta = -0.207$ ,  $p < 0.104$  for Employees satisfaction & engagement)

The PLS analysis supports the mediation test (Section 5.2.5), competitiveness showed to be a strong predictor of financial performance ( $\beta = 0.533$ ,  $p < 0.001$ ), which is a strong predictor of survivability ( $\beta = 0.382$ ,  $p < 0.001$ ).

Although Agile mindset and team and program level maturity are weakly correlated and Agile mindset and Agile portfolio maturity moderately correlated, no significant predictive relationship was found between Agile mindset and Agile transformation maturity in any direction. The Agile mindset was only found to be moderately correlated to team and program level maturity and strongly correlated to program level maturity (Table 9).

The implications of the final research model and its relation to the current literature are further discussed in the Discussion sections 6.1 and 6.2.

## 5.6 Reliability analysis of the constructs

The scales used for measuring the constructs Agile mindset, competitiveness, survivability and business performance have been validated in previous studies. By testing the reliability of the scales for the data set in this research, the reliability of the results of this research can be compared to previous studies in which the constructs have been used (Table 22). The reliability for Laanti's Agile transformation maturity model can not be measured since it only exists out of single-item measures.

A high Cronbach's alpha ( $>0.7$ ) (Naidoo, 2010 [61]) indicates that the items in a survey

are highly reliable and consistent in measuring the same construct. The reliability scores for the data in this research are very similar to the reliability scores for the data used in its original research.

Sigalas et al. (2013 [86]) reported a Cronbach's alpha of 0.84 for the construct for competitiveness, which was also found in this research.

Naidoo (2010 [61]) reported a Cronbach's alpha score of 0.68 for the construct for competitiveness. Using the data for this research, this is found to be 0.72. Kim et al. (2011 [47]) reported a score of 0.95 for the construct for financial performance, which is the same as the score found for the data used in this research.

Construct	Cronbach's $\alpha$ this research	Cronbach's $\alpha$ original
Agile mindset	0.95	not reported but reliable
Competitiveness	0.84	0.84
Survivability	0.72	0.68
Financial performance	0.95	0.95

Table 22: Cronbach's alpha scores for constructs

Table 22 shows that reliability tests for the measurement scales used for Agile mindset, competitiveness, survivability and financial performance show positive results in terms of the reliability of the scales

## 6 Discussion

To provide better meaning to the results both literature has been consulted as well as practitioners from the field. Their interpretations were collected during the RTE Summit 2022 in November in Amsterdam in two interactive workshops of around one hour. In these workshops, the intermediate results of this study were presented on large posters on the wall and then discussed. The workshops were visited by around 16 participants, of which the majority worked as a manager of a team of teams (release train engineer) in an organization that uses Agile methods.

The discussion consists of three parts: (1) The main findings of this research are discussed in Section 6.1. (2) In Section 6.2 the development of the research model is discussed and (3) Section 6.3 consists of a comparison to the Agile transformation maturity distribution in previous studies.

### 6.1 The impact of Agile transformations on competitiveness, survivability, and financial performance

The purpose of this thesis was to measure how Agile transformations influence the competitiveness, financial performance and survivability of organizations. This has been measured by developing a research model that explains the relationship between Agile transformations and the competitiveness, financial performance and survivability of organizations. By testing and improving this research model with data obtained from the target group, four main contributions were made to the knowledge about the relationship between Agile transformations and business performance. (1) Agile transformations positively influence competitiveness, financial performance and survivability. (2) The Agile mindset has a stronger influence on competitiveness and business performance than Agile transformation maturity. (3) The metrics "lead time per feature", "detection of defects" and "ability to attract employees" showed to be the most important improvement points for enhancing competitiveness. And (4) there are several boundary conditions that play a role in the success of Agile transformations.

#### 6.1.1 Agile transformations positively influence competitiveness, financial performance and survivability.

The PLS-SEM analysis showed sufficient results for the research model as is displayed in Figure 11. This means that for the data collected in this research, both Agile transformation maturity and Agile mindset showed to be predictors for competitiveness, sub-sequential financial performance and survivability. Both the Agile mindset as team level and program level maturity showed to positively influence competitiveness indirectly by improving the organizational performance dimensions Workflow reliability and Customer-focused development. Agile transformation maturity and the portfolio level showed to have a small positive direct influence on competitiveness.

Previous work by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]) already showed a positive effect of Agile transformations and Agile transformation maturity on the same organizational performance metrics as presented in this research. Their findings are in line with the findings of this research that also shows a positive effect of Agile transformation maturity on the same organizational performance metrics but later factorized among other organizational performance dimensions.

This research adds to their work by adding among others the Agile mindset and Business performance dimensions (competitiveness, financial performance and survivability) to the

research model. The contributions of this research show that when a goal is to become more competitive, so as to be able to respond effectively to external opportunities and threats, organizations should primarily focus on three capabilities: (1) increasing the Agile transformation maturity at the portfolio level of their organization, (2) making their workflow more reliable and (3) improving on customer-focused development.

**Increasing Agile transformation maturity at the portfolio level** Increasing the Agile transformation maturity at the portfolio level of an organization can according to Laanti (2017 [50]) be done by aiming for the achieved milestones proposed in the Agile transformation maturity framework, which has been developed by identifying what goals seem fit to each level of maturity. In a thesis by Poot et al. (2022 [69]), several improvements to this framework were identified, which were used in the survey for this research (Appendix 10). A prioritized portfolio backlog is identified as a basic necessity for aligning goals within an organization or business unit. To increase agility at the portfolio level, e.g. agility as part of values and company strategy, measuring feedback and using this data and trends for systematic and fast-rolling decision-making are mentioned.

Previous research does not mention the role of Agile transformation maturity at the portfolio level as a determiner of competitiveness as it is not included in the conceptual framework of this research. Why particularly Agile transformation maturity at the portfolio level is a direct determinant of competitiveness could be explained by a comment that was given by a participant in one of the workshops: "a strong relationship between the portfolio level and competitiveness is not surprising. Roadmaps and strategy play an important role in being competitive as an organization to position yourself in a market and adapt to changes in the market. To do this well, the whole organization needs to follow a certain strategy". Also, compared to the achievements necessary to reach the next stage for program and team level maturity in Laanti's Agile transformation maturity model (Figure 3), milestones such as "detecting and utilizing fast business opportunities" or "systematic and fast-rolling decision making" seem like capabilities that link agile portfolio maturity to competitiveness.

**Increasing Workflow reliability** For making the workflow more reliable, the findings of this research indicate that organizations should focus among others on adopting agile culture by creating an Agile mindset within their organization and increasing the Agile transformation maturity at its program level.

According to Eilers et al. (2021 [31]), to adopt an Agile mindset, organizations should adopt a culture that emphasizes learning, customer co-creation, collaboration and self-guidance. No evidence was found in the literature that supports the finding that the presence of an Agile mindset within an organization makes the workflow more reliable. However, when collaboration within the business unit is strong and ties with the customer are close it is plausible that minor updates to the product could be committed faster and the timing of these commits could become more predictable and easier to plan. Further research is necessary to give a better understanding of this relationship.

For increasing agility at the program level of an organization, Laanti (2017 [50]) identified e.g. incremental planning and execution as a basic necessity for aligning teams. Systematically speeding up production releases and continuous positive feedback from customers from the last deliveries are identified as milestones that fit a more mature program level in an organization or business unit. This seems in line with the metrics factorized to Workflow reliability as faster production releases are similar to fast commits of code or product features.

**Increasing Customer-focused development** The results indicate that an Agile mindset and Agile transformation maturity at the team level are important determiners for improving customer-focused development: the fast delivery of products aligned with customers' requirements. This indicator for organizational performance showed to be the strongest determiner of competitiveness ( $\beta = 0.363$ ). Laanti (2017 [50]) identified using scrum and version control as basic necessities for agility at the team level. E.g. a test-first approach and frequent releases are identified as capability goals that fit with a higher level of agile team maturity.

Previous research does not mention the presence of an Agile mindset as a determiner for more customer-focused development efforts. Miler & Gaida (2019 [58]) supported this link partially with their findings that the Agile mindset is related to increased levels of customer satisfaction with the product and closer collaboration with the customer which would increase the alignment between product and requirements.

