School in Times of Corona: Environmental Turbulence, its Impact on Performance and Moderating Role of Personnel Stability

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Master Thesis

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05-08-2022

Wordcount: 12031

Supervisor: Rick Anderson

Second Reader:

Leiden University Public Administration: Public Management & Leadership

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1. Introduction

In March 2020, the World Health Organization proclaimed a state of emergency due to the rapid spread of the novel COVID-19 virus, and officially declared the outbreak of the pandemic (Cucinotta & Vanelli, 2020, p. 157). Governments worldwide followed suit, declared states of national emergency in most countries across the globe where there has been a serious uptick in COVID-19 cases, and began implementing various measures in order to curb the spread, primarily aimed at limiting social contact. Lockdowns of differing levels of strictness were imposed across the globe, while social activities were canceled and international traffic slowed down to unprecedented levels (Shrivastava & Shrivastava, 2020). The world has not seen a pandemic of this scale since the outbreak of the Spanish Flu in the beginning of the 20th century, as the impact of the spread of the pandemic was global in scale and resulted in series of interconnected crises, including economical and political ones (Sharif et al., 2020).

With the softening of the anti-epidemic measures worldwide, it would be of great academic and practical interest to assess the impact of the virus on public organizations, as the anti-epidemic measures limited public organizations in the provision of their services and forced them to adapt to new realities (Liu et al., 2021). A knowledge gap arises, however, as the literature on this topic primarily focuses on the strategies of public organizations to adapt to new realities (Fedele et al., 2021, p. 943); very little attention in the literature so far has been paid to organizational stabilizing features. This research aims at assessing the explanatory power of the existing theories on stabilizing features and their relationship with organizational performance. For this purpose, it seeks to assess to what extent the existing stabilizing features were able to moderate the impact of the corona crisis on public organizational performance in the educational sector, using existing data on school performance and stabilizing features. The findings of this research may provide a beneficial insight for public managers, specifically for the purpose of harnessing their organizations against the negative impacts of pandemics.

Next to the provision of healthcare, provision of education has been a dominant topic in the literature in the light of the COVID-19 crisis, as educational facilities across the world faced a tremendous crisis with regard to the provision of education for their pupils. In some countries, schools even had to close entirely, as there was no technological infrastructure to continue educational processes in the home environment, or such infrastructure was underdeveloped (Coutts et al., 2020, p. 483).

Where online education was possible, the implementation and the process were met with various difficulties, as will be illustrated in the background section. This research, therefore, focuses on the educational setting, and looks at the role of stabilizing features in moderating the impact of the pandemic on the provision of education.

The topic of environmental dynamism, or environmental turbulence, has been extensively evaluated in literature on public administration, specifically on its impact on organizational performance. Measuring the impact of environmental turbulence can be clouded by various biases, but ceteris paribus, it can be assumed that in most cases, environmental turbulence will have a negative effect on organizational performance.

Hence, the literature paid specific attention to the ways organizations can shield themselves from the effects of environmental turbulence, with many pointing towards stabilizing features of the organization. According to O'Toole & Meier (2003b), stability of the organizations in the public sector is a quintessential trademark asset of bureaucracy, as bureaucracy is expected to deliver stable results over time. In another study, Boyne & Meier (2009) compare organizations that hold onto their stabilizing features, and organizations which seek to alter their operating procedures to barrier the organization against the effects of environmental turbulence. The authors rule out the latter strategy for the survivability of public organizations, as organizations under duress from the turbulence will have a hard time restructuring, and propose that the ability to stay stable, not change rapidly, will have more beneficial effects for public organizations and their performance levels (Boyne & Meier, 2009, p. 806).

It can therefore be assumed that organizations with strong and durable stabilizing features will be better apt at withstanding the effects of the environmental turbulence. Examples of such stabilizing features include but are not limited to personnel retention, hierarchy, reliance on Standard Operating Procedures (SOP's), and technological integration level. Investments within such features by organizations would enhance the ability of the organizations to withstand periods of duress while delivering stable, or only mildly deviating performance results (Boyne & Meier, 2009).

This research seeks to investigate the impact of environmental turbulence on the educational system of the Netherlands. In the last two years, the Dutch educational system came under duress from the effects caused by the COVID-19 pandemic. The government of the Netherlands announced a variety of measures aimed at combating the spread of the virus in March 2020, with one of such measures being the dismissal of in-person classes in educational organizations across the country, ranging from grade schools to universities (Bruins & Slob,

2020). In most cases, this resulted in the transfer of education from classrooms and lecture halls to home environments. Both teachers and pupils were working primarily from home using information technology, specifically online video calls and other means of online education (Geijsel et al., 2020).

Hence, when taking into consideration the nature of change within the context of the COVID-19 pandemic in the educational dimension, it can be assumed that educational facilities in the Netherlands had to deal with many sources of environmental turbulence in the form of COVID-19 containment policies. It is therefore crucial to establish whether the pandemic influenced the organizational performance, and to what extent stabilizing features were able to shield the organizational performance from the effects of the introduced measures.

For the purpose of this research, the following research question is proposed:

"How do stabilizing features moderate the relationship between the effects of the COVID-19 pandemic and public schools' performance?"

This research is structured as follows: first, the reader will be presented with a brief literature review on the trends in public education in light of the pandemic. Theoretical assumptions about the relationship between the variables of environmental turbulence, organizational performance and the moderating effect of stabilizing features will be outlined in the theoretical framework chapter. This research opts out for the deductive form of hypotheses formulation, as these will be derived from existing theory, in an attempt to test the theory against existing data. The derived propositions will be tested quantitatively, using statistical tests on comparison of the means and correlation. Moreover, conceptualization of the variables within the scope of this research will be provided. This allows for formulation of hypotheses, which will be tested through quantitative research on the data obtained from the website of DUO, which is the executive agency of the Dutch Ministry of Education. The research strategy and methods will be outlined in the methodology chapter, as well as operationalization of the variables and methods of data collection. Finally, the results of this research will be presented and discussed in the closing chapters.

2. Background

For the purpose of this research, a small literature review has been conducted on the topic of the impact of COVID-19, as well as anti-epidemic measures, on the provision of public education across the European Union. The findings of this brief literature review are summarized below, and will be incorporated in the development of some of the main notions of this research. The studies mentioned below have been authorized by the governments of European Union countries, primarily by their departments and ministries of education. An important note here is that this research concerns itself with provision of education as a public good: therefore, private educational settings are excluded.

One of the studies on the impact of the epidemic has been conducted in the Netherlands by Femke Geijsel, Tessa Jenniskens, and Annemarie van Langen, in 2020. The authors conducted and facilitated a questionnaire among pupils in secondary education in the Netherlands, with approximately 22 thousand respondents from 70 schools with various variants and divisions within the Dutch secondary education (Geijsel et al., 2020). The main aims of that research were to establish the current trends regarding online education in the Netherlands, as well as pupils' opinions, reflections, and suggestions on this topic. For instance, pupils were asked to reflect on their online classes, how well they could concentrate, and how well the teachers were able to explain the learning material (Geijsel et al., 2020).

The authors concluded that two main factors facilitated pupils' learning motivation during online classes: good work environment at home and sufficient support from teachers. The latter factor is especially relevant to pupils in 'bovenbouw': the final 2-3 years of secondary education, at the end of which pupils are required to pass standardized country-wide examinations (Rijksoverheid, N.d.-a). Pupils, especially in HAVO (Hoger Algemeen Voortgezet Onderwijs; Senior General Secondary Education) and VWO (Voorbereidend Wetenschappelijk Onderwijs; Pre University Education) (Rijksoverheid, N.d.-b), showed a lack of motivation for studying, which was explained by the authors as an effect of lower experienced support from the teachers, educational and moral (Geijsel et al., 2020). The authors suggested the following: the schools assumed that this group of pupils was able to work more independently in comparison with pupils from 'onderbouw', which are the early school years (Rijksoverheid, N.d.-a). The pupils from 'bovenbouw' indicated in the questionnaire that they indeed were able to study without cooperating with their fellow pupils, but that they also required more help and feedback from the teachers. This can be explained by the fact that pupils

in ‘bovenbouw’ are primarily preoccupied with preparation for their final exams, which they need to pass either in year 5 for HAVO, or year 6 for VWO (Rekers-Mombarg et al., 2010).

To sum up, the main findings of Geijsel et al. (2020) are the following: for continued motivation and interest in their education during online classes, especially in the final school years, students require an appropriate work environment and support from their teachers. Results from other European Union countries sketch a similar picture. For instance, Rodríguez et al. (2022) present the exemplary story of a principal in the Spanish city Granada, who was confronted with the suddenly introduced anti-epidemic measures, due to which all classes at her school were dismissed. As in many cases across Europe, the principal was confronted with many issues while having to continue the provision of education. For instance, plenty of students, especially from lower-income backgrounds, were not able to join online classes, primarily due to the absence of necessary technology, such as computers or access to the internet (p. 50-51).

Another common issue was personnel retention: a lot of younger teachers, especially those who worked part-time, were either not able to deal with the increased workload or quit in favor of alternative career opportunities (p. 55). On the other hand, more senior and experienced teachers were able to continue to provide educational services (p. 50). The authors note that while the principal expected younger teacher personnel to get acquainted faster with the technology necessary for the provision of education, many senior teachers took extra time to get acquainted and continued working where many of their younger colleagues gave up (p. 55). As the previous example, the example of the Spanish principal from Granada illustrates the quintessential necessity of personnel input in the educational processes during the pandemic.

Combined, these observations provide a guiding line for this research: the moderating role of personnel stability on the effects of the pandemic and anti-epidemic measures on organizational performance. In their work, Geijsel et al. (2020) denote two necessary conditions for the pupils to pass their exams during COVID-19: support from educators and appropriate working environment. While the latter cannot be tested within the scope of this research, the former condition, albeit insufficient on its own, can be assessed through the measurement of personnel tenure and employment stability, according to Rodríguez et al (2020).

3. Theoretical Framework

The aim of this section is to present the reader with the theoretical notions and relevant findings regarding the concepts used in the research question and subsequent hypothesis building: environmental turbulence, organizational performance and stabilizing features, in order to give the reader an insight of what is meant with these particular terms.

3.1 Environmental Turbulence

Environmental Turbulence, also mentioned in literature as "environmental shocks" by some authors, refer to the outside shocks with the potential to disrupt organizational activities or even affect the organization to such extent that it threatens organizational survivability. Organizational environment is conceptualized as follows: "all elements that exist outside the boundary of the organization and have the potential to affect all or part of the organization" (Daft, 2010, p. 220). Open Systems Theory, or OST proponents Katz & Kahn (1978) suggest that for a better understanding of organizational workings, organizations can best be seen as embedded in their organizational environment. According to the author's model, organizations can be seen as 'boxes', with 'inputs' (resources and information drawn from the environment), 'throughputs' (processes and procedures within an organization that transform resources and information) and 'outputs' (products and services delivered by an organization). The environment, therefore, has the capacity to affect one or all of these elements (Kahn et al., 1978).

