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**-RESEARCH ARTICLE-**

# ENHANCING MEGA PROJECT RESILIENCE THROUGH CAPABILITY DEVELOPMENT IN INDONESIA

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**─Abstract─**

What drives organizational resilience is the project organization's ability to consistently encourage knowledge management, situational awareness, and organizational learning to adapt to disruptions, adapt to and capitalize on potential opportunities, and mitigate the consequences of uncertainty and risk. Researchers utilized the resilience theory to determine the resilience of the development project. This form of research is referred to as "causal effect" research. Information was collected from 100 Indonesian megaproject team leaders to accomplish the research objectives. The data were then examined using the structural equation modeling (SEM) method. (1) a significant positive relationship exists between the leadership agility variable and project resilience; (2) a significant positive relationship exists between the organizational adaptability variable and project resilience; (3) a significant positive relationship exists between the leadership agility variable and technology adoption; and (4) a significant positive relationship exists between the organizational adaptability variable and technology adoption.

**Keywords:** leadership agility, project resilience, technology adoption, turbulence environment

## 1. INTRODUCTION

National Strategic Projects (abbreviated as PSN) are infrastructure projects in Indonesia that President Joko Widodo deems strategic for boosting economic growth, equitable development, community welfare, and regional development. A Presidential Regulation governs PSN. Project implementation is managed directly by the central government, regional governments, businesses, and Government Business Entity Cooperation (KPBU), with priority given to domestic components. This project is classified as a megaproject in Indonesia. One of the PSN megaprojects still under construction is the relocation of the Indonesian capital from Jakarta to East Kalimantan Province. This megaproject necessitates coordinating and collaborating with numerous stakeholders for the relocation to be effective. The variety of resilience definitions and the nature of state reliance (Chelleri et al., 2021) present a difficulty in applying resilience in project management. For instance, in ecology, the greater the number of accessible species, the greater the likelihood that other species in the environment will be stable and adaptive in response to unforeseen circumstances (Mrad et al., 2018). This is not the case with personnel in project organizing. He et al. (2019) demonstrate that the greater the number of personnel from diverse organizations allocated to make crucial decisions on projects, the more consistent and stable the projects become due to interpersonal friction. Therefore, applying this parallel to project management may hinder the development of resilience. Thus, this project's strength must be maintained, and determined which aspects can boost its effectiveness.

Organizational adaptability is one of the factors that might enhance the project's resilience. The concept of organizational adaptability is founded on fundamental principles such as organizational personnel's adaptive capacity (Melián-Alzola et al., 2020), flexibility, and coping ability (Negri et al., 2021), necessitating the development of personnel organization to enable the organization to develop the required capabilities. On the other side, according to (Chen et al., 2021; Machiels et al., 2021; Miceli et al., 2021), this culture is maintained by the leaders and management team. The commitment and collaboration required to maintain and develop a resilient culture for managing disruption are hindered by project leaders' concurrent management of multiple projects and project personnel's affiliations with different parent organizations before, during, and after a project (Gemünden et al., 2018). Consequently, recognizing the strategic leadership attributes that will assist the project team in maintaining resilience will facilitate the efficient use of the notion of resilience in project management.

Due to the industrial period, technology must be utilized in the management of all areas of projects. With the rapid pace of digitalization, the fourth industrial revolution, and digital transformation, technological innovation has transformed the methods in which commercial organizations work. Online, more ties were forming and maintained, including supplier-buyer relationships and intra-company collaboration. If digitalization is viewed from the perspective of digital technologies, then having a digital connection, having access to static and dynamic information, and ways of articulating collaborative work using digital technologies (or Information and Communication Technologies) can be viewed as part of the expanding digitalization sphere. The adoption and aggregation of various digital technologies, such as SMACIT (social, mobile, analytics, cloud, and Internet of Things) technologies, is an efficient digital business strategy in the aftermath of digital transformation. Despite the COVID-19 pandemic throughout the country, work should continue on national strategic projects (PSN). According to Aldianto et al. (2021), the pandemic has significantly affected all worldwide operations. The analysis is limited by Laksana (2021), who asserts that the COVID-19 epidemic has hindered development programs in Indonesia. Therefore, it is hoped that environmental disturbances will not impede the project's execution. However, based on previously published journals, it is clear that they only undertake research on specific topics and only incorporate a few characteristics that can sustain a project. In light of the research mentioned above, the researchers are interested in undertaking studies on organizational adaptation, technology uptake, and leader resilience, with environment turbulence as a mediating variable. In addition, this research examines megaprojects, such as the movement and growth of Indonesia's capital city, to identify how to maintain and develop it effectively.