**The Agile mindset as a determiner for reputation and employee satisfaction & engagement** Creating an Agile mindset, which consists of a culture that emphasizes learning, customer co-creation, collaboration and self-guidance (Eilers et al., 2022 [31]), was found to positively influence the reputation of an organization, and the satisfaction and engagement of its employees. Earlier studies also showed a positive effect of learning culture on employee satisfaction (Egan et al., 2004 [30]). The results showed that organizations with a strong Agile mindset had better interaction with their customer, could attract employees more easily, and had higher satisfied and engaged employees. Although these could all be desirable outcomes of an Agile transformation, these organizational performance measures were not found to significantly influence competitiveness, financial performance or survivability.

The findings of this research show that if Agile transformations improve the Agile transformation maturity and Agile mindset of organizations, Agile transformations positively influence the competitiveness of organizations. Competitiveness was found to be a strong determiner of financial performance, which showed to be a strong determiner of the survivability of organizations. As suggested by Asseraf & Gziny (2022 [6]) and Harraf et al. (2015 [38]), the Agile mindset and capabilities that fit with an increased stage of Agile transformation maturity showed to be internal organizational resources and capabilities that can enhance the competitiveness of organizations, which is necessary for long-term (financial) success and survival.

#### **6.1.2 Agile mindset is stronger related to competitiveness and business performance than Agile transformation maturity**

The findings show that the Agile mindset correlates stronger to the business performance dimensions of competitiveness, financial performance, and survivability than Agile transformation maturity (Table 13). Also, in the PLS analysis of the researched model (Figure 10), an Agile mindset showed to be a stronger overall determiner of competitiveness. The indirect effect on competitiveness is stronger for Agile mindset ( $\beta = 0.480, p < 0.001$ ) than for portfolio maturity ( $\beta = 0.311, p < 0.003$ ), program maturity ( $\beta = 0.117, p < 0.064$ ) and team maturity ( $\beta = 0.073, p < 0.142$ ). Except for Agile transformation maturity at the program level which showed a stronger effect on workflow reliability, the Agile mindset showed to stronger influence the organizational performance indicators of customer-focused development, reputation and employee satisfaction & engagement.

This implies that developing a culture of learning, co-creation with the customer, collaboration and self-guidance is more important for business success than aiming for the milestone



capabilities and processes identified by Laanti (2017 [50]), that fit with a higher level of Agile transformation maturity during a transformation. This is in line with the Agile Manifesto, which states that individuals and interactions go over processes and tools (Agile Manifesto, 2001 [11]). Also, Denning (2016 [26]) states that an Agile mindset is more important than Agile methods, processes or organizational structures". Adopting an Agile mindset, however, is seen as more challenging than Agile methods and its difficulty is one of the main reasons Agile transformations fail (Dikert, 2016 [28]).

### 6.1.3 Organizational performance metrics to improve competitiveness

The organizational performance metrics presented in the framework (Figure 4) adopted from Poot et al. (2022 [69]) showed to be impacted by Agile transformations for the data collected in this study, the study by Poot et al. and other previous studies collected by Poot et al. (2022 [69]). Several of these metrics showed a strong relationship with competitiveness in the Results Section 5.2.4. For practitioners that seek to enhance the competitiveness of their organization, a focus on improving the strongest related metrics could provide guidance during an Agile transformation.

As can be seen in Figure 7, the five metrics that are strongest related to competitiveness (Spearman's correlation greater than 0.5), are "lead time per feature", "detection of defects", "ability to attract employees", "Efficiency of development" and "customer service request turnaround time".

Participants of the workshops hosted in November at the RTE Summit 2022 generally agreed that these metrics are important for increasing competitiveness and making an organization capable of responding effectively to changes in the market. There is also some but limited evidence in literature that supports these findings.

**Lead time per feature** Lead time per feature refers to the time it takes to deliver a feature requested by the customer. Baumann & Pintado (2013 [10]) emphasize the importance of fast delivery of product features to help organizations respond to opportunities and threats in the marketplace. A participant at the workshop noticed that "Whenever an organization is able to deliver faster than competition it is better able to deliver features that fit better to changes in market circumstances". Another participant noticed that however lead time is important to be competitive, faster lead times often mean smaller features which could be beneficial for predictability and quality but not necessarily mean an organization is able to respond faster to changes in the market.

**Detection of defects** Detection of defects seems more directly related to quality than to competitiveness. However, a manager of a large semiconductor company noticed during the workshop that to them quality and reduction of errors are more important than fast delivery and short lead times. Their competitiveness lies in repetitively being able to have a product of higher quality than their competitors. By early detection of defects in the quality of their products, they are able to keep neutralizing the threats of competition. Also Kannan & Tan (2005 [43]) showed a positive relationship for "employee training in quality management and control" and "empower detection of defects" with competitiveness.

**Ability to attract employees** As a participant in the workshop mentioned, an ability to easily attract employees could help to scale or diversify the business which could be a necessary feature when market conditions change. Purusottama & Ardianto (2019 [72]) found

that a good corporate image showed to increase the ability to attract talented employees and this is theorized to increase an organization's competitiveness.

**Efficiency of development** Efficiency in development allows organizations to allocate their resources to faster develop products. As Baumann & Pintado (2013 [10]) mentioned in their work, whenever organizations are able to achieve efficiency in the development process that comes with costs and times savings they could introduce new products or features faster and therefore also respond faster to opportunities and threats in the market.

**Customer service request turnaround time** Short customer service request turnaround times show a combination of speed and care for the customer. A participant in the workshop noticed that being able to deliver quickly to customer needs also means an organization is competitive. Customer needs are a good indication of what happens in the marketplace and quickly responding to their requests shows both good interest in customers and in general gives a good indication of what is happening at the moment in the market. In literature, no support was found for the strong relationship between customer service request turnaround time and competitiveness.

#### 6.1.4 Boundary conditions to the success of Agile transformations.

The broad adoption of Agile methods, currently also outside IT, in domains such as HR and marketing (Oprins et al., 2019 [67]), might argue that every organization can benefit from it. Also, vendors of agile frameworks benefit from the idea that adopting Agile methods is beneficial for everyone. To test whether every organization can expect the same benefits from undergoing an Agile transformation, several conditions have been identified that could have an effect on this.

Doz and Dualipe (2019 [29]) argued that organizations that are not able to make the work more modular, are likely to benefit less from adopting Agile methods. Organizations that work on mega projects, such as bridges and nuclear power plants, experience more difficulties in making the work more modular (Flyvbjerg, 2021 [32]). These projects are only beneficial if they are 100% finished. Also, testing is difficult when only parts of these projects are finished. Still, Flyvbjerg argues that these projects also benefit from an agile approach and modularity in their work. The results of the questionnaire support these statements (Table 16): the ability to make work modular showed a strong correlation with competitiveness (0.554), and moderate correlations across the levels of Agile transformation maturity and with Agile mindset.

Also, the strategic orientation of an organization might affect its potential benefits from adopting Agile methods. Organizations that primarily focus on operational excellence, producing a homogeneous product at lower costs than competitors, might benefit less from adopting Agile methods than organizations that differentiate through product leadership or customer intimacy (Hallgren, 2009 [35]). Since this work is mostly routine, these organizations are less likely to benefit from working in sprints and getting frequent customer feedback. Also, the requirements are less likely to change often. Also, Doz & Dualipe (2019, [29]) argue that organizations with routine day-to-day operations seem to benefit less from adopting Agile methods.

The findings show lower means for organizations focused on operational excellence for Agile mindset, Agile transformation maturity, competitiveness, financial performance and survivability (Table 11). However, the correlations between Agile transformation maturity and Agile mindset with competitiveness are similar for all strategic orientations. This shows

that organizations with a focus on operational excellence are less mature in their adoption of Agile methods and Mindset, and are less competitive (measured by the ability to respond to changing market conditions) than organizations with a focus on product quality or customer intimacy. However, since the correlation between the adoption of Agile capabilities, processes, Agile mindset and competitiveness is similar for the different strategic orientations, based on the results it can not be said that organizations that focus on operational excellence benefit less from Agile, only that they have adopted it less in their organization. Thus, the findings indicate that there is no difference in benefits of Agile transformations between different strategic orientations.

The sample of this study is not large enough to be able to measure differences between industries. To get more insights into whether every organization experiences the same benefits of undergoing an Agile transformation, future studies could compare the effect of Agile transformations on organizational performance across industries.

In Section 2.1.2, boundary conditions to the implementation of Agile methods derived from literature were discussed. These boundary conditions are: "commitment of higher management to the Agile transformation" and "compatibility of the organization's culture to the Agile mindset" These conditions have been tested in this study, and all conditions have a moderate to high correlation with Agile transformation maturity, Agile mindset and the business performance dimensions. The results of this study indicate that these boundary conditions, proposed by Doze & Dualipe (2018 [29]) are indeed boundary conditions to the success of Agile transformations.