Another essential framework to be considered is the "task environment" (Scott, 2003). Unlike the "institutional environment", which concerns itself with policies and regulations, the "task environment" refers to three important variables: munificence, complexity and dynamism. Munificence and Complexity may both be considered as parts of the 'input' element in the OST, as both of these relate to the resources and information that can be obtained from the environment. According to Dess & Beard (1984), munificence refers to the availability of resources within the organizational environment, as well as the ease of tapping into said resources. Complexity, in its turn, refers to the heterogeneity of the information stemming from the environment: a more heterogeneous environment is said to be more complex for monitoring and interpretation (Dess & Beard, 1984). Lastly, dynamism refers to the variation within both munificence and complexity. As public organizations are usually durable and stable organizations, they are assumed to have features that help them interpret their environment and react appropriately to changes, or dynamism in the environment (Boyne & Meier, 2009, p.

813). However, in some cases, this dynamism may have a profoundly negative impact on the organizational workings. In this case, such dynamisms in the organizational environment are referred to as shocks, or environmental turbulence (Boyne & Meier, 2009, p. 806). Another conceptualization of environmental shocks would be the notion of 'crises': unlike dynamism, which may have consequences for the long-term stability of the organization, crises are usually short-term events that can directly affect the work of an organization drastically (Van den Bekerom et al., 2018). Pearson & Clair provide the following definition of a crisis: "..a low-probability, high-impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly" (Pearson & Clair, 1998, p. 60)

Environmental turbulence is characterized not in particular by the direction of change, but rather by the amount and speed of change (van den Bekerom et al., 2015). Additionally, turbulence can also stem from the interior workings of the organization, when, for instance, the introduction of some new procedures or sudden change in the hierarchy results in detrimental effects on the organization (Boyne & Meier, 2009). However, environmental turbulence specifically refers to turbulence stemming from the outside of the organization, or its external environment. Moreover, turbulence can be conceptualized into the following two groups: the "unknown knowns" and the "unknown unknowns" (Melton, 2017). Unknown knowns are changes that are in a way anticipated, apart from a precise moment when such changes may appear, while unknown unknowns refers to changes that are completely unexpected, leaving the organization surprised (Ansell & Boin, 2019).

When it comes to the effects of environmental turbulence, a lot will depend on the nature and the scope of the event that is described using this concept. Natural disasters, for example, illustrate a form of "environmental turbulence", whereby, for instance, a hurricane has the capacity to significantly affect and even endanger organizational activities and structures. For instance, Hurricane Katrina's impact on pupils in the USA state of Texas in 2005 affected organizational activities by forcing most schools to close down (Ryu & Johansen, 2017). Because of that pupils missed school days, which affected organizational performance, as school curricula had to be readjusted (van den Bekerom et al., 2015).

Moreover, the disastrous impact of the hurricane affected some core assets of public organizations, such as school buildings. In order to restore such assets, public managers had to cut budgets of some core activities, thereby further affecting organizational performance (Ryu & Johansen, 2017, p. 208). To sum up, the impact of environmental turbulence can be multifaceted and has the capacity to affect organizational activities on many levels.

3.2 Organizational Performance

Speaking in broad terms, organizational performance can be conceptualized as the degree to which an organization is capable of achieving its goals. Scholars have conceptualized numerous explicit dimensions of performance, by which organizational performance may be measured or judged (Andrews et al., 2006).

"New Public Management", or "NPM", is an approach to running organizations in the public sector that has been introduced in the late 1970s, initially in predominantly English-speaking countries, such as the UK, USA, and Australia, but later also in most European countries (Patrick & French, 2011). This approach is in particular characterized by the application of principles from the private sector towards the workings of public organizations. According to the proponents of "NPM", such an approach has the capacity to make public organizations work more in a "businesslike" manner, through the introduction of incentives for competition, efficiency, and output increase (Diefenbach, 2009, p. 893). Critics of "NPM", in the meanwhile, accuse the approach of excessive standardization in the pursuit of maximum efficiency, thereby 'perverting' the social importance of organizational outputs and outcomes (Diefenbach, 2009, p. 905).

Some of the most important additions of NPM to public administration are the practices related to performance management, whereby such practices from the private sector were transferred and applied to the workings of organizations in the public sector. Anderson & Klaassen (2012, p. 484) define performance management as follows: "..a type of management in which information in relation to performance is used for decision-making". Essentially, this entails that information on the organizational output is used for the implementation of managerial practices. The authors further equate output management to performance management (p. 485) and underpin the importance of control for output in organizational decision-making.

The reasoning behind the application of 'private' performance management in the context of public organizations is summarized by Diefenbach (2009, p. 899) in the following way: "To systematically, regularly and comprehensively capture, measure, monitor and assess crucial aspects of organizational and individual performance will lead to positive consequences such as increased efficiency, productivity, and quality, higher performance and motivation". Despite such positive characterizations, the application of performance management in the context of public administration has met criticism in the literature, specifically due to the narrowness of the parameters related to the measurement of performance (Diefenbach, 2009,

p. 900). A constant point of criticism is that performance measurement systems (a core part of performance management) are primarily concerned with what is measurable, governable, and in line with the strategic direction. Another point of criticism is that while the measurement systems are supposed to improve organizational efficiency, they often tend to affect the organizational work through the introduction of extra paperwork for employees in the public sector (p. 898).

In another example, Patrick & French (2011) present the No Child Left Behind (NCLB) act as an illustration of New Public Management's focus on performance management, as well as its influence on actual performance (p. 341). The aim of NCLB was to decrease the achievement gap between students in the US, especially between poor & minority groups of students and their fewer disadvantaged peers. Next to the introduction of standardized testing and performance reviews across the country, the act is primarily known for linking educational outcomes with school financing (Wong, 2008). The authors assess that performance management, one of the core elements of NPM, is built around the premise that the introduction of performance accountability is the fastest way towards improving performance (Patrick & French, 2011). Moreover, "the development and use of performance measures" (p. 361) are considered to be the main tool of performance management. The authors note, however, that the implementation of the NCLB act has left a limited impact (p. 362): they explain that in the states where high-performance index scores in the context of NCLB were registered, there was no significant improvement in terms of average reading and math skills among 8th graders. To sum up, while according to the newly introduced performance measures there was a significant improvement in grades, this did not translate into improvements for more specific variables, relevant to the outcomes of education. Moreover, the authors suggest that a lot of states introduced lenient measurement systems for the evaluation of educational progress, which may explain improvements in grades but lack of improvements in the outcomes (Patrick & French, 2011, p. 345)

In order to revise performance measurement systems introduced in the context of New Public Management, scholars have attempted to develop alternative measurement systems, whereby the focus would fall not only on the organizational output but also on the outcomes of said output. Crucially, scholars acknowledge that public and private organizations differ primarily in their purpose and incentives: while private organizations are incentivized by their profit margins, a measurable and quantifiable goal in itself, public organizations are primarily concerned with the contributions towards the "common good", which is measurable to a lesser extent than 'profit margins' (Hvidman & Andersen, 2014, p. 55). With this in mind, scholars

attempted to include necessary variables in their models for public performance measurement, such as democratic outcomes.

The Triple-E (or 3E) and the IOO models serve as a source of inspiration for commonly used indicators for performance measurement (Andrews et al., 2006, p. 15). Both models serve as sequences of particular steps, which describe the process of the production of a service (Boyne, 2002, p. 17) The 3E model stands for Economy - Efficiency - Effectiveness (Economy leads to Efficiency, which leads to Effectiveness). In this model, Economy refers to "the cost of procuring specific service inputs of given quality" (Boyne, 2002, p. 17), Efficiency can be interpreted as cost per unit of outcome (for instance, budget per graduated pupil, etc.), and lastly, Effectiveness refers to the ability of the organizational outcomes to achieve desired organizational goals (Boyne, 2002, p. 18). As per Boyne (2002), the IOO model manages to incorporate evaluation criteria similar to those present in the 3E model and makes some aspects that are implicitly present in the 3E model much more explicit. IOO stands for Input - Output - Outcome (Input leads to Output, which leads to Outcome): according to Walker et al (2010), Input is similar to Economy in the 3E model, as it describes expenditure. Output refers to the quality and the quantity of the service, while Outcome is similar to Effectiveness in the 3E model, with the additions of fairness and impact equity (Andrews et al., 2006, p. 20).

3.3 Organizational stability and stabilizing features

Stability is said to be one of the quintessential trademarks of any bureaucratic system across the globe (O'Toole & Meier, 2003b). In their 2011 book, Meier & O'Toole provide the following definition of stability: "constancy in the design, functioning and direction of an administrative system over time" (p. 135). In an earlier article, the authors outline five dimensions of stability in public organizations: structural stability, mission stability, production/technology stability, procedural stability, and personnel stability (O'Toole & Meier, 2003b, p. 45-46). The authors further note that dimensions may be interconnected, and yet distinguishable from one another, as multiple dimensions denote different directions of stability.

Boyne and Meier (2009) conceptualize two directions of stability for their research on the moderating effect of stability on the organizational performance: vertical stability, which denotes the consistency of hierarchy, and horizontal stability, which denotes the consistency of personnel remaining in their field of work without changing departments (p. 810). The dimensions of stability mentioned earlier can be conceptualized as the so-called "stabilizing

features'". One of the main aims of the presence of such features within an organization is said to provide it with sufficient buffering against negative external developments. Thompson (1967) refers to buffering against external shocks as "slack", while O'Toole & Meier (2011, p. 186) provide the following definition for it: "resources that can, if needed, be mobilized as inputs for the technical core during turbulent times". Further on, the authors define buffering in the following manner: "we refer to any of these influences that reduce the impacts of environmental forces of organizational or performance results as buffers, and we refer to the dynamic of reducing such influences as buffering" (p. 219). In essence, organizations can rely on their stabilizing features as a buffer against environmental shocks.