## 2. THEORETICAL REVIEW

### 2.1 Firm Resilience in Megaprojects

Organizational resilience has become more widespread in the building and construction industry in recent years. As opposed to conventional projects, Megaprojects are more

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

likely to be affected by high-level unforeseen events due to the megaproject's large complexity, longer duration, and the ambivalence generated by the project's stakeholders (C. Wang et al., 2022). These unanticipated occurrences include not only natural catastrophes, economic crises, epidemics, and other catastrophic calamities that disrupt the routine operations of participants but also emergencies that were not accounted for in the project's design and disrupt the normal building process. These unanticipated occurrences have the potential to impede typical construction progress. Consequently, the concept of organizational resilience in megaprojects transcends disciplinary borders and incorporates disaster response, risk management, and safety management. According to (Machiels et al., 2021), organizational resilience can increase transparency in the design and construction of megaprojects by including the perspectives of a variety of project participants. According to the hypothesis proposed by Wang et al. (2021), organizational resilience in megaprojects is characterized principally by strong leadership and management, skilled employees, collaborative partnerships, and the ability to predict and respond to unexpected occurrences. According to Visser (2021), the building organization resilience index system can aid construction professionals in designing, analyzing, and implementing plans or strategies before and after disasters to achieve successful disaster recovery. Rizzo (2020) asserts that the organizational resilience of megaprojects might be characterized differently at various stages of project management. This concept can be divided into two distinct categories: defensive resilience, which refers to preventing accidents and directing processes to decrease the negative effects of natural disasters, and recovery resilience (adjusting organizational strategies and structures to adapt to change and learning from previous disasters). This definition is also consistent with the general definition of organizational resilience, which is the capacity to plan and predict ahead of disasters, respond and adapt to environmental changes, and proactively restore and renew organizational functions to thrive despite adversity.

## 2.2 Leadership Agility on Project Resilience

Diverse disciplines, including ecology (L. Williams, 2022), strategic management, safety engineering (Jongen et al., 2019), and, more recently, projects (Naderpajouh et al., 2018; Thomé et al., 2016), have made substantial use of resilience. The term "resilience" in this discipline refers to an element's "capacity and ability" to recover to a stable condition after a disturbance (Miceli et al., 2021). A. Williams et al. (2017) defined organizational resilience as the process through which an organization develops and utilizes its skills to engage with internal and external dynamics constructively, changing and preserving function before, during, and after adversity. Organizational resilience in megaprojects focuses on collective responses to adversity and crisis recovery via collaboration between project stakeholders. The project can be expanded if the stakeholders who become leaders in their respective fields possess the necessary skills. According to research by Khunwishit et al. (2018), leadership influences the durability of a project. Therefore, the built hypothesis is:

**H1 – There is an influence of Leadership Agility on Project Resilience**

## 2.3 Organizational Adaptability on Project Resilience

Environmental complexity in organizational activity represents heterogeneity. According to (Tonkin et al., 2018), the organization's adaptability allows it to overcome this predicament. It is acquired once the employee encounters a sense of stability and personal resilience. One of the goals of companies is to adapt to local and international changes to sustain profitability and respond to both positive and bad developments (Rizzo, 2020). In this context, organizational resilience is the capacity of an organization to anticipate and withstand events by adapting to them and recovering spontaneously.

Consequently, this organizational agility might enhance the durability of the project. This is consistent with Al-Abrrow et al. (2019), who found that organizational factors can influence the best project resilience. Therefore, the built hypothesis is:

**H2 – There is an influence of Organizational Adaptability on Project Resilience**

## 2.4 Leadership Agility on Technology Adoption

The current state of stability results from agile leadership, collaboration with other teams, proactive awareness of envisaged, unforeseen circumstances, and mutual care among team members amid unexpected situations. Moreover, Industry 4.0 brings difficulties and opportunities in all facets of life. In contemporary production, digitization, automation, and the application of artificial intelligence will boost productivity and efficiency and provide consumers with convenience (Joiner, 2019). Digital technology supports education development through distance learning, government through e-government, financial inclusion through fintech, and the development of MSMEs with e-commerce. In conjunction with the expansion of the digital economy, diverse economic resources can now be exploited with improved distribution speed and quality due to the integration of technology. When leadership agility increases, technology adoption also increases (Ding et al., 2020). Consequently, the hypothesis is:

**H3 – There is an influence of Leadership Agility on Technology Adoption**

## 2.5 Organizational Adaptability on Technology Adoption

In an organizational structure, managers are ultimately responsible for deciding whether to adopt new technology after identifying their goals for upgrading various company departments (Miller, 2019). Individual employees then decide whether or not they will utilize the technology (Abdalla et al., 2022). Depending on the circumstances, this secondary adoption may be obligatory, or it may be voluntary. In addition to adaptation capability, organizational adaptability encompasses resistance to adverse situations and maintenance of the current state, thereby changing adverse events into possibilities for long-term sustainability. Technological adoption must be adapted to achieve

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

organizational success in the rapidly evolving digital environment (Dasgupta et al., 2019). When organizations can adapt well to industrial 4.0, they can successfully implement new technologies. According to research conducted by Batubara et al. (2018), organizational adaptation affects technological adoption. Consequently, the hypothesis is:

**H4 – There is an influence of Organizational Adaptability on Technology Adoption**

## 2.6 Technology Adoption on Project Resilience

The fast and dynamic penetration of the digital economy, which includes on-demand services, e-commerce, financial technology (Fintech), and internet of things (IoT) service providers, has altered Indonesia's contemporary digital economy landscape. According to the findings (Kusiak, 2020), digitization, more transparency, and growing service orientation in the manufacturing sector offer the potential to overcome organizational resilience. (Sakurai et al., 2020) To reestablish order following the earthquake in Japan, technological solutions that are both socially and environmentally resilient are required. Therefore, implementing this technology can boost the project's resiliency and accelerate project development. This is consistent with Sheel et al. (2019) findings that technology adoption impacts project resilience. Consequently, the hypothesis is:

**H5 – There is an influence of Technology Adoption on Project Resilience**

## 2.7 Leadership Agility on Project Resilience through Environment Turbulence

Leadership is a person's ability to influence other individuals or members to achieve organizational objectives. Leading agility is presented as a means of leading a team in a complicated, ambiguous, and uncertain environment (Joiner, 2019). Environmental turbulence can sustain the leadership agility that can boost the project's resilience. The environment can be stable, i.e., characterized by low unpredictability. Changing environment is the second sort of environment. When changes are unforeseen and unanticipated, the atmosphere is turbulent (Joiner, 2019). The most important environmental challenges are the nature of the changing pressure and the speed with which the organization must be able to act. It appears that the level of ambient turbulence influences structure. Consequently, the hypothesis is:

**H6 – There is an influence of Leadership Agility on Project Resilience through the Turbulence Environment**

## 2.8 Organizational Adaptability on Project Resilience through Environment Turbulence

In the context of environmental volatility, Simoncelli et al. (2019) discovered that the association between market orientation and performance appears to be substantial. Environmental turbulence is characterized by market volatility, technological volatility, and intense competition Rego et al. (2022). Rapid technological evolution is one of the distinguishing features of turbulence. Foreseeing the outcome of general conditions and uncertainties is impossible, which often results in high customer preference levels (C. Wang et al., 2022). Innovations in technology and market conditions both play an impact. Consequently, the hypothesis is:

**H7 - There is an influence of Organizational Adaptability on Project Resilience through the Turbulence Environment**

### 2.9 Technology Adoption on Project Resilience through Environment Turbulence

Environment turbulence refers to a condition of things that is very complicated, highly viscous, and characterized by hypercompetition and chaos. It is vital to consider aspects unrelated to the market, and businesses must also consider internal and external environmental processes (Rego et al., 2022; C. Wang et al., 2022). The tumultuous environment is the most dynamic and uncertain setting (Turulja et al., 2019). When the project's workers can overcome the chaotic environment, they will also be able to overcome other obstacles. Consequently, the hypothesis is:

**H8 - There is an influence of Technology Adoption on Project Resilience through the Turbulence Environment**

## 3. RESEARCH FRAMEWORK

Based on the above-developed hypotheses, the following research framework, presented in Figure 1, has been developed to carry out the present study.