## **6.2 Interrelationship model for the effects of Agile transformation maturity and mindset on organizational and business performance.**

One of the contributions of this research is an updated and tested research model that models the relationship between Agile transformation maturity, Agile mindset, organizational performance and business performance. With the establishment of this model, several choices have been made supported by similar studies that are discussed in Section 6.2.1. Section 6.2.2 provides a short explanation of the model and Section 6.2.3 contains a discussion of the links found in the model.

### **6.2.1 Developing the model**

Throughout this study, a research model has been developed and tested to explain the relationship between Agile transformation and competitiveness, financial performance and survivability in more detail. In Section 3, a conceptual model has been proposed that assumes a relationship between Agile transformation maturity and Agile mindset and competitiveness, financial performance and survivability. This relationship is theorized to happen through improved organizational performance dimensions (Figure 1).

The development of this conceptual model was based on existing literature on the relationship between Agile transformation maturity, Agile mindset, organizational performance dimensions and business performance. The purpose of this research was to measure how Agile transformations influence the competitiveness, financial performance and survivability of organizations by testing and improve a research model that depicts the interrelationships between the variables involved in the relationship between Agile transformation maturity and business performance.

The results of the survey indicated that the proposed conceptual model (Figure 1) can be accepted. To summarize, the results indicated that the relationship between Agile transformation maturity and Agile mindset and the competitiveness, survivability and financial performance of organizations is positive for all three performance dimensions. The direction of the relationship, however, could not be decided based on the results of a correlation test. The direction as suggested in the conceptual model (Figure 1) is supported by claims in literature by among others Queiroz et al. (2018 [73]) and Asseraf & Gziny (2022 [6]) that an Agile mindset and large-scale agility (Laanti et al., 2017 [50]) are valuable resources in modern organizations that are important for an organization's competitiveness and financial performance. Although the relationship between Agile mindset and competitiveness has not been discussed in previous research, the relationship between Agile mindset and business performance (here similar to financial performance) was shown to be positive (Eilers et al., 2022 [31]; Queiroz et al., 2018 [73]; Asseraf & Gziny, 2022 [6]).

On the other hand, it could not be unthinkable that primarily organizations that are performing well have the financial resources to embark on an, often costly, Agile transformation. In addition to that, it seems more likely that this impact is indirect and Agile transformations showed to positively impact several internal performance measures that could improve the business performance of the organization (Stettina et al., 2021 [94]; Poot et al., 2022 [69]).

Although the dimensions in the conceptual model all showed moderate to strong correlations (Figure 6), the adopted internal performance framework, proposed by Poot et al. (2022 [69]) did not fit based on the collected data (Table 5.3). This makes it uncertain if the metrics measure the dimensions they are assigned to. Exploratory factor analysis showed a different factorization of the variables (Table 18) and this resulted in a proposition of an updated organizational performance framework (Table 19) and an updated research model (Figure 10). This final research model has been tested using partial least squares (PLS) structural equation modeling (SEM) (Section 5.4). The results of this analysis partially support the updated research model and helped to develop a final research model for this research data. This model is displayed in Figure 11, and only contains the significant relationships.

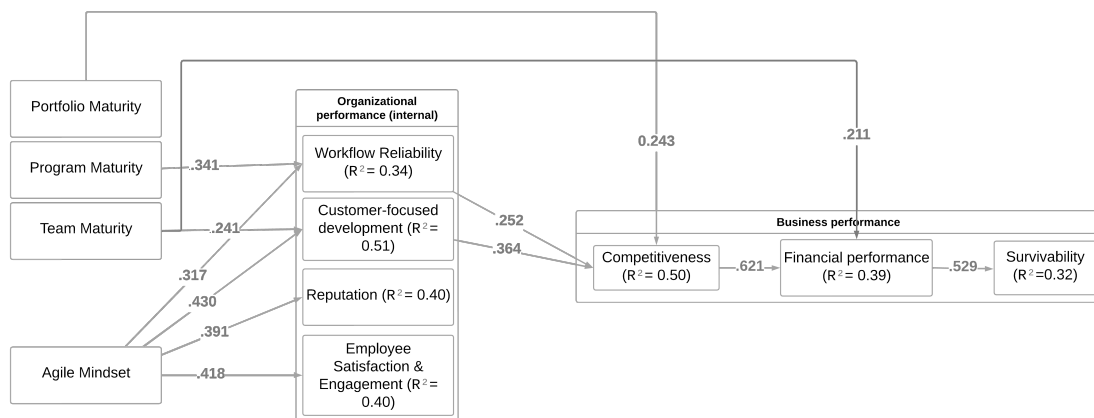


Figure 11: PLS test results for the updated research model, showing the significant path coefficients

### 6.2.2 Model description

The final research model can be divided into four components, Agile transformation maturity, Agile mindset, internal organizational performance dimensions and business performance dimensions.

Agile transformation maturity is measured by a framework developed by Laanti (2017 [50]) and has been improved by Poot et al. in 2022 [69]. This framework is used to measure the stage of Agile transformation maturity an organization is in at three different organizational levels, being the portfolio level, program level and team level. Selecting what stage an organization is currently in is based on identified capabilities and Agile methods that were found to correspond to a certain stage.

Agile mindset is measured by a scale developed by Eilers et al. (2022 [31]) and consists of four main elements: To what extent an organization possesses a culture of learning, customer co-creation, collaboration and self-guidance.

Internal organizational performance factors are based on earlier work of Stettina et al. (2021 [94]) and Poot et al. (2022 [69]). The metrics that have been identified as improved by Agile transformations in earlier research have been mapped to new factors in this research based on an exploratory factor analysis. Based on the common properties of the underlying variables the factors have been given names.

The business performance dimensions consist of competitiveness (Sigalas et al., [86]), financial performance (Queiroz et al., 2018 [73]) and survivability (Naidoo, 2010 [61]). These scales have been adopted from earlier research in which they have been developed and validated.

The relationships between these components have been tested by developing and testing an interrelationship model. The model shows positive significant relationships between Agile mindset and all four organizational performance factors. Also a positive relationship was found between team level maturity and customer-focused development and a weak relationship between team level maturity and financial performance. For program level maturity and the factor workflow reliability a moderate positive relationship was found.

Portfolio maturity was found as a moderate predictor for competitiveness. Only two out of four organizational performance factors, workflow reliability and customer-focused development have shown to be a predictor for competitiveness.

The strong relationship between competitiveness and survivability is explained by a mediation via financial performance.

### 6.2.3 The links in the model

The links between the predictors and predicted variables are individually discussed:

**Agile mindset and internal organizational performance** The Agile mindset showed to be a predictor for all four organizational performance dimensions (Customer-focused development  $\beta = 0.430$ , Employee satisfaction and engagement  $\beta = 0.418$ , Reputation  $\beta = 0.391$  and Workflow reliability  $\beta = 0.317$ ). The Agile mindset emphasizes an organization's attitude towards learning spirit, collaborative exchange, empowered self-guidance and customer co-creation.

Because the Agile mindset is still a relatively new research topic, there is limited research on the links between the Agile mindset and these internal performance dimensions.

There is some evidence in literature that supports the findings that the presence of an Agile mindset within the organization increases Customer-focused development and Reputation. Miler & Gaida (2019 [58]) found that an Agile mindset is related to "attitude towards customer satisfaction and needs" and Eilers et al. (2022 [31]) found that customer co-creation is one of the four main capabilities that fit with the presence of an Agile mindset.

It seems likely that organizations that are focused on the customer in their development process have better alignment between the product and requirements, which likely also supports the efficiency of development, the perceived product quality and customer satisfaction. Because short ties with the customer also create a short feedback loop in the development process, defects in the product can be recognized early in the process which helps to reduce lead times. These are all metrics that have been factorized to Customer-focused development.

Also, customer feedback speed and customer service request turnaround time are metrics that are likely to be positively related to short ties with the customer and are factorized into Reputation. It is unsure if a strong Agile mindset within an organization helps them to attract new talent. However, learning spirit, which was found to be strong in organizations with a strong Agile mindset (Eilers et al., 2022 [31]; Miler & Gaida [58]) showed to be strongly related to job attractiveness in the eyes of job seekers in an experiment conducted by Schlechter et al. (2015 [83]).