In their work, Andrews et al. (2013) provide an illustration of this particular model, by assessing the effects of migration out of Eastern Europe after European Union enlargements in 2004. The authors present their results, which suggest that while a net increase in migration had a negative impact on the performance of English local governments, said governments with high administrative capacity were able to buffer themselves against such effects and deliver higher performance results as compared to governments with lower administrative capacity (Andrews et al., 2013, p. 190-191). Administrative capacity, therefore, may be said to serve the function of a stabilizing feature. Another example of the application of the model is provided by van den Bekerom et al. (2015): in their article, the authors illustrate that the schools in the Netherlands are able to buffer themselves against the negative effects of environmental turbulence, in form of changing rates of yearly enrollments, by increasing managerial networking activities, in downward, sideward and outward directions (van den Bekerom et al., 2015, p. 653). Therefore, the increased activity within the context of managerial networking can be considered a form of buffering, aimed at stabilizing organizational performance.

As with environmental turbulence, differentiation between long-term and short-term stability is crucial. Contingency theory holds that there is no ideal way of managing an organization, as the activities of organizations are influenced by contextual factors (Waterhouse & Tiessen, 1978). Hence, a contingent approach to managing the organization would take these contextual factors into account, making the organizational work relative to the organizational environment (Scott, 1981). While Boyne's & Meier's (2009) and Meier's and O'Toole's (2009) research results suggest that organizations with stronger stabilizing features are better apt at muddling through the impacts of environmental turbulence, contingency theory opposes this theoretical notion: an organization with strong stabilizing features would act with a lesser degree of contingency, hence, it would be more susceptible to environmental dynamism in the long run.

3.4 Impact of Environmental Turbulence

As mentioned earlier, sudden and dramatic shifts in organizational environment can have detrimental effects on organizational workings, their performance, and even their existence. Such shifts may include the impacts of natural hazards, such as hurricanes or pandemics, but the definition of environmental turbulence is not limited to these: overall, the literature sees sudden shifts in the munificence, defined as ”the relative level of resources available to an organization within its environment” (Aldrich, 2008, p. 63), and the complexity, defined as “the degree of similarity or differentiation between the elements of the population dealt with, including organizations, individuals, and any social forces affecting resources” (Aldrich, 2008, p. 66), as main moving factors behind environmental turbulence. Nevertheless, it is important to differentiate between dynamism and shocks, as the former might impact organizational stability in the long run but have a very limited short-term impact, unlike crises, which can have a profound effect directly.

This research conceptualizes the COVID-19 crisis as environmental turbulence. The crisis had made a profound impact on the workings of organizations in the public and the private sectors (Ansell et al., 2021), and continues to do so in some areas across the globe, where the pandemic either had not yet curbed down the moment of this writing or had re-surged after a period of calmness (Ni, 2022). COVID-19 pandemic is first and foremost, a health crisis: the spread of the novel coronavirus has resulted in the deaths and illnesses of millions of people across the globe. In order to curb the spread of the pandemic, governments worldwide implemented a broad array of measures, with the main focus being the limiting of social contacts within the population. Some of these measures introduced new challenges for public and private organizations alike: it is therefore not illogical to see the COVID-19 pandemic not as one major crisis, but rather as a set of interconnected crises. The term “wicked issue”, which describes tough interconnected policy issues that require significant amounts of energy and bureaucratic devotion (Moon, 2020), can be applicable in this regard.

3.5 Short-term stability

Stability is often seen by scholars of public administration, politicians, and service recipients alike as a core feature of bureaucratic systems, so much that it is considered a pearl of conventional wisdom (Weber, 1946, p. 228). Moreover, bureaucratic systems are often valued for their stability, as stability demonstrates resilience and reduces uncertainty regarding the future (O'Toole & Meier, 2003a, p. 98). In their study, Boyne & Meier (2009) demonstrate that

environmental shocks, or environmental turbulence, affect organizational performance on all levels and that organizations that stick to their stabilizing features will experience a drastically lower impact of the shocks, as opposed to organizations that reformed their core features amid ongoing environmental turbulence. Stabilizing features overall play an important role in the continuation of the functioning of bureaucracies: bureaucracies provide stable outcomes and certainty, while stability protects them from environmental shocks.

So what are exactly stabilizing features? Examples of such features include but are not limited to the organization's formal hierarchy, goals of the organization, rules and SOPs, production tools, and personnel stability (Meier & O'Toole, 2011, p. 24). In their 2003 article, O'Toole and Meier focus on the latter: the authors link personnel stability, or constancy in personnel (O'Toole & Meier, 2003b, p. 43), to the organizational performance in the public sector. The authors argue that personnel stability on two levels, namely top managers and front-line workers in the educational sector, contributes greatly to the delivery of organizational outputs (p. 47). According to O'Toole and Meier, while literature on public administration puts an emphasis on the necessity of change in the organizational environment, advocating for values associated with New Public Management, such as "adaptability, entrepreneurship and reform" (2003b, p. 43), the stability argument still holds its merit, which they ultimately demonstrate with their quantitative research. For the purpose of this research, organizational stabilizing features are conceptualized as personnel stability or constancy in school personnel. The focus of this research is on the impact of a short-term critical event, such as COVID-19, hence, the theoretical notion of the positive relationship between stability and performance is accepted here.

3.6 Summary of theoretical notions & theoretical model

1. Environmental Turbulence is defined as an event (or series of events) that stems from the organizational environment and has the capacity to affect the organizational workings in a serious or even threatening way. In this model, the COVID-19 pandemic, as well as the measures taken against the spread of the pandemic, are conceptualized as environmental turbulence.
2. Organizational Performance is defined as the ability of the public organization to achieve its goals, with a focus on the organizational output and its quality. For the purpose of this research, the organizational performance of secondary schools in the Netherlands will be conceptualized as the quality of provided education expressed in average grades.
3. Lastly, Stabilizing Features are defined as organizational elements that strengthen and support organizational stability. As per theory, strong organizational stabilizing features have a positive effect on organizational performance, albeit in the short term. For the purpose of this research, organizational stabilizing features are conceptualized as personnel stability or constancy in personnel-related variables.

The relationship between the variables in this model is expressed in the following way: environmental turbulence has a negative effect on the organizational performance, while this relationship is in its turn moderated by the strength of stabilizing features. Hence, this research adopts the following research question:

RQ: “How do stabilizing features moderate the relationship between the effects of the COVID-19 pandemic and public schools’ performance?”

For the purpose of this research, two groups of hypotheses have been adapted in order to test the model. The first group of hypotheses concerns itself with the effect of the environmental turbulence, while the second group concerns itself with the moderating effect of stabilizing features.

1. H0: There is no association between Environmental Turbulence (ET) and Organizational Performance (OP) variables.

   H1: ET negatively affects OP.

2. H0: There is no association between Stabilizing Features (SF) variable and the ET-OP relationship.

   H1: SF acts as a moderating variable in the ET-OP relationship, whereby its strength decreases the effect of ET on OP.

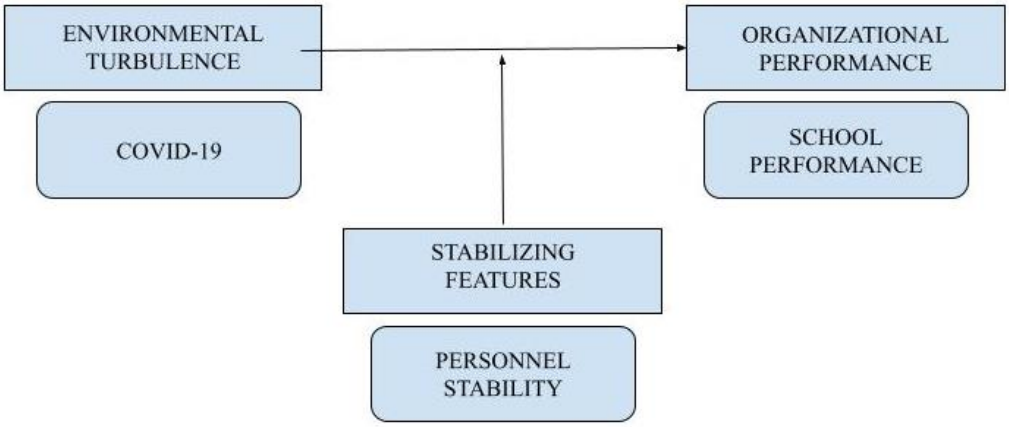

Figure 1: Conceptual model

4. Methodology

4.1 Research Design and Unit of Analysis

As outlined in the research model presented in Figure 1, this research treats Environmental Turbulence as an Independent Variable, Organizational Performance as a Dependent Variable, and Stabilizing Features as a Moderating Variable. For the purpose of hypothesis testing, this research employs a longitudinal research design, with the aim to measure the effect of Environmental Turbulence on Organizational Performance, as such design will allow to explore changes in trends over time (Halperin & Heath, 2017, p. 151-153). This research is quantitative and deals with aggregated data on the units of analysis: public schools. The way this data are obtained and operationalized will be described in the sections below.

For the statistical investigation of the available data, two tests will be employed: Paired Samples T-Test for the first hypothesis, and Pearson's R correlation analysis for the second hypothesis. The justification for these two tests in particular is as follows: in order to assess the

changes in performance, it is possible to employ a regular Paired Samples T-Test, as the sample data are paired: namely, average grades for the same schools for different years are provided in the dataset, allowing this research to establish whether a statistically significant difference exists between the average grades of different years. For the second hypothesis, Pearson's R has been selected due to the fact that this research seeks to establish the presence, or absence, of a correlation between the personnel stability variables and changes in average grades. While a regression analysis could be used to establish a linear effect of the variables in the relationship, there remains a huge risk of confounder bias, as there are numerous other variables outside of the scope of this research that can have an effect on the dependent variable. IBM SPSS 25 will be used for the conduct of statistical analyses on the obtained data.

As this research aims at studying the effect of the COVID-19 pandemic on public organizations in the Netherlands, public schools have been selected as the main unit of analysis. The educational sector in the Netherlands is divided into three phases: Primary, Secondary and Higher Education. Primary Education serves as the first step for many students in the Netherlands, at the end of which students complete final exams, the score of which determines whether they are going to graduate and to which schools in the second phase, or Secondary Education, they may apply. Secondary Education is in its turn divided into three variants: VMBO (Voorbereidend Middelbaar Beroepsonderwijs; Pre-vocational Secondary Education), HAVO (Hoger Algemeen Voortgezet Onderwijs; Higher General Continued Education) and VWO (Voorbereidend Wetenschappelijk Onderwijs; Preparatory Scientific Education) (Rijksoverheid, N.d.-b).