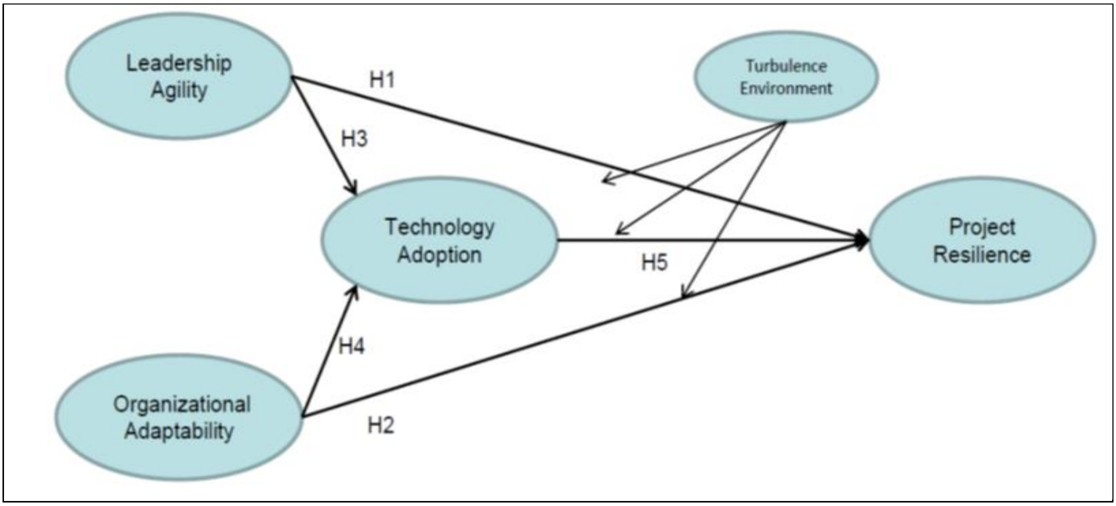


**Figure 1.** Hypothesis Framework

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

## 4. RESEARCH METHOD

This study is a form of investigation called causal impact research. The causal effect research aims to determine the connection or influence between two or more variables. The quantitative method is represented by numbers from scale-based measurements of the investigation variables. This study uses the Likert scale (5-4-3-2-1) from (Pranatawijaya et al., 2019). The precise population count is unknown. This study utilized only primary sources. A questionnaire was issued to the project manager/construction team leader of the Jakarta Bandung Fast Train and Jabodedek LRT projects to collect preliminary data. The participants in this study are project team leaders or aspects of leadership for the Jakarta-Bandung Fast Train and Jabodebek LRT projects in Indonesia. The unit of analysis is the project team leader, which comprises 100 individuals, including the project owner and project contractor, and a working term of more than five years. The survey is designed for construction-related work units. The questionnaire is provided in both paper copy and Google Form versions, which can be completed online. Minimum expected levels of responding jobs include the project manager, superintendent, and project team leader. The data was evaluated using intelligent PLS applications and a structural approach to Equation Model (SEM) (Civelek, 2018). The scale items utilized in the present investigation are shown in Table 1 through 5 below.

**Table 1. Indicators Measuring Project Resilience**

| Dimensions | Indicator |
|---|---|
| *Proactivity* | 1. Leadership and management<br>2. Access to External Resources<br>3. Ability to Leverage Knowledge and Information<br>4. Care Competence of Staff |
| *Coping ability* | 5. Network Robustness<br>6. Market Sensitivity<br>7. Planning Preparedness |
| *Flexibility* | 8. Reflective Business Model<br>9. Situational Awareness<br>10. Innovation and Diversification |
| *Persistence* | 11. Compliance and Regulation<br>12. Adaptive Ability |

## 5. OUTER MODEL ANALYSIS

### 5.1 Validity and Reliability Test

Validity and reliability tests are performed to ensure that the measurement can be used as a measurement (valid and reliable). Validity and reliability testing can be seen in (table 6):

**Table 2. Dimensions Indicator Technology Adoption**

| Dimensions | Indicator |
|---|---|
| *Organizational Culture* | 1. Supportive organizational culture<br>2. Employee and partner engagement<br>3. Employee training and skills development<br>4. Leveraging internal and external (technological) knowledge |
| *Technology Utilization* | 5. Aligning business and IT strategies<br>6. Agile transformation management<br>7. Process standardization and data integration |