There is also some evidence in literature that support the finding that the presence of an Agile mindset supports Employee satisfaction & engagement. Both Miller & Gaida (2019 [58]) and Eilers et al. (2022 [31]) found that collaboration is stronger in organizations with a strong Agile mindset. Since Eilers found that self-guidance and autonomy is stronger in organizations with a strong Agile mindset, autonomy in the development team is also likely to be related to the Agile mindset. Autonomy was also found to be negatively related to employee turnover (Liu et al., 2011 [54]). There was no evidence found in literature that supports a relationship between Agile mindset and "fun at work", "pride in the results accomplished" and "ability to cope with the amount of work".

Apart from the assumption that good collaboration, which is emphasized by a strong Agile mindset, could support the predictability of the delivery of product or features, there seems to be a lack of evidence in literature that supports or contradicts the finding that a strong Agile mindset makes the workflow more reliable.

**Team level maturity and customer-focused development** Team level maturity showed to be a predictor of customer-focused development ( $\beta = 0.241$ ). The development team is responsible for most of the underlying variables for this dimension. Transformation maturity at the team level, which consists of properties such as Scrum/Kanban in use, test-driven environment and error-free releases when more mature (Figure 3), can be seen as a predictor for e.g. efficient development, detection of defects, lead time per feature and quality of the product.

**Program level maturity and workflow reliability** Program level maturity showed to be a predictor of workflow reliability ( $\beta = 0.341$ ), which consists of the metrics "The degree to which work is planned", "Number of days between commits" and "Predictability of delivery". These metrics seem to be most related to individual teams. A reason why this is strongest linked to the program level could be that incremental planning and execution and alignment between teams could improve the predictability of the delivery and planning of the work.



**Organizational performance dimensions and business performance** For the organizational performance dimensions, only workflow reliability and customer-focused development showed significant path coefficients with competitiveness ( $\beta = 0.252$  and  $\beta = 0.364$ ). This contradicts the findings of Saeidi et al. (2015 [80]), that found competitiveness mediates the relationship between reputation, and the financial performance of an organization, but support their finding that competitiveness mediates the relationship between customer satisfaction and financial performance.

The results indicate that a reliable workflow that consists of planned work, frequent commits of code, and predictability of delivery is a predictor for competitiveness, so it helps an organization to easily and effectively respond to external opportunities and threats (Sigalas et al., 2013 [86]). A reason for this could be that if the teams are stable and reliable and the amount of work that can be done in a certain amount of time is predictable, it is easier to respond to external factors and change the requirements of the work.

**Portfolio level maturity and competitiveness** Portfolio level maturity showed to be a predictor of competitiveness ( $\beta = 0.243$ ). The portfolio level is mainly about the strategy of the organization. Whenever an organization achieves a high level of strategic agility, it is likely to be able to respond quickly to emerging opportunities and threats. Eilers et al. (2022 [31]) found a strong relationship ( $r=0.504$ ,  $p < 0.001$ ) between Agile mindset and strategic agility, assessed by the ability of firms to easily and quickly change their strategy in customer responsiveness, business partnerships, and operations.

When consulting Laanti's Agile transformation model[50], milestones that have been identified as higher Agile transformation maturity capabilities at the portfolio level such as "detecting and utilizing fast business opportunities" can be linked to the used definition of competitiveness. Furthermore, little academic research was found on the positive relationship between agile adoption at the portfolio level of organizations and its competitiveness.

**Team level maturity and financial performance** The findings indicate that team level maturity is a weak significant determiner of financial performance ( $\beta = 0.211$ ). Unlike Agile transformation maturity at the portfolio level, in which the strategy of the organization or business unit is determined, it seems less likely that team level maturity is a direct predictor of financial performance. Capabilities like frequent product releases, error-free releases and test-driven development seem less likely to affect such a high-level concept as financial performance. During the workshop one of the participants mentioned: We understand why team level links strongest to financial performance. It is the agile core, if the teams perform well the overall business performance will increase. Strong teams mean a strong ART (agile release train) and your performance will go up".

**Competitiveness, financial performance and survivability** Competitiveness was found to be a predictor of financial performance ( $\beta = 0.621$ ), which was found to be a predictor of survivability ( $\beta = 0.529$ ). Also, mediation analysis showed the relationship between competitiveness and survivability to be mediated by financial performance. The positive relationship between competitiveness and financial performance was shown in previous research (Saedi et al., 2015 [80]). In previous research the relationship between these dimensions was described as follows: Organizations need to be competitive in order to be profitable and achieve business performance (Sigalas et al., 2013 [86]; Porter, 1985 [70]), which is necessary for the long-term viability of an organization (Queiroz et al. 2018 [73]; Naidoo, 2010 [61]).



The Spearman's correlations test showed that the dimensions of Agile transformation and Agile mindset and competitiveness, financial performance and survivability are moderately to strongly related. The tests of the final research model did not show full support for the model, but both Agile transformation maturity and the Agile mindset showed to be predictors of competitiveness. All together can be said that based on the findings of this research Agile transformations, measured by Agile transformation maturity positively influences competitiveness. At the portfolio level, this is a direct predictor, at the team and program level this is an indirect predictor via internal organizational performance. Both correlation tests as the PLS analysis showed that the Agile mindset influences competitiveness and internal organizational performance more strongly than Agile transformation maturity. Therefore, if the objective of an Agile transformation is to increase competitiveness, a focus on cultural change is more important than a focus on implementing processes and tools.

### 6.3 Comparing Agile transformation maturity across multiple studies over time

This section contains a discussion of the findings of this study compared to two previous studies that have used the same survey items and were conducted in a similar context.

The data for Stettina et al. (2021 [94]), was collected in 2018 and the data for Poot et al. (2022 [69]) was collected in 2021. Both studied the impact of Agile transformations on the internal performance of organizations. In Figure 12, an increase in Agile transformation maturity can be seen over time and when rising in organizational levels. While the ratio of respondents that considered themselves "World-class" stayed the same over the years and across levels, apart from some exceptions the ratio of organizations that can be considered "Novice" or higher and "Fluent" or higher constantly grew across years and across all organizational levels. Although the results have not been collected in the same sample and also the job roles of the participants in the samples differ, a general increase in Agile transformation maturity can be seen over the past years.

The State of Agile survey has measured the ratio of organizations that have adopted Agile methods over the past 16 years (Digital.ai, 2022 [1]). This has kept rising. However, they did not provide insights into if after the adoption of the initial methods the organization matured in its agility.

At the team level there is a larger group that assessed themselves as "Fluent" (46%) compared to 23% and 30% for Poot et al. (2022 [69]) and Stettina et al. (2021 [94]). At the program level 53% of the organizations has a "Fluent" or higher maturity level, where this is smaller for both previous studies (45%) and (43%). In the previous studies a slightly larger part of the respondents consider themselves in the "World-Class" stage of the maturity model at the team and program level. For the portfolio level there is also a slight increase in organization in the "Fluent" stage or higher (41%) compared to the previous studies (37%) and (38%). Another notable difference between the distribution of the Agile transformation maturity stages across studies is that the results of this study show a higher percentage of respondents that consider themselves "Advanced" or higher at the program level than at the team level.

In Table 23 the means of Agile transformation maturity on team, program and portfolio level across the three studies are shown. The Agile transformation maturity stages from "Beginner" to "World-Class" have been translated into a number (respectively one to five) to compute the means. All means displayed in Table 23 are in between the "Novice" and "Fluent" stages.

When comparing these means a pattern can be recognized. Despite major differences in

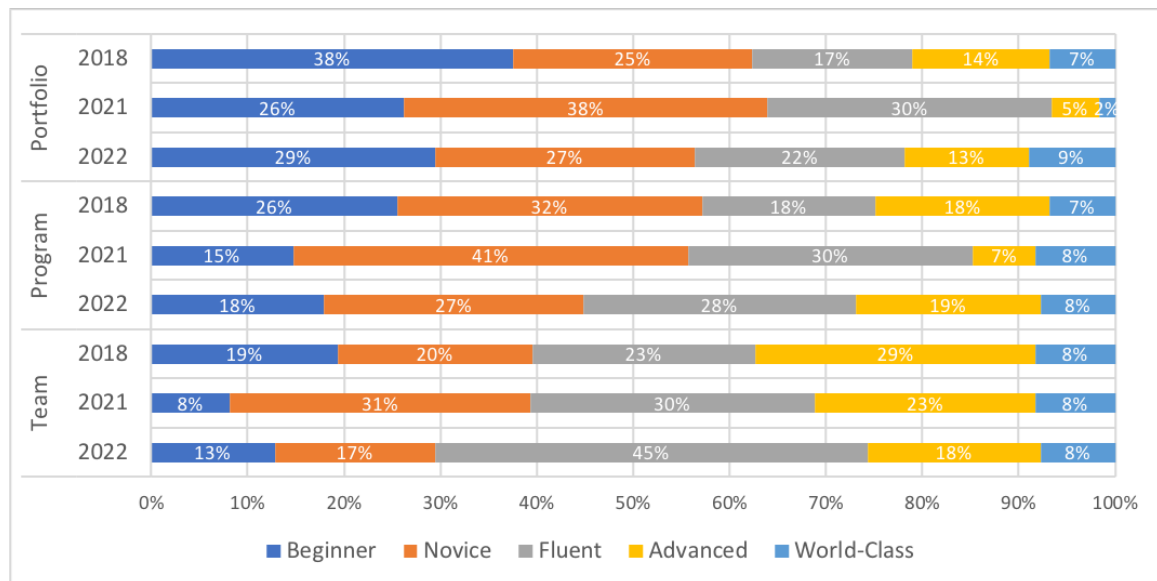


Figure 12: Distribution of Agile transformation maturity stage across studies over the years.