For the purpose of this research, schools in Secondary Education have been selected, primarily due to the availability of data on the exam results and the essential personnel related variables. Moreover, the schools have been narrowed down to those that provide their education in the VWO, as this is the highest and the hardest level of secondary public education, which therefore would be more susceptible to changes in the environment (Geijsel et al., 2020). This research concerns itself with the Dutch educational system, hence schools all across the Netherlands have been selected for the analysis. After narrowing down based on the availability of data, 429 various schools across the Netherlands have been selected for this research. The Netherlands has a highly developed and standardized educational system: for instance, a VWO diploma obtained in Groningen, in the north of the Netherlands, can be said to have the same value as a VWO diploma obtained in Maastricht, in the south of the Netherlands, while their respective holders will not differ drastically in terms of quality of education they have received (CITO, 2019, p. 68). Moreover, inclusion of schools country-wide will allow for the

diversification of studied contexts: urban, rural, multicultural, monocultural, small & large schools etc., thereby increasing the external validity of this research, as well as the applicability of its findings.

4.2 Data Collection

The Dutch Educational Agency, or DUO (Dienst Uitvoering Onderwijs) collects data every year on various performance markers and various pupil and personnel-related variables, such as age, sex, student-teacher ratio, etc. In order to obtain this information, DUO contacts schools individually, after which schools provide DUO with the required information. This usually happens around October every year, hence the information available through the DUO database is relevant for each school as of October of every school year (Dienst Uitvoering Onderwijs, 2021). The validity and reliability of this data is very high: DUO is a governmental agency that is responsible for all the financial tasks related to the provision of education in the Netherlands (Dienst Uitvoering Onderwijs, 2022c), and maintains for that purpose multiple comprehensive and freely available datasets (Dienst Uitvoering Onderwijs, 2022a,b). The reliability of the provided data is high due to the consistency: every year, more than 95% of the schools in the Netherlands provide DUO with the required data (Dienst Uitvoering Onderwijs, 2022b)

For the purpose of this research, two groups of data have been collected from the DUO website in June 2022. The first group contains average grades for the years 2017, 2018, 2019 and 2021 (Dienst Uitvoering Onderwijs, 2022a). Pupils at VWO are required to take two separate exams for each subject they have had at school: the School Exam and the Central Exam. While School Exams are designed and organized by schools themselves, Central Exams are developed and organized by CITO (Centrale Instituut voor Toetsontwikkeling; Central Institute for Exam Development). According to Anton Béguin, ex-director of CITO, central exams are objective, neutral, standardized and equal for all schools and pupils (CITO, 2019, p. 68). The standardized nature of these central exams allows for a proper comparison across various cases. As mentioned above, students are required to take an exam for every subject they have had at school. Pupils in VWO are required to choose a profile in the last three years of their education (Bovenbouw), of which there are 4 available: Economics & Society, Culture & Society, Nature & Technology and Nature & Health (Rijksoverheid, N.d.-c).

This research operationalizes average Central Exam grades as Organizational Performance, as earlier research on education in the Netherlands has measured organizational

performance of educational facilities by employing average grades, as exemplified by van den Bekerom et al. (2015) Further, van den Bekerom et al. (2015) mention that average grades of CITO exams "..are considered to be an authoritative indicator for school performance by the Dutch Inspectorate for Education—and by most teachers and parents as well" (p. 647).
For the purpose of this research, the averages of all grades for all the subjects have been selected. Selecting only a number of subjects, for instance the so-called "kernvakken" (three core subjects that need to be passed by every single pupil, which include English, Mathematics and Dutch) may skew the average results, as some subjects are more susceptible to change than the others. For instance, exam results for mathematics fell much more drastically in comparison with the results for English, which almost hasn't changed. Including all the subjects, across all the profiles will allow for a comprehensive comparison, as these averages are less susceptible to changes due to the broad number of observations.

The second group of variables contains personnel-related variables. Of these, four have been identified and selected; these will be operationalised as markers of personnel stability. The variables include: teacher's age, FTE (Full-Time Employments), permanent/temporary employment contracts and finally, pupils-per-teacher ratio (Dienst Uitvoering Onderwijs, 2022b). This selection is justified by the fact that these most closely relate to the personnel stability factors among the available data. As mentioned in the background section, according to the results of Geijsel et al. (2020) and Rodríguez et al. (2022), some crucial personnel stability factors allowed schools to mitigate the negative effects of the anti-epidemic measures such as lockdowns. The authors specify the following three factors: personnel tenure, full-time employment and permanent employment. According to the authors, these factors have an impact on support for pupils from the teachers, which is especially necessary during preparation for central exams (Geijsel et al., 2020). As there is no data available on personnel tenure school-by-school, this research treats personnel age as a marker of personnel tenure: Rodríguez et al. (2022) mention that in their case, it was up to the older, more experienced teachers to bear the brunt and continue to provide education, as younger educational personnel were often unable to continue with their work under new pressuring circumstances.

4.3 Operationalization

In order to assess the impact of the pandemic on public education in The Netherlands, this research opts for a direct comparison of average grades between the period of 2017-2019 and the year 2021, as a way to investigate and provide support for the first hypothesis, which states

that Environmental Turbulence has a negative effect on Organizational Performance. This selection is based on the availability of data, which are available from the school year 2016-2017 until the school year 2020-2021.

Having a selection of grades from three years, rather than one, will also minimize the risks associated with bias. Moreover, 2019 was the last year prior to the pandemic, as in 2020 Central Exams were canceled; instead, average grades of School Exams were used to determine whether the pupils were able to graduate. As these exams primarily took place prior to March 2020, when the pandemic began, considering these results within the scope of this research will most likely have negative effects on the internal validity. This is due to the fact that School Exams differ in many ways from Central Exams, making the comparison between the two counterproductive for this particular model. 2021 was therefore used for a number of reasons: first, Central Exams got re-introduced, and second, pupils who participated in the 2021 Central Exams, were in their fifth and sixth years during the pandemic.

This entails that this particular cohort of pupils were exposed to the effects of the pandemic on education for a longer period of time than the pupils who graduated in 2020. As of this writing, the data for 2022 Central Exams were not yet available. Comparing 2017-2019 and 2021 average grades will allow this research to compare results prior to and after the impact of pandemic on public education. Moreover, it will allow this research to establish trends prior to and after the pandemic and assess the diversion from the general trend in the period after the initial outbreak of the pandemic.

As mentioned earlier, in order to assess exam results of all pupils, all subjects were selected. These include, but are not limited to: English, Mathematics, Dutch, History, Economics, Physics, Biology, Chemistry etc. Two new variables were computed, which contain the averages of the grades for these subjects, one for 2017-2019 and one for 2021. Subsequently, another variable was computed: variable CHANGE1, which displays positive or negative percentage change of average grade per school in these subjects. This variable compares the average grades between the period of 201-2019 and the year 2021. An additional variable has been computed in order to establish the immediate changes in average grades, whereby the grades of 2019 and 2021 are compared and the change of average grades is calculated - variable CHANGE2. For both of these variables, dummy variables have been created - CHANGE1.1 and CHANGE2.1. Both of these convert all numbers of change into positives, thereby seeking to establish diversions from the performance stability, or, in other words, established performance trends. The first hypothesis suggests that environmental

turbulence has a negative effect on organizational performance. If this hypothesis holds, then the average of both variables CHANGE1 and CHANGE 2 should be a negative number.

The second set of variables, used as moderating variables, consists of four variables: AGE2020, FTE2020, CONTRACT2020 and RATIO2020. These variables, respectively, contain information on the following metrics: personnel's age, personnel's FTE's, amount of personnel working on a constant basis and teacher-to-pupil ratio, all per school. In order to assess the strength of each variable, the variables were adjusted and calculated the following way:

- AGE2020 contains the percentage of teachers older than 45. As the original dataset from the DUO website contains the amount of teachers per age group, this number has been recalculated, whereby teachers older than 45 have been added up and divided by total number of teachers per school. This specific margin has been chosen due to the fact that the median age of teachers in the Netherlands in 2020 was 47.5 (Appendix B, table 3). Additionally, this research uses the number of teachers, which is expressed not in the physical number of teachers but in the amount of FTE's. This has been done for a specific reason: the dataset that contains the physical number of teachers does not show results of schools with less than 5 teachers in any particular age group due to privacy concerns, thereby introducing a data gap.
- FULLTIME2020 shows the percentage of teachers working more than 0.8 FTE. The original dataset, obtained from the DUO website, contains the following numbers: teachers that work less than 0.5 FTE's, teachers that work between 0.5 and 0.8 FTE's, and teachers that work more than 0.8 FTE's. The last group has been divided by the total number of FTE's.
- CONTRACT2020 contains the percentage of teachers working permanently as opposed to the percentage of teachers with temporary contracts.
- RATIO2020 has been recalculated in order to fit into previously used scales, namely percentage. The original variable, as provided by DUO, presents the amount of pupils per teacher. The new variable expresses the percentage of teachers, whereby the total number would express the sum of teachers and pupils per school. A very important note here is that due to the recalculations of the ratio, the directions of change have been swapped around: higher ratio in the original model entails that the percentage of teachers in the total teacher-pupil group will be lower.

Every variable used in this research for the personnel related variables contains information about 2020, due to the fact that these numbers have been obtained around October 2020, which is the same school year, namely 2020-2021, that the 2021 Central Exams took place. The strength of each of these variables, according to the theoretical framework, is supposed to reflect on the impact of the pandemic on the provision of public education.

4.4 Summary of Methodology & Limitations

In this chapter, variables that will be used for the statistical analyses are operationalized. In order to establish the effect of Environmental Turbulence on Organizational Performance, data prior to and after the impact of the ET will be compared. For that purpose, data on the average grades for Central Exams per school have been aggregated in a broad database. The schools themselves are denoted by their BRIN-code - a special code which is used for the identification of schools and educational facilities by the Ministry of Education and other affiliated agencies.

One of the limitations of this research are the amounts of graduates per school; in order to avoid skewing the performance results, these were not weighted in with the calculation of the average grades per school. Dutch schools tend to differ drastically in the amount of graduating VWO students - some schools tend to have less than 10 graduates, while other schools have more than 200 graduates in this particular educational variant (Dienst Uitvoering Onderwijs, 2022a). This primarily comes down to school specialization - some schools, like athenaeums and gymnasiums, specialize in VWO, while other schools have a broad array of educational variants, among which VWO can be the smallest one in terms of number of pupils (Rijksoverheid, N.d.-c).

Considering the fact that the effect of ET on OP will be established through the comparison of the results of various years, this research operationalizes this effect as the variables CHANGE1 and CHANGE2, which are treated as dependent variables. Variables AGE2020, FULLTIME2020, CONTRACT2020 and RATIO2020 represent the four factors of personnel stability, which acts as the moderating variable in the conceptual model: specifically, personnel stability is alleged to moderate the impact of environmental turbulence on organizational performance. It is for this reason that these four variables are treated as independent variables. The last six mentioned variables will be used in a Pearson's R correlation analysis, whereby the correlation between the variables will be established.