**Table 3. Dimensions Indicator Leadership Agility**

| Dimensions | Indicator |
|---|---|
| robust – high speed | 1. Effective In Recognizing Problems<br>2. Making Decisions |
| competency | 3. Adaptive System<br>4. Flexible Structure<br>5. Responsibility sharing |

**Table 4. Dimensions Indicator Organizational Adaptability**

| Dimensions | Indicator |
|---|---|
| *Adaptability* | 1. Project Work Finalization<br>2. Adaptation Of Work Descriptions |
| *Consistency* | 3. Decentralization Of Planning Activities<br>4. Job Enlargement And Rotation |
| *Involvement* | 5. Teamwork<br>6. Cooperation Between Different Business Functions And Professional fields Within firm |
| *Mission* | 7. Professionalization Of Employees<br>8. Reorganizations Of Departments |

Determine convergent validity using the standardized loading factor, which describes the association size between each measurement item (indicator) and its construct. If the correlation is more than 0.70, it is considered that the individual reflexive measures are high. Discriminant Validity is a measuring model that evaluates reflexive indicators based on the cross-loading of measures with conceptions. When examining the value of the extracted average variance (AVE) square root, the instrument is deemed genuine if the AVE score exceeds 0.5. In addition, composite dependability is a metric that can evaluate a construct in terms of the coefficients of latent variables. The construct is

**Vol:** 14 **No: 0**3 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

deemed highly dependable if this measurement yields a value of more than 0.70. Cronbach's Alpha is a test of reliability used to increase the composite dependability of results. If a variable's Cronbach's alpha value is more than 0.70, it is dependable.

**Table 5. Indicator Measuring Environmental Turbulence**

| Dimensions | Indicator |
|---|---|
| *Market Turbulent* | 1. The speed of change for customers' preferences over the time<br>2. Frequency of customers searching for new products/services over the time<br>3. Frequency of customers searching for existing products/services over the time<br>4. The difference between current and new customer's products/services requirement<br>5. The speed of change for marketing practice over the time |
| *Technological Turbulent* | 6. The speed of change in technology over the time<br>7. The difficulty in predicting the technology change over the time<br>8. The opportunity for new products/services has been made possible through technological breakthroughs in our industry<br>9. The intensity of new products/services launched as a result of technological breakthroughs |
| *Regulatory Turbulent* | 10. Difficulty in predicting regulatory changes over the time<br>11. The intensity of regulatory changes over the time<br>12. Uncertainty of the law & regulations implementation |
| *Competitive Turbulence* | 13. The intensity of the competitor's new movement<br>14. The strength of competitors<br>15. The intensity of new products available in the market |

**Table 6. Testing Instrument**

| Instrument Test | Test used |
|---|---|
| Validity test | Convergent Validity AVE |
| Reliability Test | Cronbach Alpha Composite Reliability |

## 5.2 R Square Test

The effect of certain independent latent variables on the latent dependent variable is assessed using R-square for the dependent construct, which displays the magnitude of the impact.

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

### 5.3 Inner Model Analysis

The Structural Model sometimes referred to as the Inner Model Analysis, predicts the causal relationship between the model's tested variables. Smart PLS testing tests the hypothesis during the analysis of the inner model. The t-statistical and probability values can be used to test the hypothesis. The t-statistical value used to test the hypothesis is 1.96 when the p-value is less than 5%. In contrast, the beta score is utilized to identify the direction of the relationship's influence.

## 6. RESEARCH RESULT

A validity test is used to determine whether or not a questionnaire is valid. Convergent validity and AVE were used to test the validity of this study. The instrument is declared valid if the AVE value exceeds 0.05 and the external load value exceeds 0.6. (Table 7)