	Lim 2022 (N=92)	Poot 2021[69] (N=61)	Stettina 2018[94] (N=134)
Portfolio	2.35	2.18	2.28
Program	2.64	2.52	2.49
Team	2.78	2.92	2.87

Table 23: Means of Agile transformation maturity - cross study (year is period of data collection)

job functions of the respondents for all three studies (Table 24), the distribution of Agile transformation maturity is quite similar (Figure 12). In all three studies the team level has the highest maturity and this declines at the program and then at the portfolio level.

Overall the results of this study seem in line with the results of previous studies, despite a big difference in the roles of respondents in their organization. Large anomalies in relation to previous studies have not been reported. This speaks in favor of the reliability of our data.

Lim 2022 (N=92)	Poot 2021[69] (N=61)	Stettina 2018[94] (N=134)
Scrum master (16.3%)	Agile coach (18.0%)	Agile coach (26.1%)
Project manager (10.9%)	Managers (11.5%)	Transformation lead (21.6%)
Agile coach (9.8%)	Release train engineer (11.5%)	Team coach (21.6%)
Release train engineer (9.8%)	Product Manager/Owner (11.5)	Transformation sponsor (8.2%)
Business analyst (4.3%)		DevOps coach (5.2%)
Product owner (3.3%)		

Table 24: Distribution of job roles among respondents - cross study (year is period of data collection)

## 7 Conclusion

This conclusion section contains a resume of the main findings of this research and its implications. In Section 7.1, threats to the validity of this research are being discussed.

This research aimed to investigate the effect of Agile transformations on the competitiveness, financial performance and survivability of organizations. As part of the answer to the research objective, a research model explaining the relationship between Agile transformations and the competitiveness, financial performance and survivability of organizations has been developed. This model was tested using data collected by employing a web-based survey, applying constructs adopted from previous studies. 134 responses were collected from managers in organizations that are adopting Agile methods. After corrections for missing data and invalid responses, 92 responses were used for analysis. Spearman's correlation tests, confirmatory and exploratory factor analysis and Partial Least Squares Structural Equation Modeling (PLS-SEM) have been performed on the collected data.

Using confirmatory and exploratory factor analysis, an updated research model has been proposed, which has been tested and updated using the Partial Least Squares Structural Equation Modelling (PLS-SEM) technique. The relationship between Agile mindset and transformation maturity, organizational performance and business performance for the data collected in this research is best shown by the final research model.

The main contributions of this study are threefold. (1) Agile transformations were found to positively influence the competitiveness, financial performance and survivability of organizations. (2) Both the Agile mindset and Agile transformation maturity showed this effect, but the Agile mindset showed to have a stronger effect on performance. (3) The internal performance metrics that contribute most to the competitiveness of organizations are given. A summary of these three main findings is presented below:

1. First, for the data collected in the research, both Agile mindset and Agile transformation maturity showed to have a positive influence on competitiveness, subsequent financial performance and survivability (which showed a mediating relationship). Previous research conducted by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]) showed positive effects of Agile transformations on the internal performance of organizations. The findings in this research contribute to that knowledge by showing the positive effects of Agile transforma-

tions on the business performance of organizations. This implies that Agile transformations not only improve internal performance, such as Productivity and Employee satisfaction but also the competitiveness, financial performance and long-term viability of organizations.

2. The second finding that can be drawn from the updated research model is that an Agile mindset was found to be stronger linked to competitiveness than Agile transformation maturity. This implies that developing a culture of learning, customer co-creation, collaboration and supported self-guidance is more important for business success than aiming to achieve the milestone Agile capabilities or practices that were identified by Laanti in 2017 [50]. This means that when undergoing an Agile transformation, the focus should not only be on implementing Agile practices and tools or changing the organization's structure but primarily on the people and culture within the organization. When introducing Agile practices it should be clear what the rationale and goal behind this adoption is, otherwise achieving support for these changes and finally cultural change becomes difficult.

3. The third finding shows which internal performance metrics contribute most to the level of competitiveness. The five metrics that showed the strongest correlations with competitiveness are "ability to attract employees", "detection of defects", "lead time per feature", "efficiency of development" and "overall customer satisfaction". Making improvements on these metrics is a difficult process, but all these metrics showed in this and previous research to be improved by adopting Agile methods. When aiming to improve an organization's competitiveness, which also showed to contribute to an organization's financial performance and survivability, a focus on making improvements on these metrics will probably have the strongest impact.

In conclusion, besides the addressed limitations due to sampling error and reliability of measurement scales, this thesis made contributions to the understanding of the relationship of Agile transformations with the competitiveness, financial performance and survivability of organizations. It builds upon prior research conducted by Poot et al. (2022 [69]) and Stettina et al. (2021 [94]) that showed the benefits of Agile transformations on the internal performance of organizations and additionally explored the effects of Agile mindset, business performance and boundary conditions to the success of Agile transformations.

Contributions were made by developing and testing a research model that showed the relationship between the Agile mindset, Agile transformation maturity, internal organizational performance and business performance. Adopting agile practices and the development of an Agile mindset within an organization showed to improve several internal organizational performance metrics of organizations, which improve the ability to respond effectively and easily to changing market conditions (competitiveness) and the financial performance and long-term viability of organizations. This contributes to the empirical knowledge of the role of agile culture and Agile methods as valuable internal organizational resources and capabilities that lead to increased competitiveness and superior business performance. For practitioners, the findings provide guidelines on what improvements to focus on during an Agile transformation to enhance an organization's competitiveness and make it thrive in the long run.

## 7.1 Limitations

Although the methods of this study have been selected carefully, several threats to the validity of this study can be identified. These limitations should be taken into consideration when interpreting the findings of this study. The limitations addressed are biases in data

collection, quality of the responses, supporting literature and quality of the measurement scales.

Two of the biases that could be introduced by using web-based surveys as a data collection method for research are selection bias and response bias (Wright, 2019 [103]). Selection bias is the bias that occurs when the selected sample is not representative of the population. Response bias is the bias that occurs when the respondents give answers that do not reflect their true beliefs or the true situation in their organization.

The survey has been distributed via social media and email to the network of a consulting firm. The distribution to clients that have all been supported by the same consultancy firm with their transformation could be a potential risk of selection bias. The results of an Agile transformation could be different for organizations that have been supported by this consulting firm compared to organizations that have been supported by consulting firms that had a different approach to Agile transformations.

A second bias related to sample selection could be survey distribution via social media. An implication of advertising the survey via social media could be self-selection bias since respondents can decide for themselves if they want to participate in the research. It is likely that people that are members of certain LinkedIn groups have a higher interest in the subject, hence they are potentially more positive about the subject. This could potentially also lead to fewer respondents among managers that work in organizations where their Agile transformation did not have the desired outcome, which could lead to a non-response bias.

To address the risk of these biases and reduce the impact of these threads on the results, the survey has been distributed via multiple channels, both via LinkedIn and via the network of a consulting firm. To reduce self-selection bias, the survey was not only shared in advertisements but also targeted individuals were messaged.

Since there is an industry that benefits by selling advice, certificates and training to organizations that want to become more agile, there is a commercial interest in a positive view on Agile transformations, which might result in an increased response bias. Also, the people responsible for an Agile transformation could describe a more positive picture to look better. To decrease the potential of this bias, future studies could consider a method that is not solely based on self-reported items. However, the majority of job roles in the sample (scrum master, project manager, agile coach, release train engineer) except for agile coach do not seem to gain anything from a more positive view of their Agile transformation. Job roles such as transformation lead or consultant are part of a small percentage of the sample. The high differentiation in job roles helps improve the generalization of the results, since the results are less likely to be biased because of a single job role. Also, the relatively high differentiation in countries from which the data has been collected compared to similar research (Poot et al., 2022 [69]) speaks in favor of the generalizability of the results.