Variable Name	*Variable Type*	*Description*	*Form*
2017	Data	Average grades for Central Exams per school in 2017	Grades, 0-10
2018	Data	Average grades for Central Exams per school in 2018	Grades, 0-10
2019	Data	Average grades for Central Exams per school in 2019	Grades, 0-10
2017-2019	Data	Combined average grades of 2017-2019 for Central Exams per school	Grades, 0-10
2021	Data	Average grades for Central Exams per school in 2021	Grades, 0-10
CHANGE1	Dependent	Percentage change of average grades between 2017-2019 and 2021	Percentage, -100% to 100%
CHANGE1.1	Dependent - Dummy	Same as CHANGE1 but all numbers have been converted to positives	Percentage, 0% to 100%
CHANGE2	Dependent	Percentage change of average grades between 2019 and 2021	Percentage, -100% to 100%
CHANGE2.1	Dependent - Dummy	Same as CHANGE2 but all numbers have been converted to positives	Percentage, 0% to 100%
AGE2020	Independent	Percentage of teachers above the age of 45 per school	Percentage, 0% to 100%
FULLTIME 2020	Independent	Percentage of teachers working more than 0.8 FTEs per school	Percentage, 0% to 100%
CONTRACT 2020	Independent	Percentage of teachers working permanently per school	Percentage, 0% to 100%

RATIO2020	Independent	Teacher-to-kid ratio per school	Percentage, 0% to 100%

Table 1: Summary table of the used variables

5. Analysis

In this section, results of the statistical tests will be presented. These results will be assessed and discussed: the implications of these will be presented at the end of the chapter.

5.1 Hypothesis 1 - Impact of Environmental Turbulence on Organizational Performance

For hypothesis testing, two different models have been developed. Model 1 compares the average results of Central Exams between the period of 2017-2019 and the year 2021, while Model 2 compares the average results between the years 2019 and 2021. This is done in order to differentiate between the long-term and short-term impacts of the Environmental Turbulence, conceptualized as COVID-19 and the measures aimed at stopping its spread.

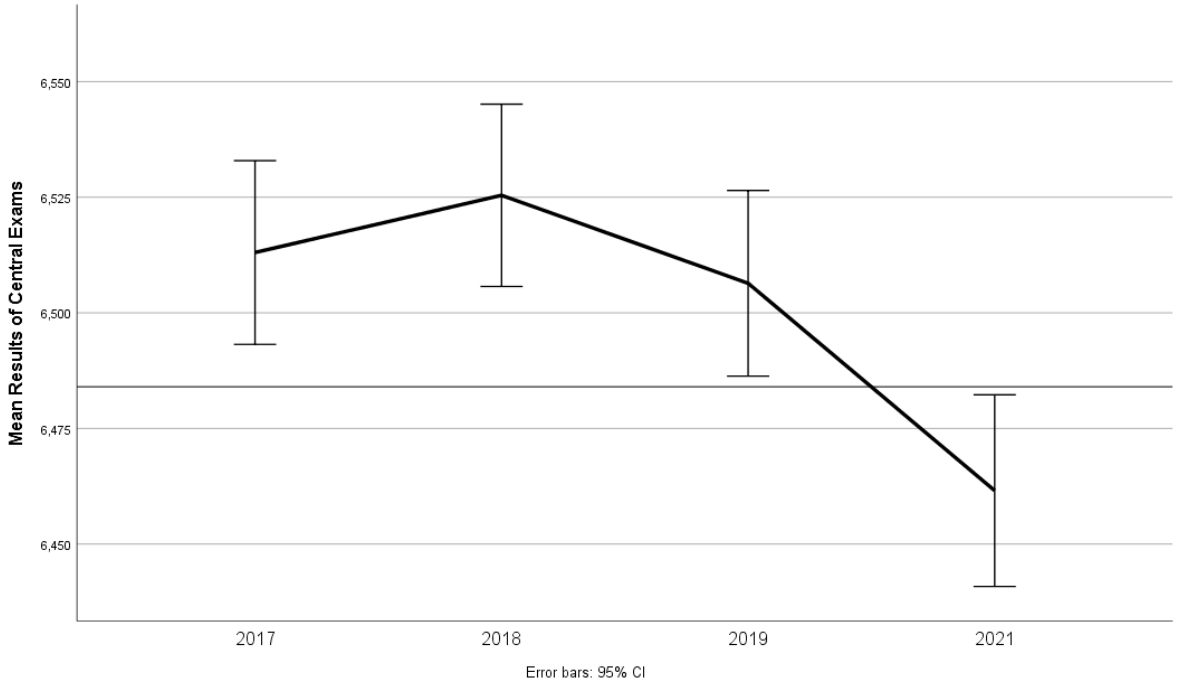

Figure 2: Mean Results of Central Exams, per year

Figure 2 illustrates the trend of average grades for Central Exams in the period of 2017-2021. Confidence Interval (CI) bars have been included in this figure to illustrate the differences between the years. The line that passes beneath the lower boundary of the 2019 CI bar and above the upper boundary of the 2021 CI bar illustrates that there is no overlap between average grades of the years investigated within the scope of this research. This illustrates that the difference between average grades before and after the outbreak of the COVID-19 pandemic is statistically significant.

According to Field (2013, p. 57), the CI contains 95% of the variance of the population mean, which therefore entails that if two CI's do not overlap then it means that the means are statistically different (p. 59).

Considering the fact that the CI's overlap in the period between 2017 and 2019, it can be said that the results of 2021 differ drastically from the previous trend. Moreover, the 2021 results diverge from the general trend in a negative way, as the average grades have decreased. Considering the timeline of events, as COVID-19 outbreak began in March 2020 and anti-epidemic measures in the Netherlands continued well into 2021, the provided data can be said to provide support for the first hypothesis, which states that Environmental Turbulence, conceptualized as COVID-19 pandemic, negatively affects Organizational Performance. In order to provide statistical proof for this relationship, a Paired Samples T-test has been performed using IBM SPSS 25 statistical program.

Table 1 in Appendix A and Table 1 in Appendix B present the descriptive statistics and the results of the Paired Samples T-Test dubbed Model 1, which compares the mean difference between the samples. The first model looks at the relationship between the average grades of the period 2017-2019 and the year 2021. The findings of the T-Test illustrate that there is a significant difference between the average Central Exam results of 2017-2019 (Mean = 6.5149, SD = 0.176) and 2021 (Mean = 6.4616, SD = 0.218); $t(428) = 6.076$, $p = .000$.

Table 1 in Appendix A and Table 1 in Appendix B present the descriptive statistics and the results of the Paired Samples T-Test dubbed Model 2, which compares the mean difference between the samples. The second model looks at the relationship between the years 2019 and 2021. The findings of this T-Test, like the Model 1 findings, illustrate that there is a significant difference between the average Central Exam results of 2019 (Mean = 6.5064, SD = 0.21161) and 2021 (Mean = 6.4616, SD = 0.218); $t(428) = 4.474$, $p = .000$.

5.2 Hypothesis 1 - Discussion of the results

Both Model 1 and 2 illustrate that there is a significant difference between the means of average grades of 2021 and the years before it. Both these models provide support for the first hypothesis and the basis for the refutation of the null-hypothesis: the occurrence of the Environmental Turbulence had a negative effect on the Organizational Performance.

5.3 Hypothesis 2 - Moderating Role of Personnel Stability

Having obtained proof for the validity of the first hypothesis, this research moves onto investigating the moderating role of Stabilizing Features (SF) in the relationship between Environmental Turbulence (ET) and Organizational Performance (OP). For that purpose, four related, albeit separate variables will be correlated with the percentage changes of average grades. This section is structured as follows: each of the Personnel Stability variables, as described in the methodology section, will be correlated with four measures of change of average grades. These measures of change are divided in 2 groups: Model 1 and Model 2. Model 1 compares the results between the period of 2017-2019 and the year 2021, while Model 2 compares only 2019 with 2021. This is done in order to compare the longer-period trend in average grades with the immediate impact of the ET on the OP. Moreover, each of the models contains two forms of change in the OP: two-directional, which measures both positive and negative changes, and one-directional, whereby all percentages of change have been converted to positive numbers. The latter was done in order to investigate the effect of the ET on the stability of performance.

5.3.1 Personnel's Age and Organizational Performance

Variable AGE2020 gives the percentage of teachers older than 45 years per school. For the purpose of this model, teachers' average age is used here for the measure of personnel tenure. Pearson's R correlation analysis was used in order to establish correlation between personnel's age, or personnel's tenure, and organizational performance. These are the results of this correlation analysis. The result table can be found in the Appendix C, Table 1.

Model 1:

- There was a weak positive correlation between the variables AGE2020 and CHANGE1, $r(427) = .117$, $p = .015$. This correlation is statistically significant at the 0.05 level.

- There was a weak negative correlation between the variables AGE2020 and CHANGE1.1, r(427) = -.119, p = .014. This correlation is statistically significant at the 0.05 level.

Model 2:

- There was a weak positive correlation between the variables AGE2020 and CHANGE2, r(427) = .102, p = 0.034. This correlation is statistically significant at the 0.05 level.
- There was a weak negative correlation between the variables AGE2020 and CHANGE2.1, r(427) = -.016, p = 0.749. This correlation is statistically insignificant at the 0.05 level.

5.3.2 Full Time Employment and Organizational Performance

Variable FULLTIME2020 gives the percentage of teachers working 0.8 Full Time Employments (FTE's) and above. Pearson's R correlation analysis was used in order to establish correlation between personnel's full-time employment and organizational performance. The result table can be found in the Appendix C, Table 2.

Model 1:

- There was a weak positive correlation between the variables FULLTIME2020 and CHANGE1, r(427) = .037, p = .439. This correlation is statistically insignificant at the 0.05 level.
- There was a weak negative correlation between the variables FULLTIME2020 and CHANGE1.1, r(427) = -.024, p = .626. This correlation is statistically insignificant at the 0.05 level.

Model 2:

- There was a weak negative correlation between the variables FULLTIME2020 and CHANGE2, r(427) = -.002, p = .963. This correlation is statistically insignificant at the 0.05 level.
- There was a weak negative correlation between the variables FULLTIME2020 and CHANGE2.1, r(427) = -.042, p = .749. This correlation is statistically insignificant at the 0.05 level.

5.3.3 Permanent Employment and Organizational Performance

Variable CONTRACT2020 gives the percentage of teachers working permanently, as opposed to temporary teachers. Pearson's R correlation analysis was used in order to establish correlation between personnel's permanent employment and organizational performance. The result table can be found in the Appendix C, Table 3

.

Model 1:

- There was a weak positive correlation between the variables CONTRACT2020 and CHANGE1, r(427) = .124, p = .010. This correlation is statistically significant at the 0.05 level.
- There was a weak negative correlation between the variables CONTRACT2020 and CHANGE1.1, r(427) = -.157, p = .001. This correlation is statistically significant at the 0.01 level.

Model 2:

- There was a weak positive correlation between the variables CONTRACT2020 and CHANGE2, r(427) = .056, p = .250. This correlation is statistically insignificant at the 0.05 level.
- There was a weak negative correlation between the variables CONTRACT2020 and CHANGE2.1, r(427) = -.153, p = .001. This correlation is statistically significant at the 0.01 level.

5.3.4 Teacher-to-pupil Ratio and Organizational Performance

The last variable, RATIO2020, transforms the Teacher-to-Pupil ratio, provided by DUO, into percentage, thereby illustrating the percentage of teachers in the larger teacher-pupil group. This has been done in order to make the data comparable with other variables, as other variables are illustrated as percentages. Pearson's R correlation analysis was used in order to establish correlation between teacher-to-pupil ratio and organizational performance. The result table can be found in the Appendix C, Table 4.

Model 1:

- There was a weak positive correlation between the variables RATIO2020 and CHANGE1, r(427) = .032, p = .512. This correlation is statistically insignificant at the 0.05 level.
- There was a weak positive correlation between the variables RATIO2020 and CHANGE1.1, r(427) = .110, p = .023. This correlation is statistically significant at the 0.05 level.

Model 2:

- There was a weak positive correlation between the variables RATIO2020 and CHANGE2, r(427) = .176, p = .000. This correlation is statistically significant at the 0.01 level.
- There was a moderate positive correlation between the variables RATIO2020 and CHANGE2.1, r(427) = .403, p = .000. This correlation is statistically significant at the 0.01 level.

5.4 Hypothesis 2 - Discussion of the results

Four different markers of personnel stability have been correlated with four different markers of change of performance, which in total produced sixteen results. Of these results, only nine are statistically significant, with significance levels below 0.05. Overall, Model 1 produced more statistically significant results, which signifies the necessity of longer-term trends for the determination of cause-and-effect relationships with high degree of certainty. The results for each marker will be briefly summarized and discussed: at the end of this segment, the results will be discussed and assessed in light of the theoretical background.

Personnel's age, which is used in this research as a marker of personnel's tenure, has a weak positive effect on performance and a weak positive effect on performance stability. This signifies the importance of experienced personnel for the retention of performance levels: schools with more teachers above the age of 45 tend to preserve their performance levels and mitigate the negative effect of external turbulence on the performance. This relationship, however, is rather weak: for statistically significant results, the Pearson's r did not exceed 0.120, illustrating an overall weak effect on school performance.

Personnel's Full-Time Employment has no significant effect on performance and performance stability. In both models, all correlations were statistically insignificant, while the Pearson's r's were very close to 0. This could signify the lack of difference between part-time and full-time employees in the educational sector of the Netherlands, albeit among teaching personnel.

Permanent employment has an effect on organizational performance that is comparable to personnel's age: overall, there is a weak positive effect on performance and performance stability. For both variables, long-term performance and performance stability seem to be influenced by their strength, albeit this effect is rather weak. Further, there is a very small positive effect on short-term performance, but this correlation is statistically insignificant. Lastly, there is a weak positive effect on performance stability.

Lastly, the teacher-to-pupil ratio seems to have no significant effect on long-term performance and a weak negative effect on long-term performance stability. The short-term effect is more profound: while there is a weak positive effect of teacher-to-pupil ratio on short-term performance, there is a moderate negative effect on performance stability, with a Pearson's r of 0.403. As mentioned in the methodology section, due to the recalculations of the variable the values have been swapped around, which means that a higher RATIO2020 entails a lower amount of pupils per teacher, and vice versa. For this model, this means that having more teachers per pupil has a negative effect on performance stability: with more teachers, there are more changes of average grades.

When considering exclusively the moderating effect of stabilizing features on the changes in performance, it can be said that there is support for the second hypothesis: overall, the strength of stabilizing features moderates the changes of grades for Central Exams, especially variables related to personnel's age, or personnel's tenure, and personnel's permanent employment. Despite earlier assumptions, outlined in the background sections, personnel's full-time employment plays no role: this might be caused by the specific context of the Dutch educational sector and labor conditions within it.

Moreover, the ratio of teachers seems to play a very counterintuitive role: in essence, the outcomes of the correlation analysis suggest that short-term changes in performance are attenuated by higher number of teachers per pupils, and increased number of teachers leads to destabilization of performance. This does not suggest that having more teachers will lead to worse performance levels, as the dummy variables consider the diversion of average grades from previously established trends, whether they're positive or negative. Rather, having more teachers will lead to more variation in average grades, as well as more rapid changes in average grades between the years, albeit under the conditions of the Environmental Turbulence. For all

the other variables, the correlation between the dummy variables and the personnel stability variables is negative: increased factor of personnel stability leads to more performance stability. The results for teacher-to-pupil ratio fall out of this norm: this is simultaneously the strongest relation demonstrated in this research, and while this research concerns itself with overall performance, the performance stability argument can be assessed in further research.

6. Conclusion

This research set out to investigate the effects of environmental turbulence on the organizational performance, and how stabilizing features moderate this relationship. It uses the recent COVID-19 pandemic as an example of environmental turbulence, or more specifically, the anti-epidemic measures aimed at curbing the spread of the pandemic. As the anti-epidemic measures, such as lockdowns and social distancing had to be implemented in both public and private organizations, the implementation had an effect on the organizational performance. This research seeks to investigate how organizations could best shield their performance levels, without altering the ways performance is measurement. For that purpose Central Exam grades have been operationalized as an example of organizational performance; these have been selected due to their standardized country-wide application, along with rigid structure for providing exams and grading. Through the statistical comparison of average exam results, support was found for the first hypothesis, namely that there was a significant change in performance, as average Central Exam grades lowered down country-wide. This change was both statistically significant in relation with the previous year the central exams took place, namely 2019, as well as in the relation with the longer pre-Covid period, namely the years between 2017 and 2019. This research employed the following research question:

"How do stabilizing features moderate the relationship between the effects of the COVID-19 pandemic and public schools' performance?"

Theoretical section of this research summarizes key notions on the effects of environmental turbulence on the organizational performance: the literature on the subject suggests that organizations with strong stabilizing features are better apt at withstanding the effects of the turbulence, as opposed to organizations that quickly seek to alter their organizational structure under the duress of the turbulence. The literature primarily points down

to the personnel stability variables, such as personnel retention, personnel position and organizational or hierarchical structure. Next to theoretical investigation, a brief inquiry into current trends in the educational sector in the EU has been made. From this brief inquiry, in the form of a brief literature review, it was established that schools in The Netherlands would best mitigate the effects of lockdowns and installed safety measures through two conditions: appropriate educational environment for pupils, and support stemming from teachers. Another article suggested that teachers with more experience and more stable employment were better apt at providing support for pupils, thereby contributing to the performance stability. These findings, coupled with theoretical investigation, lead this research to the investigation of the following four personnel stability factors: personnel's age, personnel's employment (part-time/full-time, temporary/permanent contracts) and teacher-to-pupil ratios. The data on these, along with the data on the average grades for Central Exams, were obtained from the website of DUO, the executive agency of the Dutch Ministry of Education. To answer the research question, the following two groups of hypotheses were established:

1. H0: There is no association between Environmental Turbulence (ET) and Organizational Performance (OP) variables.

   H1: ET negatively affects OP.

2. H0: There is no association between Stabilizing Features (SF) variable and the ET-OP relationship.

   H1: SF acts as a moderating variable in the ET-OP relationship, whereby its strength decreases the effect of ET on OP.

In order to provide support for the hypotheses, two statistical tests have been conducted: Paired Samples T-Test for the investigation of the effect on the changes of average grades after COVID, and Pearson's R correlation analysis for the establishment of a correlation between the personnel stability variables and the changes of average grades per school. The findings of these tests are as follows:

- Paired Samples T-Test provided proof for the first hypothesis, as it illustrated that there is a statistically significant difference between the average grades of the period between 2017 and 2019 and the year 2021. Moreover, the years 2019 and 2021 have also been compared, whereby the results, likewise, support the first hypothesis: that there is a

statistically significant difference between grades. These grades are approximately 0.05 points lower, which is a strong deviation from the trend that persisted from 2017 to 2019.

- Pearson's R correlation analysis provided proof for the second hypothesis, by illustrating that there was a net positive effect of three out of four variables on organizational performance, whereby the strength of the personnel related variables is associated with lesser decreases or even increases of average grades per school. The only variable for which the results were statistically insignificant is the variable that looks into full-time and part-time employment.

The following answer may be given to the research question: the strength of personnel stability variables is positively correlated with organizational performance: schools with stronger features experienced lesser decreases of average grades in comparison with schools with weaker features. Considering the high N (=429) and the distribution of the units of analysis, it can be said that the results of this research are highly generalizable. This generalization, however, comes at a cost: overall, the effect of stabilizing features has been relatively weak. The Large-N aspect of this research hereby showcases its limitations: while the results are relatively robust, the described effects are rather weak. Despite these, an important notion remains that while teacher's support remains an important factor behind student's motivation, this on its own is not sufficient: students also require an appropriate educational environment, whether it is at home during lockdowns or at schools.

Further research should delve deeper into the subject by assessing variables such as class size, school specialization, and more specific variables on the quality of personnel stability: level of schooling of personnel, individual reviews for teachers and their teaching methods. Moreover, further research could differentiate between the school profiles: while the VWO variant has four directions, the results of these have been lumped together for the purpose of this research, in order to provide more generalizable results. Differentiating between these profiles could, for instance, establish whether pupils and teachers in the humanities or science classes were better apt at maintaining performance levels, in comparison with the pre-COVID period. Application of in-depth analytic tools, for instance interviews of teachers within the scope of a small-N analysis or a case study, can also greatly benefit the literature on the subject, as the relationships between organizational performance and the work of the organization can be studied more extensively.

Next to finding support for the proposed hypotheses, albeit rather weak, there is another, surprisingly strong correlation that was found between the investigated variables. Specifically, it was discovered that the teacher-to-pupil ratio negatively correlates with the performance stability, as described in the analysis section. This entails that having more teachers per pupil, or less pupils per teacher, can have an effect on changes of average grades, in both directions. Further research could proceed from here and investigate the teacher-to-pupil ratios and its relationship with school performance. The literature on this topic, as described in the theoretical section, suggests that sudden shifts in hierarchy or organizational structure can have destabilizing effects on organizational performance: both positive and negative. Although this research did not concern itself with the changes in the personnel stability variables, further research could investigate how sudden shifts in the number of teachers can have an impact on the organizational performance.

One of the main take-aways for school managements and policy makers from this research would be the notion that proper investment in the quality of personnel, as well as retention of personnel and maintenance of personnel stability can have net positive effects on school performance in times of duress, such as pandemics. Providing personnel with stable work conditions can hereby strengthen the performance stability of public organizations. Ensuring that the educators can support their students during turbulent times will be especially beneficial for the stability of performance.

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8. Resources

Data on Central Exam grades:

"Examenkandidaten vwo en examencijfers per vak per instelling".

Dienst Uitvoering Onderwijs. (2022a). *Examens - Voortgezet onderwijs*. DUO. Retrieved June 28, 2022, from https://duo.nl/open_onderwijsdata/voortgezet-onderwijs/aantal-leerlingen/examens.jsp

Data on Personnel Stability variables:

Dienst Uitvoering Onderwijs. (2022b). *Personeel - DUO Onderwijsdata*. DUO. Retrieved June 28, 2022, from

https://duo.nl/open_onderwijsdata/voortgezet-onderwijs/personeel/in-aantal-fte.jsp

https://duo.nl/open_onderwijsdata/voortgezet-onderwijs/personeel/leerling-leraarratio-per-instelling.jsp

9. APPENDIX A: Frequency Tables of the Used Variables

Hypothesis 1:

Table 1 - Statistics – Average Central Exam Grades Per Year

		2017	2018	2019	2017-2019	2021
N	Valid	429	429	429	429	429
	Missing	0	0	0	0	0
Mean		6.5130	6.5254	6.5064	6.5149	6.4616
Median		6.5080	6.5176	6.4903	6.5035	6.4738
Std. Deviation		0.20930	0.20767	0.21161	0.17611	0.21837
Minimum		5.73	5.86	5.87	5.90	5.72
Maximum		7.07	7.70	7.17	7.05	7.14

Hypothesis 2:

Table 2 - Statistics – Dependent Variables – Changes in Performance

		CHANGE1	CHANGE1.1	CHANGE2	CHANGE2.1
N	Valid	429	429	429	429
	Missing	0	0	0	0
Mean		-0.8007	2.2516	-0.6423	2.4444
Median		-0.7700	1.8235	-0.8117	1.9286
Std. Deviation		2.79886	1.84244	3.19869	2.15782
Minimum		-14.17	0.01	-18.92	0.00
Maximum		7.20	14.17	19.05	19.05

Table 3 - Statistics – Independent Variables – Personnel Stability Factors

		AGE2020	FULLTIME2020	CONTRACT2020	RATIO2020
N	Valid	429	429	429	429
	Missing	0	0	0	0
Mean		47,9243	69,9622	85,3841	6,1028
Median		47,5224	71,1164	86,6610	6,0085
Std. Deviation		7,89475	8,60350	7,26148	1,26046
Minimum		16,40	31,46	41,84	4,54
Maximum		80,11	88,59	98,99	25,87

10. APPENDIX B: Paired Samples T-Test for Hypothesis 1

Table 1: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
				Std. Error	95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Mean	Lower	Upper			
Model 1	2017-2019 - 2021	,05339	,18201	,00879	,03612	,07067	6,076	428	,000
Model 2	2019 - 2021	,04484	,20757	,01002	,02514	,06454	4,474	428	,000

11. APPENDIX C: Pearson's R Correlation Analyses for Hypothesis 2

Table 1: Correlations of Personnel's Age and Change Variables

		AGE2020	CHANGE1	CHANGE1.1	CHANGE2	CHANGE2.1
AGE2020	Pearson Correlation	1	,117*	-,119*	,102*	-,016
	Sig. (2-tailed)		,015	,014	,034	,749
	N	429	429	429	429	429
CHANGE1	Pearson Correlation	,117*	1	-,411**	,814**	-,264**
	Sig. (2-tailed)	,015		,000	,000	,000
	N	429	429	429	429	429
CHANGE1.1	Pearson Correlation	-,119*	-,411**	1	-,338**	,676**
	Sig. (2-tailed)	,014	,000		,000	,000
	N	429	429	429	429	429
CHANGE2	Pearson Correlation	,102*	,814**	-,338**	1	-,188**
	Sig. (2-tailed)	,034	,000	,000		,000
	N	429	429	429	429	429
CHANGE2.1	Pearson Correlation	-,016	-,264**	,676**	-,188**	1
	Sig. (2-tailed)	,749	,000	,000	,000	
	N	429	429	429	429	429

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2: Correlations of Full-time Employment and Change Variables

		FULLTIME2020	CHANGE1	CHANGE1.1	CHANGE2	CHANGE2.1
FULLTIME2020	Pearson Correlation	1	,037	-,024	-,002	-,042
	Sig. (2-tailed)		,439	,626	,963	,382
	N	429	429	429	429	429
CHANGE1	Pearson Correlation	,037	1	-,411**	,814**	-,264**
	Sig. (2-tailed)	,439		,000	,000	,000
	N	429	429	429	429	429
CHANGE1.1	Pearson Correlation	-,024	-,411**	1	-,338**	,676**
	Sig. (2-tailed)	,626	,000		,000	,000
	N	429	429	429	429	429
CHANGE2	Pearson Correlation	-,002	,814**	-,338**	1	-,188**
	Sig. (2-tailed)	,963	,000	,000		,000
	N	429	429	429	429	429
CHANGE2.1	Pearson Correlation	-,042	-,264**	,676**	-,188**	1
	Sig. (2-tailed)	,382	,000	,000	,000	
	N	429	429	429	429	429

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Correlations of Permanent Employment and Change Variables

		CONTRACT2020	CHANGE1	CHANGE1.1	CHANGE2	CHANGE2.1
CONTRACT2020	Pearson Correlation	1	,124*	-,157**	,056	-,153**
	Sig. (2-tailed)		,010	,001	,250	,001
	N	429	429	429	429	429
CHANGE1	Pearson Correlation	,124*	1	-,411**	,814**	-,264**
	Sig. (2-tailed)	,010		,000	,000	,000
	N	429	429	429	429	429
CHANGE1.1	Pearson Correlation	-,157**	-,411**	1	-,338**	,676**
	Sig. (2-tailed)	,001	,000		,000	,000
	N	429	429	429	429	429
CHANGE2	Pearson Correlation	,056	,814**	-,338**	1	-,188**
	Sig. (2-tailed)	,250	,000	,000		,000
	N	429	429	429	429	429
CHANGE2.1	Pearson Correlation	-,153**	-,264**	,676**	-,188**	1
	Sig. (2-tailed)	,001	,000	,000	,000	
	N	429	429	429	429	429

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: Correlations of Teacher-to-Pupil ratio and Change Variables

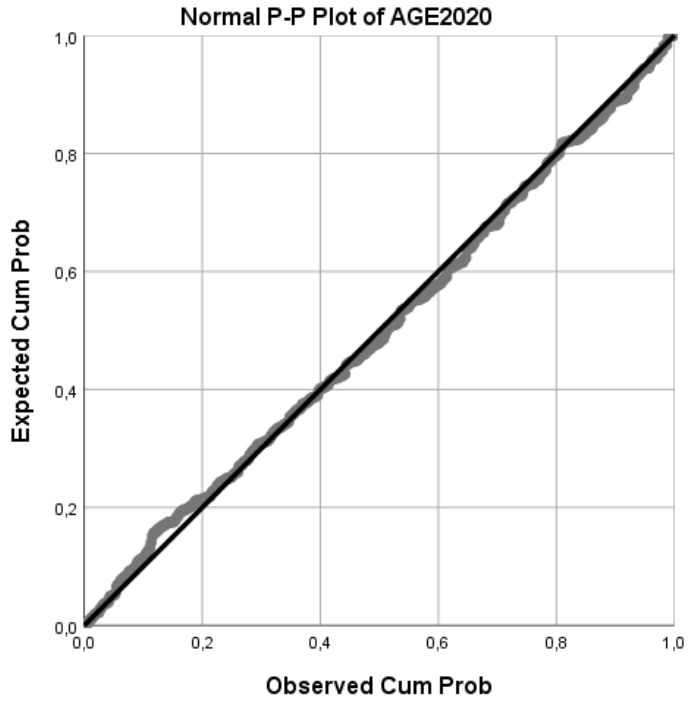
		RATIO2020	CHANGE1	CHANGE1.1	CHANGE2	CHANGE2.1
RATIO2020	Pearson Correlation	1	,032	,110*	,176**	,403**
	Sig. (2-tailed)		,512	,023	,000	,000
	N	429	429	429	429	429
CHANGE1	Pearson Correlation	,032	1	-,411**	,814**	-,264**
	Sig. (2-tailed)	,512		,000	,000	,000
	N	429	429	429	429	429
CHANGE1.1	Pearson Correlation	,110*	-,411**	1	-,338**	,676**
	Sig. (2-tailed)	,023	,000		,000	,000
	N	429	429	429	429	429
CHANGE2	Pearson Correlation	,176**	,814**	-,338**	1	-,188**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	429	429	429	429	429
CHANGE2.1	Pearson Correlation	,403**	-,264**	,676**	-,188**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N	429	429	429	429	429

*. Correlation is significant at the 0.05 level (2-tailed).

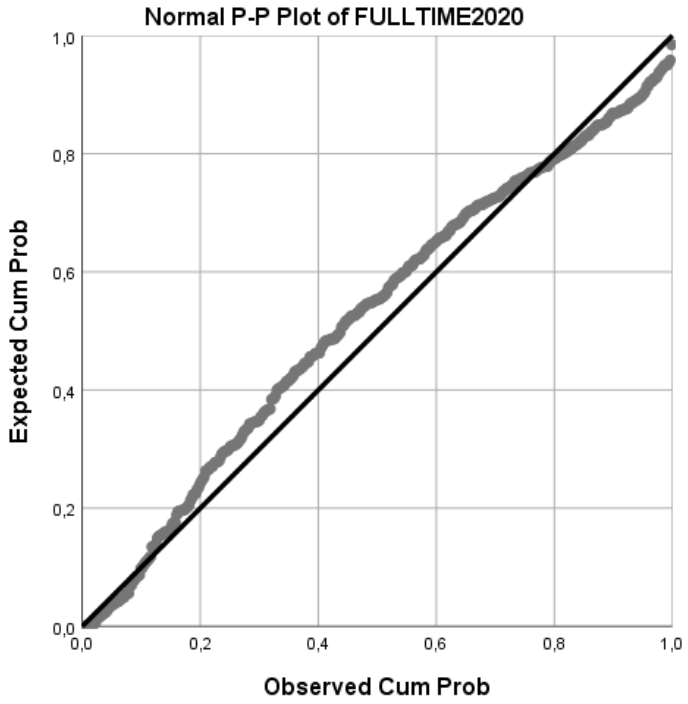
**. Correlation is significant at the 0.01 level (2-tailed).

12. APPENDIX D: P-P Plots of the Used Variables

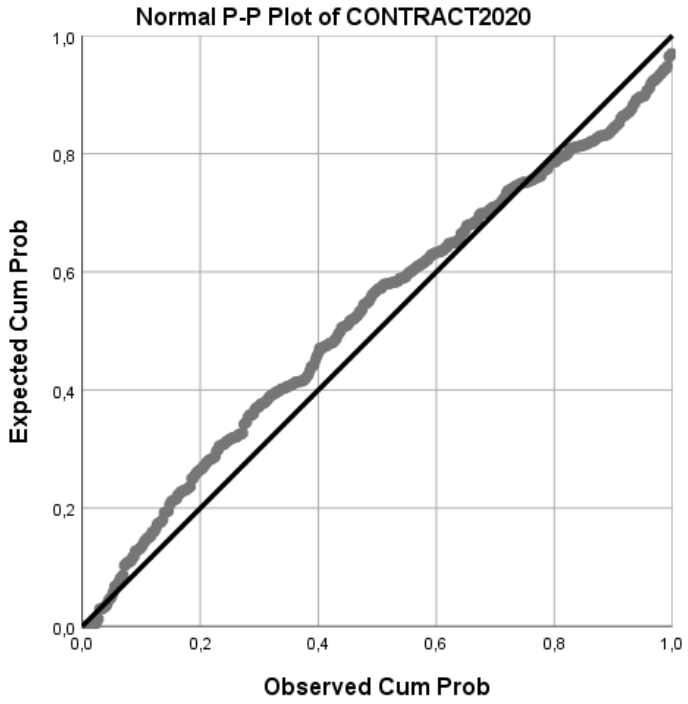
AGE2020



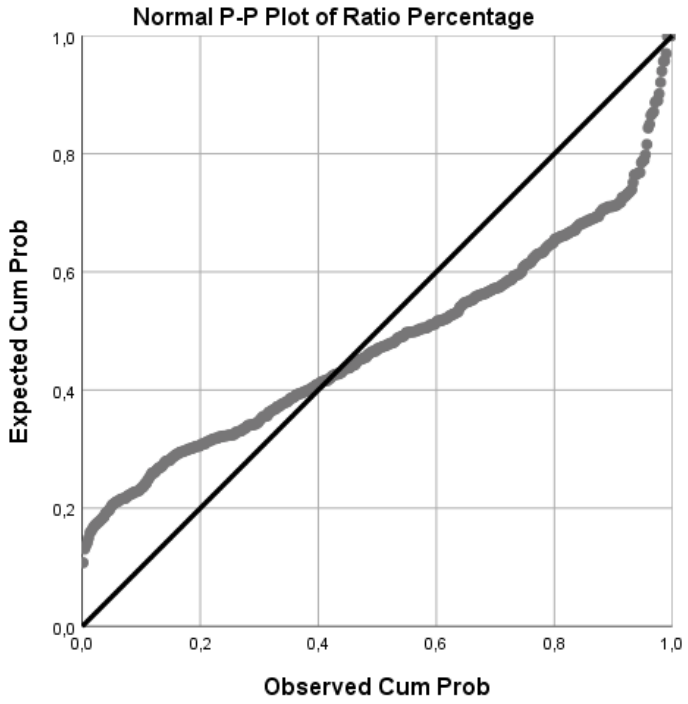
FULLTIME2020



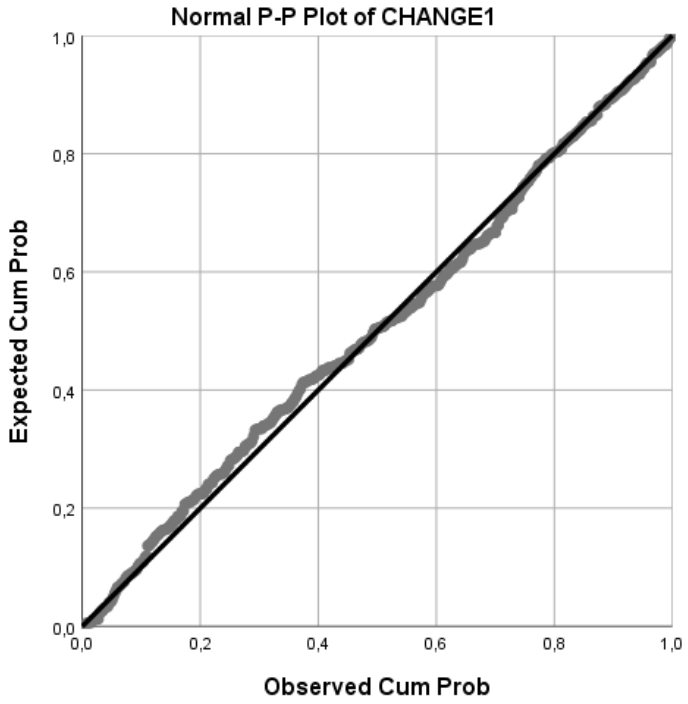
CONTRACT2020



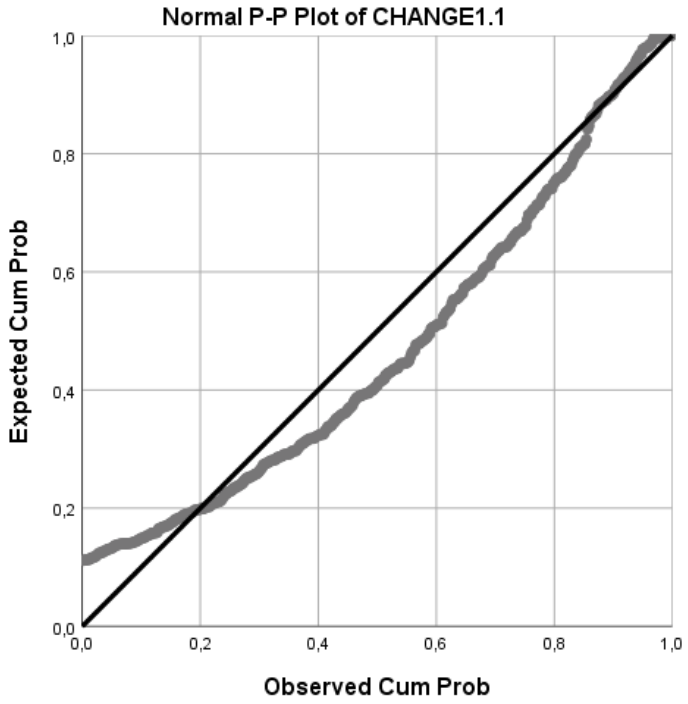
RATIO2020


Normal P-P Plot of Ratio Percentage
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0

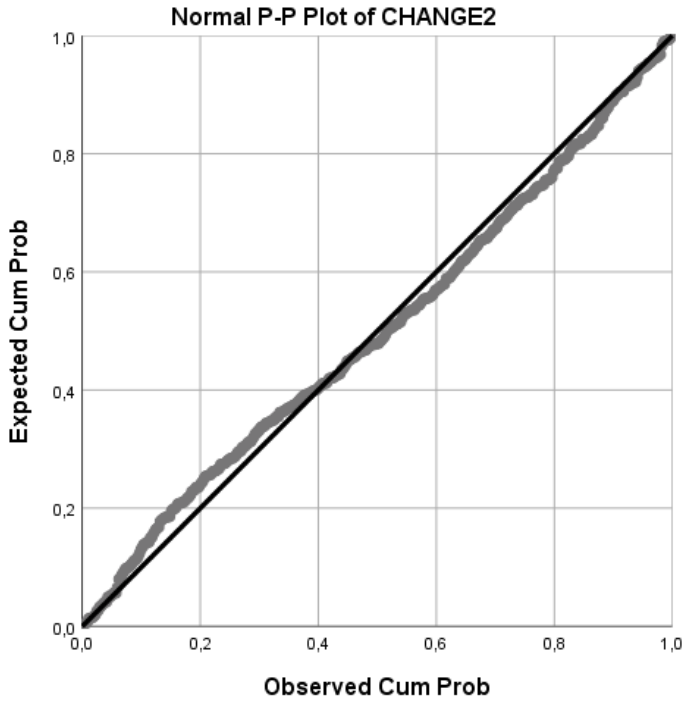
CHANGE1


Normal P-P Plot of CHANGE1
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0

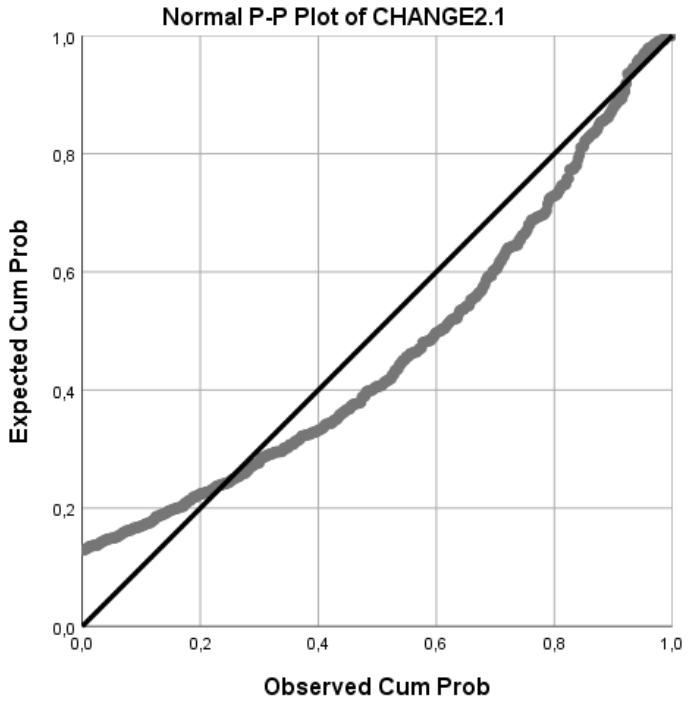
CHANGE1.1


Normal P-P Plot of CHANGE1.1
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0

CHANGE2


Normal P-P Plot of CHANGE2
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0

CHANGE2.1


Normal P-P Plot of CHANGE2.1
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0