**Table 7. Research Result**

| Variable | Indicator | Outer Loading | AVE | Information |
|---|---|---|---|---|
| LEADERSHIP AGILITY (X1) | LA1 | 0,830 | 0,653 | Valid |
| | LA2 | 0,773 | | Valid |
| | LA3 | 0,808 | | Valid |
| | LA4 | 0,815 | | Valid |
| | LA5 | 0,814 | | Valid |
| ORGANIZATION AL ADAPTABIITY (X2) | OA1 | 0,784 | 0,636 | Valid |
| | OA2 | 0,788 | | Valid |
| | OA3 | 0,796 | | Valid |
| | OA4 | 0,774 | | Valid |
| | OA5 | 0,719 | | Valid |
| | OA6 | 0,804 | | Valid |
| | OA7 | 0,871 | | Valid |
| | OA8 | 0,838 | | Valid |
| PROJECT RESILIENCE (Y) | PR1 | 0,808 | 0,552 | Valid |
| | PR10 | 0,725 | | Valid |
| | PR11 | 0,776 | | Valid |
| | PR12 | 0,799 | | Valid |
| | PR2 | 0,754 | | Valid |
| | PR3 | 0,707 | | Valid |
| | PR4 | 0,724 | | Valid |
| | PR5 | 0,730 | | Valid |
| | PR6 | 0,731 | | Valid |
| | PR7 | 0,720 | | Valid |
| | PR8 | 0,719 | | Valid |
| | PR9 | 0,718 | | Valid |

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

**Table 7. Continued**

| | | | | |
|---|---|---|---|---|
| TECHNOLOGY ADOPTION (Z) | TA1 | 0,812 | 0,659 | Valid |
| | TA2 | 0,801 | | Valid |
| | TA3 | 0,808 | | Valid |
| | TA4 | 0,831 | | Valid |
| | TA5 | 0,802 | | Valid |
| | TA6 | 0,815 | | Valid |
| | TA7 | 0,812 | | Valid |
| TURBULENCE ENVIRONMENT (M) | TE1 | 0,783 | 0,636 | Valid |
| | TE10 | 0,792 | | Valid |
| | TE11 | 0,812 | | Valid |
| | TE12 | 0,788 | | Valid |
| | TE13 | 0,814 | | Valid |
| | TE14 | 0,825 | | Valid |
| | TE15 | 0,823 | | Valid |
| | TE2 | 0,822 | | Valid |
| | TE3 | 0,779 | | Valid |
| | TE4 | 0,821 | | Valid |
| | TE5 | 0,780 | | Valid |
| | TE6 | 0,790 | | Valid |
| | TE7 | 0,741 | | Valid |
| | TE8 | 0,809 | | Valid |
| | TE9 | 0,782 | | Valid |

## 6.1 Reliability Test Results

The researchers utilized two types of reliability tests the Cronbach Alpha test and the Composite Reliability test. Cronbach Alpha is a reliability statistic that assesses the minimum reliability value (lower bound). The data are deemed reliable if the Cronbach alpha value is more than 0.7. Composite reliability, on the other hand, assesses a variable's true dependability value; data with a composite reliability score of >0.7 are regarded as extremely dependable (see table 8). According to the findings of the calculations, all elements of the instrument met the criteria for validity and reliability, with scores exceeding the standards.

## R-Square

The R-Square approach measures the extent to which exogenous variables influence an endogenous variable. As indicated in Table 9, the R-Square value was estimated based on the data analysis performed with the smartPLS application.

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

**Table 8. Reliability Test Result**

| | Cronbach's Alpha | Composite Reliability |
|---|---|---|
| (M) TURBULENCE ENVIRONMENT | 0,959 | 0,963 |
| (X1) LEADERSHIP AGILITY | 0,867 | 0,904 |
| (X2) ORGANIZATIONAL ADAPTABIITY | 0,918 | 0,933 |
| (Z) TECHNOLOGY ADOPTION | 0,914 | 0,931 |
| (Y) PROJECT RESILIENCE | 0,926 | 0,937 |

The diversity in technology adoption is explained by the turbulent environment, leadership agility, organizational flexibility, and project resilience, according to Table 9. In contrast, the remainder is explained by unstudied variables. Environments of turbulence, leadership agility, organizational adaptability, and technological adaptation account for 61.5 percent of the time of consumer trust; the remainder is explained by variables not addressed in this study.

**Table 9. R-Square Result**

| | R Square | R Square Adjusted |
|---|---|---|
| (Z) TECHNOLOGY ADOPTION | 0,607 | 0,599 |
| (Y) PROJECT RESILIENCE | 0,615 | 0,586 |

## 6.2 Hypothesis Testing (Table 10)

### 6.2.1 Leadership Agility affects Project Resilience

The results of testing the leadership agility hypothesis on project resilience yield a score (p = 0.254) with p values of 0.012 (p0.05) and t statistics of 2.523 (p> 1.96), indicating that the leadership agility variable and project resilience have a significant positive relationship. The more agile the leadership, the more resilient the project will be.