Another limitation of the research has been the number of previous studies on the subject. Apart from research on how Agile transformations impact the internal performance of organizations, there has been a lack of previous studies on the effect of Agile transformations on organizational performance. For developing the research model there was little empirical evidence to support the interrelationships. Therefore also theories from literature and several assumptions have been used.

The quality of the results could be impacted by the quality of the measurement scales used in this research. Reliability tests showed good reliability for the scales that measured Agile mindset, competitiveness, financial performance and survivability. During the workshop, some participants commented on the Agile transformation maturity scale adopted from Laanti (2017 [50]). Although it was generally accepted that all milestones presented can be seen as positive outcomes of Agile transformations, there was no general acceptance of the categorization of milestones to the different stages of maturity (Beginner to World-class). Further research could indicate whether the same results can be obtained using a different scale to measure Agile transformation maturity.

## 8 Appendix

### 8.1 Appendix 1: Results of PLS-SEM

	Original sample (O)	Sample mean (M)	(STDEV)	P values
Agile mindset ->Competitiveness	0,480	0,498	0,065	0,000
Agile mindset ->Customer-focused dev.	0,583	0,604	0,087	0,000
Agile mindset ->Employee satisfaction	0,543	0,561	0,099	0,000
Agile mindset ->Portfolio mat.	0,386	0,406	0,115	0,001
Agile mindset ->Program mat.	0,310	0,324	0,110	0,005
Agile mindset ->Team mat.	0,306	0,321	0,115	0,008
Agile mindset ->Financial perf..	0,333	0,351	0,096	0,001
Agile mindset ->Reputation	0,533	0,554	0,093	0,000
Agile mindset ->Survivability	0,309	0,330	0,102	0,002
Agile mindset ->Workflow reliability	0,449	0,474	0,097	0,000
Competitiveness ->Financial perf..	0,533	0,533	0,112	0,000
Competitiveness ->Survivability	0,204	0,208	0,073	0,005
Customer-focused dev. ->Competitiveness	0,315	0,300	0,144	0,029
Customer-focused dev. ->Financial perf..	0,168	0,159	0,083	0,044
Customer-focused dev. ->Survivability	0,064	0,062	0,037	0,087
Employee satisfaction ->Competitiveness	-0,207	-0,207	0,128	0,104
Employee satisfaction ->Financial perf..	-0,110	-0,111	0,073	0,132
Employee satisfaction ->Survivability	-0,042	-0,041	0,030	0,153
Portfolio mat. ->Competitiveness	0,311	0,310	0,104	0,003
Portfolio mat. ->Customer-focused dev.	0,153	0,143	0,121	0,206
Portfolio mat. ->Employee satisfaction	0,112	0,098	0,174	0,520
Portfolio mat. ->Financial perf..	0,140	0,136	0,150	0,348
Portfolio mat. ->Reputation	0,211	0,196	0,123	0,088
Portfolio mat. ->Survivability	0,026	0,028	0,153	0,863
Portfolio mat. ->Workflow reliability	0,065	0,045	0,134	0,629
Program mat. ->Competitiveness	0,117	0,108	0,064	0,064
Program mat. ->Customer-focused dev.	0,177	0,173	0,108	0,101
Program mat. ->Employee satisfaction	0,252	0,247	0,150	0,093
Program mat. ->Financial perf..	-0,020	-0,025	0,146	0,889
Program mat. ->Reputation	0,194	0,188	0,114	0,087
Program mat. ->Survivability	0,004	-0,014	0,156	0,978
Program mat. ->Workflow reliability	0,342	0,340	0,113	0,002
Team mat. ->Competitiveness	0,073	0,072	0,050	0,142
Team mat. ->Customer-focused dev.	0,211	0,203	0,091	0,020
Team mat. ->Employee satisfaction	0,068	0,070	0,109	0,532
Team mat. ->Financial perf..	0,295	0,297	0,121	0,015
Team mat. ->Reputation	0,041	0,040	0,122	0,738
Team mat. ->Survivability	0,386	0,386	0,124	0,002
Team mat. ->Workflow reliability	0,060	0,061	0,127	0,636

Table continued on next page

	Original sample (O)	Sample mean (M)	(STDEV)	P values
Financial perf.. ->Survivability	0,382	0,389	0,108	0,000
Reputation ->Competitiveness	0,134	0,162	0,186	0,472
Reputation ->Financial perf..	0,071	0,090	0,107	0,505
Reputation ->Survivability	0,027	0,036	0,045	0,549
Workflow reliability ->Competitiveness	0,256	0,250	0,120	0,033
Workflow reliability ->Financial perf..	0,137	0,133	0,070	0,050
Workflow reliability ->Survivability	0,052	0,051	0,030	0,086

Table 25: The results from the PLS-SEM for all the indirect relationships.

### 8.1.1 Graphical results of PLS-SEM

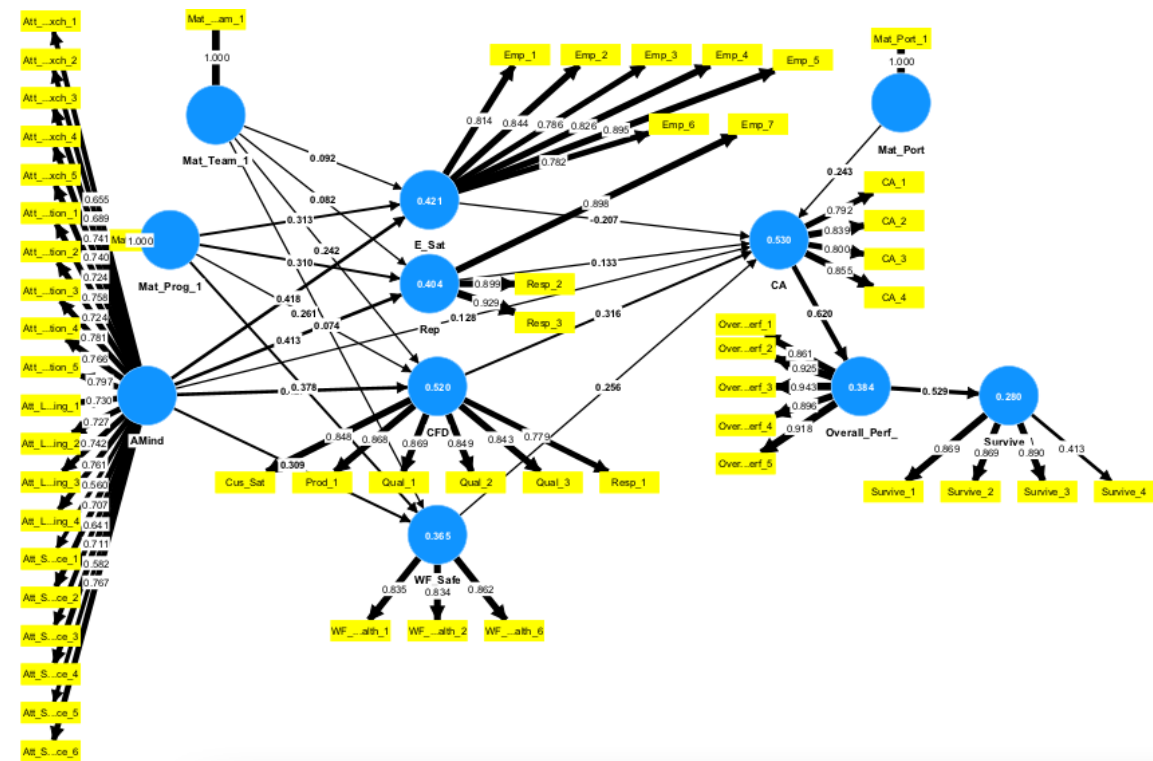


Figure 13: The results from PLS analysis. The arrows display the effect size, the number in the variable the  $R^2$  adjusted and the yellow variables are the latent variables.



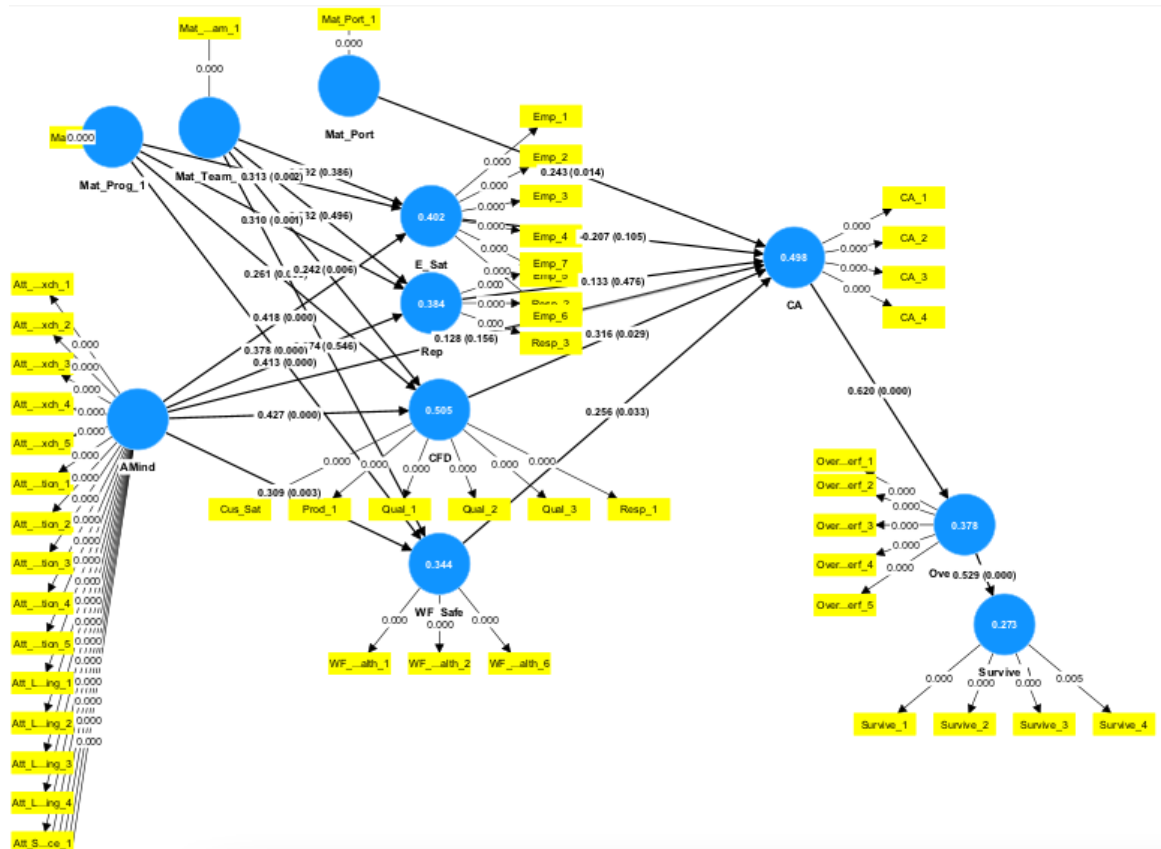


Figure 14: The results from the bootstrapping in PLS analysis. In brackets the measured significance for the effects

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## 10 Survey questions



Universiteit  
Leiden  
The Netherlands

## Welcome letter

### Survey | The Impact of Agile Transformations on the Success of Organizations

What is the **impact** of an **agile transformation** on the success and survivability of your organization?



Universiteit  
Leiden  
The Netherlands

Dear participant,

I have a question for you: has your organization become more competitive and successful after an agile transformation? Many organizations undergo an

agile transformation, but is it really worth it? To quantify and measure this, and to approach a conclusion on the added value of agile transformations, I am conducting an in-depth research that can only be complete with your valuable input.

But first, let's make clear what is in it for you:

Within 2 **months** you will receive a **report** with the results of our research, you can use this to:

- Get insights in the agile maturity of your organization.
- Benchmark yourself against other organizations.
- Identify the benefits of the agile transformation at your organization.

We know that agile transformations help organizations perform better on, for instance, employee satisfaction, quality and lead-time. But how does an agile transformation influence the success of organizations? Your participation in this survey will help the field of agile research getting a better understanding of the true value and benefits of working agile. And, added bonus, you will help me graduate on a topic we are both passionate about!

This survey is anonymous and the answers you will give cannot be traced back to you. We will handle your data with the highest level of confidentiality. We would like to encourage you to answer all questions, there are no right or wrong answers.

Thank you very much in advance, I look forward to sharing my results with you.

Kind regards,

Maarten Lim

Graduate student MSc ICT in Business at Leiden University

Dr. Christoph Johann Stettina

Leiden University

This survey will take around 12 minutes to answer.

If you have any questions during or after filling in this survey,  
please feel free to contact me:

E-mail: [m.t.e.lim@umail.leidenuniv.nl](mailto:m.t.e.lim@umail.leidenuniv.nl)

LinkedIn: [www.linkedin.com/in/maarten-lim-b111161bb/](https://www.linkedin.com/in/maarten-lim-b111161bb/)

## **Personal & Company Information**

### **Personal & organization's information**

What is your role/job title in your organization?

Which of the following industry classifications best represents the principal business activity of your organization?

☐ Aerospace

- ☐ Apparel
- ☐ Business services
- ☐ Chemicals
- ☐ Energy
- ☐ Engineering & Construction
- ☐ Financials
- ☐ Food, Beverages & Tobacco
- ☐ Health Care
- ☐ Hotels, Restaurants & Leisure
- ☐ Household Products
- ☐ Industrials
- ☐ Materials
- ☐ Media
- ☐ Motor Vehicles & Parts
- ☐ Retailing
- ☐ Technology
- ☐ Telecommunications
- ☐ Transportations
- ☐ Wholesalers
- ☐ Public sector
- ☐ Other: \_\_\_\_\_

Please specify:

--

How many employees work at your organization?

- ☐ 1 - 9 Employees
- ☐ 10 - 19 Employees
- ☐ 20 - 99 Employees
- ☐ 100 - 499 Employees
- ☐ 500 - 1,999 Employees
- ☐ 2,000 - 4,999 Employees
- ☐ 5,000 - 9,999 Employees
- ☐ 10,000+ Employees

[Optional] What is the name of the organization where you are employed?

Is IT/software development the main focus of your business unit or department?

☐ Yes

☐ No

## Organizational Agility

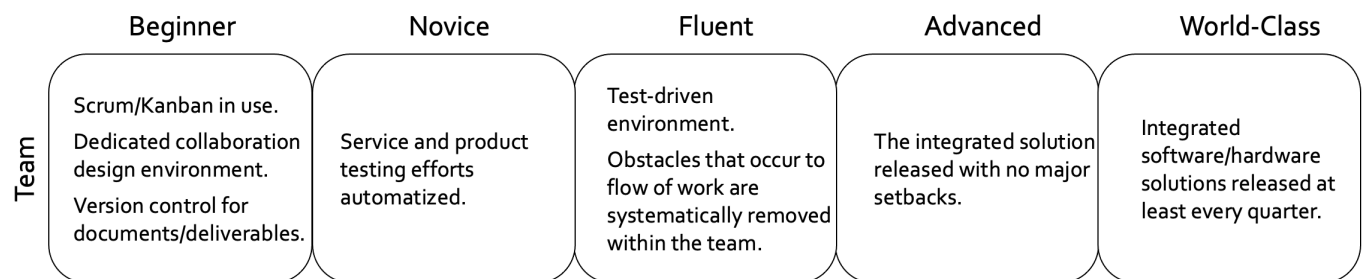
At what stage is your organization's agile maturity on the **Team level**?





Here you find the **"Team level"** of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.

The model builds up from left to right: meaning that if you consider yourself at a particular stage, all the items from the previous stages are included. For example: When your organization is "Fluent" on the "Program level", it needs to have implemented all the practices in all the former levels ("Beginner" & "Novice").



Here you find the **"Team level"** of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.

The model builds up from left to right: meaning that if you consider yourself at a particular stage, all the items from the previous stages are included. For example: When your organization is "Fluent" on the "Program level", it needs to have implemented all the practices in all the former levels ("Beginner" & "Novice").

	Beginner	Novice	Fluent	Advanced	World-Class
Team	Fast fixes as needed. Scrum in use. Dedicated build environment. Version control.	Automated testing, integration and deployment efforts.	Test-first approach. Systematically removing impediments	No errors released, production code practically error-free.	Production releases multiple times per day.

At what stage is your organization's agile maturity on the **Program level**?

	Beginner	Novice	Fluent	Advanced	World-Class
Program level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Here you find the '**Program level**' of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.