### 6.2.2 Organizational Adaptability Affects Project Resilience

The results of testing the organizational adaptability hypothesis on project resilience yielded a score (p = 0.252) with p values of 0.003 (p0.05) and t statistics of 3.023 (p> 1.96), indicating that organizational adaptability variables and project resilience have a significant positive relationship. The more adaptable an organization is, the more resilient a project is.

### 6.2.3 Leadership Agility affects Technology Adoption

The results of testing the leadership agility hypothesis on technology adoption yield a score (p = 0.454) with p values of 0.000 (p0.05) and t statistics of 5.669 (p> 1.96), indicating that the leadership agility variable and technology adoption has a significant positive relationship. Technology adoption will be better if leadership agility is improved.

### 6.2.4 Organizational Adaptability Affects Technology Adoption

The test of the organizational adaptability hypothesis on technology adoption yielded a score (p = 0.448) with p values of 0.000 (p0.05) and t statistics of 5.429 (p> 1.96), indicating a significant positive relationship between organizational adaptability and technology adoption variables. The more adaptable an organization is, the easier it will be to adopt new technology.

### 6.2.5 Technology Adoption affects Project Resilience

The results of testing the technology adoption hypothesis on the resilience project yielded a score of (p = 0.330), with p values of 0.002 (p0.05) and t statistics of 3.118 (p> 1.96), indicating a significant positive relationship between technology adoption variables and project resilience. The more technology is adopted, the more resilient the project will be.

### 6.2.6 The turbulence Environment does not Affect Project Resilience

The results of testing the turbulence environment hypothesis on project resilience show that there is no relationship between turbulence environment variables and project resilience (p = 0.124), with p values of 0.002 (p 0.51) and t statistics of 1.954 (p> 1.96) indicating that there is no relationship between turbulence environment variables and project resilience.

### 6.2.7 Turbulence Environment is not able to moderate Leadership Agility toward Project Resilience

Testing the leadership agility hypothesis on project resilience moderated by the turbulence environment yielded a score (-0.073) with p-values of 0.553 (p0.05) and t-statistics of 0.593 (p>1.96), indicating that the turbulence environment was unable to moderate leadership agility on project resilience.

### 6.2.8 A Turbulence Environment is not Able to Moderate Organizational Adaptability to Project Resilience

The results of testing the hypothesis that a turbulence environment moderates organizational adaptability to project resilience yielded a score of (-0.023) with p values of 0.830 (p0.05) and a t statistic of 0.215 (p>1.96), indicating that a turbulence environment was unable to moderate organizational adaptability to project resilience.

**Vol:** 14 **No:** 03 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 1-21) **Doi:** 10.34109/ijefs. 20220060

**Table 10. Hypothesis Result**

| | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values | Information |
|---|---|---|---|---|
| **Direct Effect** | | | | |
| (X1) LEADERSHIP AGILITY -> (Y) PROJECT RESILIENCE | 0,254 | 2,523 | 0,012 | Significant Positive |
| (X2) ORGANIZATIONAL ADAPTABIITY -> (Y) PROJECT RESILIENCE | 0,252 | 3,023 | 0,003 | Significant Positive |
| (X1) LEADERSHIP AGILITY -> (Z) TECHNOLOGY ADOPTION | 0,454 | 5,669 | 0,000 | Significant Positive |
| (X2) ORGANIZATIONAL ADAPTABIITY -> (Z) TECHNOLOGY ADOPTION | 0,448 | 5,429 | 0,000 | Significant Positive |
| (M) TURBULENCE ENVIRONMENT -> (Y) PROJECT RESILIENCE | 0,124 | 1,954 | 0,051 | Not Significant |
| (Z) TECHNOLOGY ADOPTION -> (Y) PROJECT RESILIENCE | 0,330 | 3,118 | 0,002 | Significant Positive |
| Indirect Effect | | | | |
| Moderating Effect X1 -> (Y) PROJECT RESILIENCE | -0,073 | 0,593 | 0,553 | Not Significant |
| Moderating Effect X2 -> (Y) PROJECT RESILIENCE | -0,023 | 0,215 | 0,830 | Not Significant |
| Moderating Effect Z -> (Y) PROJECT RESILIENCE | 0,045 | 0,290 | 0,772 | Not Significant |

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### 6.2.9 Turbulence Environment is not Able to Moderate Technology Adoption toward Project Resilience

The results of testing the hypothesis that a turbulence environment moderates organizational adaptability to project resilience yielded a score of (-0.023) with p values of 0.830 (p0.05) and a t statistic of 0.215 (p>1.96), indicating that a turbulence environment was unable to moderate organizational adaptability to project resilience.

## *7.* DISCUSSION

Most unanticipated events project managers confront today are not connected with the same extreme contexts and limitations as those mentioned in the three preceding cases; hence, they typically do not necessitate much improvisation. However, they necessitate swift and agile answers. To practice responsive agility effectively, a project manager must function within an organizational culture that recognizes the inevitability of unforeseen events (Karlsen et al., 2020). According to Laufer (2018), "the future is changing so rapidly that it is impossible to predict. We have put a significant focus on speedy response. We will continue to be startled, but not by our continued amazement. Similar attitudes are advantageous for organizations. Former American Institute of Psychoanalysis president Theodore Rubin wrote, "The problem is not that there are problems. Expecting otherwise and believing that having troubles is a problem. According to the findings of this study, the elements that can influence project resilience's success include leadership agility, organizational adaptability, and technology adoption without moderation effects.

Good leadership and the capacity to work under duress will contribute to the project's resiliency within the organization. Resilience requires awareness of the variables that disturb the gap between available and necessary resources (Aldianto et al., 2021; Rusdi et al., 2020). Interdependent teams are one of the organizations' most effective social networks for problem-solving and coordinated action. Our world is far too complex for a single leader to navigate independently. Modern leaders require one or more leadership teams with extensive knowledge and problem-solving skills to determine the organization's proper priorities and direct its specific actions. When needed, a resilient leader recognizes their limitations and defers to those with greater knowledge. This symbiotic relationship ensures the existence of the entire organization (D. Wang et al., 2022). Empowering teams also enhances the organization's leadership qualities and prepares others to assume a leadership position when an unanticipated problem emerges. A distributive form of leadership raises the leadership quotient, enabling an organization to quickly adapt to change and recover from threats or crises. Team cohesion is regarded as one of the essential elements of highly functional organizations, as it fosters a feeling of oneness and "we" (Todt et al., 2019).

Moreover, leaders who spot prospective technical advancements can help their organization stand out from the competitors. As the era advances, technology must be studied further, and enterprises must be ready to adapt to these conditions. As a leader in the current technological era, it is regrettable if you do not utilize existing technologies. Suppose a leader lacks the necessary skills to track the evolution of the digital age. In that circumstance, he is likely to be criticized even by his subordinates, reducing his ability to lead an organization to its objectives (Rusdi et al., 2020).

Aside from that, one of the organization's goals is to adapt to local and international changes to sustain prosperity and respond to positive and bad changes (Al-Abrrow et al., 2019). In this context, organizational resilience refers to an organization's capacity to foresee and respond to events by adjusting and recovering naturally. Individuals, communities, and organizations with resilience can absorb stress, recover function, and emerge from adversity stronger than before (Ma et al., 2018).

Therefore, enterprises must utilize cross-platform, cross-platform, and cross-platform technology to develop information system applications that function across platforms, networks, and computing environments. It is necessary to study all employees and organizational components (Dasgupta et al., 2019). Adaptable organizations will be able to compete in the marketplace effectively. Companies with a high level of resilience can successfully adopt new technologies. This situation illustrates that the corporation has established a robust strategy and defense to overcome rivals by embracing the prevailing fashion (Sheel et al., 2019).

## 8. CONCLUSION

Based on the preceding explanation, it can be stated that the leadership agility variable and project resilience, as well as the organizational adaptability variable and project resilience, have a significant positive association. Significant positive relationships exist between the leadership agility variable and technology adoption, the organizational adaptability variable and technology adoption, and the technology adoption variable and project resilience. However, there is no relationship between the turbulence environment variable and project resilience.

## 9. RESEARCH IMPLICATIONS

This research has both theoretical and practical implications. This study contributes to the current literature on the management and extension of megaprojects, notably in Indonesia. However, the scope of this study is restricted to the following variables: leadership agility, organizational flexibility, technology adoption, and turbulence environment as a moderating component. To ensure the robustness of megaprojects, it is necessary to do further research that considers numerous other factors. In addition, the study's findings will assist practitioners in strengthening the organizational resilience of their megaprojects by enhancing leadership agility, organizational flexibility, and technology uptake.

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