	Beginner	Novice	Fluent	Advanced	World-Class
Program	Agile projects / programs. Incremental planning and execution. Agility to embrace change.	Team of teams in use. Agile roles in use and defined and carry responsibility. Increment demos guide future development. Organized for lean-agile way-of-working. Value stream thinking.	Agile budgeting and cost follow-up. Networked leadership. Systematically speeding up production releases. Agile metrics. Acceptance test planned first before features.	Continuous positive feedback from customers from last deliveries.	Ability to respond rapidly to changing customer needs. Networked, empowered, self-controlled, adaptive organization. Ability to create systems and services previously impossible.

Here you find the '**Program level**' of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.

	Beginner	Novice	Fluent	Advanced	World-Class
Program	Agile projects / programs. Incremental planning and execution. Agility to embrace change.	Team of teams in use. Agile roles in use and defined and carry responsibility. Increment demos guide future development. Organized for lean-agile way-of-working. Value stream thinking.	Agile budgeting and cost follow-up. Networked leadership. Systematically speeding up production releases. Agile metrics. Acceptance test planned first before features.	Continuous positive feedback from customers from last deliveries.	Ability to respond rapidly to changing customer needs. Networked, empowered, self-controlled, adaptive organization. Ability to create systems and services previously impossible.

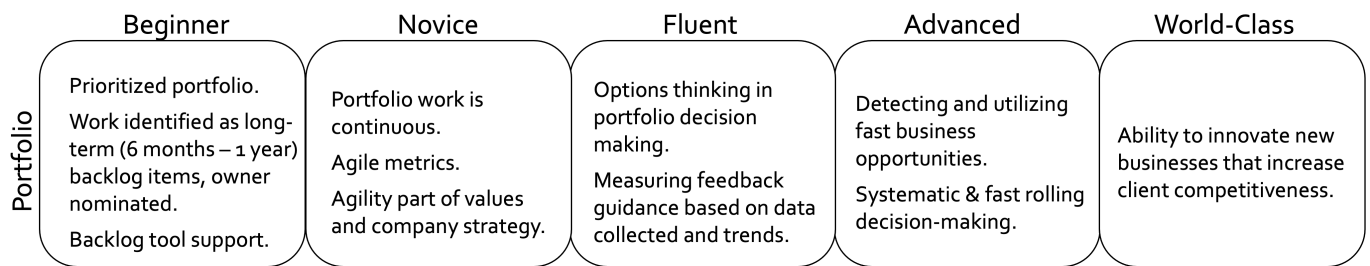
At what stage is your organization's agile maturity on the **Portfolio level**?

	Beginner	Novice	Fluent	Advanced	World-Class
Portfolio level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Here you find the '**Portfolio level**' of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.

	Beginner	Novice	Fluent	Advanced	World-Class
Portfolio	Prioritized portfolio. Work identified as long-term (6 months – 1 year) backlog items, owner nominated. Backlog tool support.	Portfolio work is continuous. Agile metrics. Agility part of values and company strategy.	Options thinking in portfolio decision making. Measuring feedback guidance based on data collected and trends.	Detecting and utilizing fast business opportunities. Systematic & fast rolling decision-making.	Ability to innovate new businesses that increase client competitiveness.

Here you find the '**Portfolio level**' of an agile maturity framework. This table displays what organizational capabilities fit with what level of agile maturity.



## Agile Mindset

About the current mindset in your business unit/department: please select to what extent you disagree/agree with the following statements.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree
We can decide for ourselves how we achieve a work goal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are generally good at organizing ourselves.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are encouraged to learn new skills that help to handle changes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mistakes are used as a chance to adjust our approach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have the courage to take on new tasks for which we do not yet know all the requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We can adjust to changes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

About the current mindset in your business unit/department: please select to what extent you disagree/agree with the following statements. [Continue 2/4]

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree
Through direct conversation, we try to find out what the customer needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We talk to our customer regularly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We try to find out what is most important for the customer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During our work, we frequently think about how my job helps customers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We try to reach our goals by satisfying customers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

About the current mindset in your business unit/department: please select to what extent you disagree/agree with the following statements. [Continue 3/4]

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We come up with new ideas to better complete our tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We like to exchange views with others about the challenges of reaching our goal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to us to always learn something new.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We enjoy exploring new situations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

About the current mindset in your business unit/department: please select to what extent you disagree/agree with the following statements. [Continue 4/4]



	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We solve difficult challenges best when working together with others in teams.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our work is transparent for others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Different perspectives within our team are appreciated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We like to support each other in our team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We regularly peer review our approaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

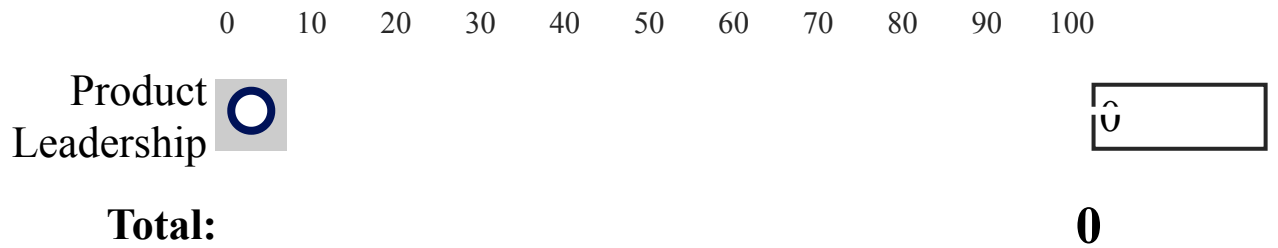
## Contextual Factors

In the following question we would like to ask about the strategic orientation of your business unit/department. There are three options:

- **Operational Excellence** (emphasizes on efficiency and reliability, low cost, and end-to-end supply chain optimization)
- **Customer Intimacy** (emphasizes on flexibility and responsiveness, customer service and market management)
- **Product Leadership** (emphasizes on creativity, product development, time to market and market communications)

What is the current strategic business orientation of your business unit/department? **Please divide 100 points among the three orientations below.** Allocate the greatest number of points to whatever orientation best describes your business unit/department. Please make sure the total number of points add up to 100.

	0	10	20	30	40	50	60	70	80	90	100	
Operational Excellence												<input type="text" value="0"/>
Customer Intimacy												<input type="text" value="0"/>



## Internal Performance Metrics

On a scale from 1-10 (1 being poor and 10 being excellent), how would you rate your -business unit/department- on the following items?

[illegible]

On a scale from 1-10 (1 being poor and 10 being excellent), how would you rate your -business unit/department- on the following items? [Continue 2/4]

[illegible]



On a scale from 1-10 (1 being poor and 10 being excellent), how would you rate your -business unit/department- on the following items? [Continue 3/4]

On a scale from 1-10 (1 being poor and 10 being excellent), how would you rate your -business unit/department- on the following items? [Continue 4/4]

[illegible]

	Poor				Average				Excellent	
	1	2	3	4	5	6	7	8	9	10
The handling of unexpected work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Predictability of delivery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost of product development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Competitive Advantage

Please select to what extent you disagree/agree with the following statements:

Over the past three years, your competitive strategy has allowed your business unit/department to:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Exploit all market opportunities that have been presented to your industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
And exploit these seized opportunities to their full potential.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neutralize all competitive threats from rival firms in your industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
And limit these threats to an acceptable minimum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Survivability

Think about the biggest crisis your business unit/department currently faces for answering the next questions.

Please select the extent to which you agree or disagree with each statement.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We will survive our current crisis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We possess the ability to withstand the challenges of our current crisis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are in a good position to address the challenges currently being experienced as a result of the crisis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sales volumes have decreased in the last months as a result of this crisis but sales will rebound back to pre-crisis level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall Performance

To what extent do the following statements reflect the current situation in your strategic business unit/department?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We are more profitable than our competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our sales growth exceeds that of our competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our revenue growth exceeds that of our competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our market share growth exceeds that of our competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, our performance is better than our competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Supportive questions

## Supportive Questions

How would you rate the ability within your organization to make the work more modular? (1 being poor and 10 being excellent)

①    ②    ③    ④    ⑤    ⑥    ⑦    ⑧    ⑨    ⑩

How would you rate the commitment of higher management to your organization's agile transformation? (1 being poor and 10 being excellent)

①    ②    ③    ④    ⑤    ⑥    ⑦    ⑧    ⑨    ⑩

How would you rate the compatibility of your organization's culture to the agile mindset? (1 being poor and 10 being excellent)

①    ②    ③    ④    ⑤    ⑥    ⑦    ⑧    ⑨    ⑩

## Comment section

Thank you for participating in our research. If you would like to receive a report of the results of this study, please leave your e-mail address.

If you have any comments, remarks or other things of interest, please leave them below: