Al-Ishlah: Jurnal Pendidikan
Vol.17, 2 (June, 2025), pp. 3523-3534
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v17i2.6432

Developing Center of Excellence Vocational High Schools: Analysis of the Influence of Agile Leadership and School Organizational Culture

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ARTICLE INFO

Keywords:

Agile Leadership;
School Development;
School Organizational Culture

Article history:

Received 2024-12-01
Revised 2025-03-05
Accepted 2025-06-30

ABSTRACT

Being designated as a Center of Excellence Vocational School (CEVHS) is a prestigious achievement, indicating that the institution has passed a rigorous, credible selection process. Several state vocational schools in Bukittinggi City have earned this designation, prompting significant institutional transformation to improve learning quality and promote the Pancasila Student Profile. This study employed a descriptive correlational design to examine the influence of agile leadership and school organizational culture on CEVHS development. The population included 228 teachers from SMK N 1 and SMK N 2 Bukittinggi. A stratified proportional random sampling method was used, based on education level and years of service, resulting in a sample size determined using the Slovin formula. Data were collected via a Likert-scale questionnaire and analyzed using mean scores, percentages, and the Respondent Achievement Level (TCR). Multiple linear regression analysis was conducted using SPSS software. The results revealed a significant positive influence of agile leadership and school organizational culture on the development of CEVHS, with a combined contribution of 53%. These findings highlight the crucial role of leadership and organizational culture in supporting the transformation of vocational schools into Centers of Excellence. Effective implementation of these factors can enhance learning quality and align educational outcomes with national educational goals.

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1. INTRODUCTION

Vocational schools play a critical role in the modern educational landscape by emphasizing technical and practical skills that prepare students for the workforce (Clarke & Winch, 2012; Inderanata & Sukardi, 2023; Mamanov, 2023). In Indonesia, one of the flagship initiatives to enhance vocational education is the Centre of Excellence Vocational High School program (CEVHS), known locally as Sekolah Menengah Kejuruan Pusat Keunggulan (SMK PK). Launched in 2021 by the Directorate General of Vocational Education, the CEVHS program aims to improve the quality of vocational education through the Merdeka Belajar framework and the values of Pancasila, with a focus on

strengthening both hard and soft skills and aligning education with industry demands (Fahmayani, 2021).

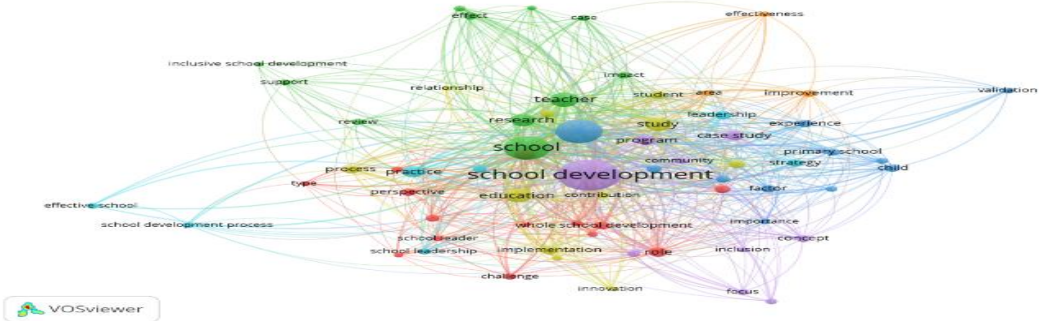
Being designated as a CEVHS signifies a significant achievement, as it requires passing a rigorous and credible selection process (Akyuwen et al., 2023). The program emphasizes the 8+I Link and Match concept promoted by the Ministry of Education and Culture, which mandates the integration of education and the professional world. Several state vocational schools in Bukittinggi City have been selected for this program, encouraging them to transform their learning environments and holistically improve student outcomes in alignment with the Pancasila Student Profile.

Interviews with school principals in these institutions reveal that attaining CEVHS status demands strong leadership and a deeply embedded organizational culture. Success hinges on the commitment of the entire school community. However, despite its ambitious goals, research indicates that the implementation of the CEVHS program has not yet reached full effectiveness. For instance, graduate employment absorption remains at 60%, only 25% of instructors hold competency certifications, and project-based learning implementation stands at 70% (Widiawati et al., 2024).

These challenges highlight the need to strengthen the implementation and management of the program. Researchers suggest that insufficient agile leadership and a weak organizational culture may hinder effective execution. Agile leadership plays a vital role in managing change and fostering innovation within schools. Such leaders are capable of designing strategies, establishing support systems, and guiding schools through dynamic environments (Attar & Abdul-Kareem, 2020a). A robust organizational culture is also essential, as it underpins staff commitment and drives sustainable change (Holbeche, 2023; Widiawati, 2015).

Agile leadership has been shown to significantly influence organizational innovation, change, and school quality (Awad & Al Adwan, 2023; Edmondson, 2021; Jassmy & Katea, 2022; Yilmaz & Özgenel, 2023). It enhances productivity and collaboration even amid constant change (Attar & Abdul-Kareem, 2020a; Parker et al., 2015). Therefore, understanding the impact of agile leadership and organizational culture on CEVHS development is essential. Strong leadership, ownership, accountability, communication, monitoring, and appreciation are key success factors in program implementation (Al Kadri & Widiawati, 2020).

While previous studies have explored the implementation of CEVHS (Anwar et al., 2024; Damayanti et al., n.d.; Fahmayani, 2021; Sunawardhani & Casmudi, 2022), there remains a gap in research that connects its development with agile leadership and school organizational culture. Based on the analysis of 500 publications indexed on Google Scholar between 2014 and 2024 using Pop and VOSviewer software, a visual representation of school development trends was generated, offering new insights into this area of study.



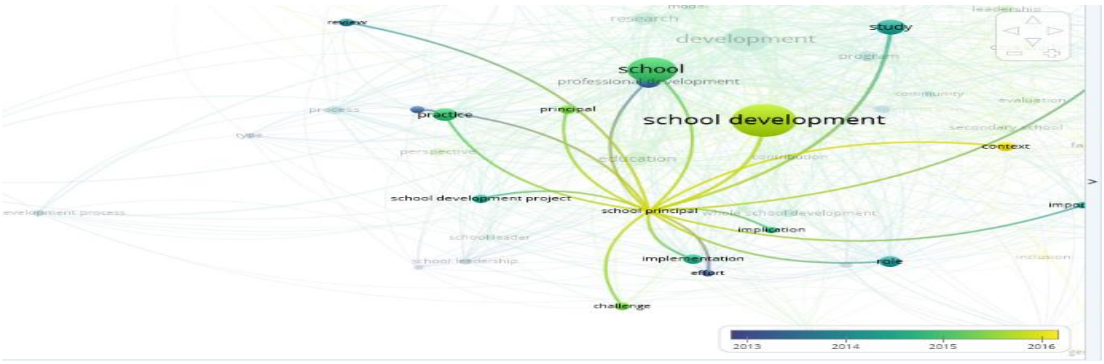


Figure 1. Research Novelty Visualisation

The visualization results indicate a clear research gap: there is a limited number of studies that specifically explore the relationship between school development and principal leadership—particularly agile leadership—and few have investigated the impact of organizational culture on school improvement. Yet, both agile leadership and a strong organizational culture are widely recognized as critical components in driving effective school development. This gap underscores the novelty of the present research.

Therefore, based on the aforementioned background, this study seeks to answer the following research question: *To what extent do Agile Leadership and School Organizational Culture influence the development of Centre of Excellence Vocational High Schools (CEVHS) in Bukittinggi City?* The primary objective of this study is to assess the degree to which agile leadership and organizational culture affect the development and success of the CEVHS program.

2. METHODS

This study adopts a quantitative research approach utilizing regression analysis to determine the influence of agile leadership and school organizational culture on the development of Centre of Excellence Vocational High Schools (CEVHS). Aligned with the principles of causal-comparative research, the study aims to identify and analyze the causal relationships between the independent variables—agile leadership and school organizational culture—and the dependent variable, which is the development of the CEVHS.

The research population comprises all teachers from public vocational high schools in Bukittinggi City, totaling 228 individuals across two institutions. Table 1 presents the demographic distribution of the study population.

Table 1. Demographic Distribution of the Research Population

Education Level	**S1**		**S2**		**Total**
Period of Service	≤ 10	>10	≤ 10	>10	
SMK N 1	75	36	22	2	135
SMK N 2	51	28	13	1	93
Amount	126	64	35	3	228
Total	190		38		

The sample in this study was selected using the proportional stratified random sampling technique, which ensures that each member of the population has an equal chance of being included in the sample. The sample size was calculated using the Slovin formula, resulting in a total of 74 teachers as respondents. A detailed summary of the sample distribution is presented in the following table.

Table 2. Research Sample Distribution

Education Level	S1		S2		Total
Period of Service	≤ 10	>10	≤ 10	>10	
SMK N 1	24	12	7	1	44
SMK N 2	16	9	4	1	30
Amount	40	21	11	2	74
Total	61		13		

The instrument employed in this study was a questionnaire developed based on a five-point Likert scale, comprising the response options: Always, Often, Sometimes, Rarely, and Never. Prior to its implementation in the main study, the questionnaire underwent validity and reliability testing to ensure its measurement accuracy. Only the items deemed valid and reliable were subsequently utilized as instruments for data collection in the field.

The research variables and their corresponding indicators, which were operationalized into the data collection instrument, are presented in the following table.

Table 3. Research Variables and Indicators

Variables	Indicators	Sub-Indicators	Item
Development of SMK PK		Curriculum	1 - 3
		Project-based learning	4 - 10
		Increased role of teachers from the world of work	11 – 14
		Practical field work	15 - 19
		Training	20 – 22
		Competency certification	23 - 24
		Teaching factory-applied research	25 – 27
		Commitment to uptake	28 – 30
		Cooperation with DUDI	31 – 34
Agile Leadership		Humility	1 – 6
		Adaptability	7 - 12
		Visionary	13 - 18
		Engagement	19 - 24
School Organizational Culture	Value	Cooperation	1 – 4
		Responsibility	5 – 7
		Innovative	8 – 10
	Trust	Integrity	11 - 13
		Competence	14 - 16
		Consistency	17 – 19
		Loyalty	20 – 22
		Openness	23 - 27

Data collection for this research was executed through a dual approach, combining direct distribution of questionnaires with the utilization of Google Forms to ensure a comprehensive reach. Initially, meticulously designed questionnaires, comprising clear and unambiguous questions tailored to the research objectives, were prepared in both print and digital formats. For direct collection, target

respondents were identified, and questionnaires were physically distributed, with researchers providing explanations of the study's purpose and instructions for completion, ensuring adequate time for responses before collection. Concurrently, a digital version of the questionnaire was created using Google Forms, allowing for wider dissemination. The Google Form link was distributed via various digital channels, and the collected data was automatically compiled into Google Sheets. Subsequently, the data from the physical questionnaires was validated for completeness and consistency before being merged with the digital data. This combined dataset was then formatted to be compatible with statistical analysis software, ensuring a robust foundation for subsequent analysis. Throughout this process, ethical considerations were paramount, with respondent consent and data confidentiality rigorously maintained, and detailed documentation of each step was recorded for transparency The questionnaires distributed were first tested for validity and reliability using the SPSS programme. The results of the questionnaire validity test indicated that the instruments measuring CEVHS development, agile leadership, and school organizational culture were valid, as evidenced by correlation coefficient (r) values exceeding 0.361. Furthermore, the reliability test demonstrated that the questionnaire was reliable, with a calculated reliability coefficient of 0.70.

The research data underwent thorough analysis using the multiple regression method, facilitated by SPSS software, to determine the relationships between variables. Initially, a descriptive analysis was conducted to summarize the data's characteristics, providing a foundational understanding of the variables' distribution and central tendencies. Prior to hypothesis testing, prerequisite tests were performed, including normality and linearity tests, to ensure the data met the assumptions required for valid regression analysis. The normality test assessed whether the residuals of the model were normally distributed, while the linearity test examined the presence of a linear relationship between the independent and dependent variables. Subsequently, hypothesis testing was carried out through multiple regression analysis, which quantified the influence of each independent variable on the dependent variable. The significance of these relationships was determined by examining the significance levels (p-values) associated with the regression coefficients. Ultimately, the coefficient of determination (R^2) was examined to assess the extent to which the independent variables accounted for the variance in the dependent variable, thereby offering an indication of the overall goodness of fit of the regression model.

3. FINDINGS AND DISCUSSION

3.1 Normality Test

The results of data analysis indicate that the normality test, conducted using the Kolmogorov-Smirnov method via the SPSS software, yielded a significance value of 0.200. According to the Kolmogorov-Smirnov test criteria, a dataset is considered normally distributed if the significance value is equal to or greater than 0.05; otherwise, it is deemed non-normal. The normality test results showed significance values of 0.081 for CEVHS development, 0.139 for agile leadership, 0.088 for school organizational culture, and 0.093 for the residuals. Since all values exceed the 0.05 threshold, it can be concluded that the data meet the assumption of normal distribution, thereby satisfying the normality requirement for further statistical analysis..

The following figure presents the outcome of the normality test.

Table 2. Normality Test Result

One-Sample Kolmogorov-Smirnov Test

		Pengembangan SMK PK	Agile Leadership	Organizational Culture	Unstandardized Residual
N		74	74	74	74
Normal Parameters[a,b]	Mean	145.86	103.15	106.80	.0000000
	Std. Deviation	12.606	14.611	13.988	8.64419069
Most Extreme Differences	Absolute	.081	.139	.088	.093
	Positive	.077	.124	.053	.042
	Negative	-.081	-.139	-.088	-.093
Test Statistic		.081	.139	.088	.093
Asymp. Sig. (2-tailed)		.200[c,d]	.001[c]	.200[c,d]	.188[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.
Sumber : olahan data penelitian tahun 2024

3.2 Linearity Test

3.2.1 Linearty Test Of Variable X1 to Y

According to the criteria for linearity testing, a Deviation from Linearity significance value equal to or greater than 0.05 indicates that the data exhibit a linear relationship, whereas a value less than 0.05 suggests non-linearity. The results of the linearity test confirm that the data meet the assumption of linearity. Data analysis conducted using SPSS revealed that the significance value satisfies this requirement. Deviation From Linearity variable Agile Leaderhip with the CEVHS Development > 0.05, with value 0.443. So it can be concluded that there is a significant linear relationship between Agile Leadership and the CEVHS Development.

The results of the linearity statistical test can be seen in the following table in detail.

Table 3. Linearity Test Result of Variable X1 to Y

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Development of the CEVHS * Agile Leadership	Between Groups	(Combined)	8000.415	29	275.876	3.372	.000
		Linearity	4396.790	1	4396.790	53.735	.000
		Deviation from Linearity	3603.625	28	128.701	1.573	.087
	Within Groups		3600.233	44	81.823		
	Total		11600.649	73			

Source: results of research data processing in 2024

3.2.2 Linearty Test Of X2 to Y

In accordance with the principles of linearity testing, a Deviation from Linearity significance value equal to or greater than 0.05 indicates that the data follow a linear pattern, whereas a value less than 0.05 suggests a non-linear relationship. The results of the linearity test indicate that the data meet the assumption of linearity. Specifically, SPSS output shows that the significance value for the Deviation from Linearity between the variable School Organizational Culture and CEVHS Development is 0.195, which is greater than 0.05. Therefore, it can be concluded that there is a statistically significant linear relationship between School Organizational Culture and the Development of CEVHS.

A detailed summary of the linearity test results is presented in the following table.

Table 4. Linearity Test Result of Variable X2 to Y

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Development of the CEVHS Organizational Culture *	Between Groups	(Combined)	8940.865	37	241.645	3.271	.000
		Linearity	5247.879	1	5247.879	71.030	.000
		Deviation from Linearity	3692.986	36	102.583	1.388	.165
	Within Groups		2659.783	36	73.883		
	Total		11600.649	73			

Source: results of research data processing in 2024

3.2.3 Influence of Agile Leadership (X1) and School Organizational Culture (X2) on the Development of of the CEVHS (Y)

The hypothesis testing in this study aims to examine the influence of Agile Leadership (X1) and School Organizational Culture (X2) on the Development of Center of Excellence Vocational High Schools (CEVHS) (Y). To assess this relationship, a multiple regression analysis was employed. The analysis was conducted using a significance level of 0.05, and the statistical computations were performed using the SPSS version 24.0 software.

The results derived from the multiple linear regression analysis are presented as follows..

Table 5. Hypothesis Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	69.747	8.572		8.137	.000
	Agile Leadership	.294	.086	.341	3.419	.001
	Organizational Culture	.429	.090	.476	4.772	.000

a. Dependent Variable: Pengembangan SMK PK

Source: results of research data processing in 2024

The results of the regression analysis indicate that the constant (α) is 69.747, with regression coefficients of 0.294 for Agile Leadership (X1) and 0.429 for School Organizational Culture (X2). Accordingly, the resulting regression equation is $\hat{Y} = 69.747 + 0.294X1 + 0.429X2$. This equation implies that when both Agile Leadership and School Organizational Culture are at zero, the predicted baseline value for the Development of the Center of Excellence Vocational High School (CEVHS) is 69.747. Furthermore, the model suggests that a one-unit increase in Agile Leadership is associated with a 0.294-unit increase in CEVHS development, while a one-unit increase in School Organizational Culture corresponds to a 0.429-unit increase. Therefore, both independent variables contribute positively to the dependent variable.

For instance, if a school principal scores 100 on both Agile Leadership and School Organizational Culture, the predicted level of CEVHS development can be calculated as 69.747 + (0.294 × 100) + (0.429 × 100) = 142.047.

As shown in the table above:

a) The Agile Leadership variable has a t-statistic of 3.419 with a significance level of 0.001, indicating a statistically significant effect on the dependent variable.
b) The School Organizational Culture variable yields a t-statistic of 4.772 with a significance level of 0.000, also demonstrating a highly significant influence.

The significance values of 0.001 for Agile Leadership and 0.000 for School Organizational Culture are both below the threshold of 0.05, indicating that the alternative hypothesis (Ha) is accepted. This confirms that the regression coefficients—0.294 for Agile Leadership and 0.429 for School Organizational Culture—are statistically significant and contribute meaningfully to the development of Center of Excellence Vocational High Schools (CEVHS) in Bukittinggi City.

An F-test was conducted to further evaluate the overall significance of the regression model. A summary of the F-test results is presented in the following table.:

Table 6. F-test of Regression Significance of Agile Leadership (X1) and School Organizational Culture (X2) on Development of the CEVHS (Y)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6145.940	2	3072.970	39.999	.000[b]
	Residual	5454.708	71	76.827		
	Total	11600.649	73			

a. Dependent Variable: Development of the CEVHS

b. Predictors: (Constant), Organizational Culture, Agile Leadership

Source: results of research data processing in 2024

The calculation results in the table above show that F count = 39.999 with $\varrho = 0.000 < \alpha$ 0.05. This means that the regression equation $\hat{Y} = 69.747 + 0.294X1 + 0.429X2$ is significant at the 95% confidence level and can be used to predict the development of the CEVHS.

To determine the magnitude of the influence of Agile Leadership (X1) and School Organizational Culture (X2) on the Development of the CEVHS (Y), it can be seen from the R value. Based on statistical tests, the R value is 0.200 with an R-squared value of 0.040. The results of the calculation of the R value can be seen in the following table.

Table 7. The magnitude of the influence of Agile Leadership (X1) and School Organizational Culture (X2) on the Development of the CEVHS (Y)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.728[a]	.530	.517	8.765

a. Predictors: (Constant), Organizational Culture, Agile Leadership

Source: results of research data processing in 2024

The results presented in the table above indicate that the multiple correlation coefficient (ryx1x2) is 0.728, while the coefficient of determination (R^2) is 0.530. This implies that Agile Leadership and School Organizational Culture together explain 53% of the variance in the development of Center of Excellence Vocational High Schools (CEVHS). The 53% value was derived using the formula proposed by Usman (2010:34), which states that the contribution of independent variables to the dependent variable can be calculated using the formula: $KP = R^2 \times 100\%$. Accordingly, $KP = 0.530 \times 100\% = 53\%$, indicating a substantial level of influence.

Based on this analysis, it can be concluded with 95% confidence that the research hypothesis—stating that Agile Leadership and School Organizational Culture significantly affect the development of CEVHS in Bukittinggi City—is supported. These findings suggest that both Agile Leadership and School Organizational Culture possess considerable predictive power in explaining the variation in CEVHS development, with a total contribution of 53%.

Discussion

Both SMK Negeri 1 Bukittinggi and SMK Negeri 2 Bukittinggi have demonstrated strong empirical foundations as Centres of Excellence (CEVHS). SMK N 1 Bukittinggi stands out for its wide range of specialized programs and the effective implementation of the *Merdeka Belajar* curriculum. This success is supported by competent human resources, adequate facilities, and well-documented administrative data in the Dapodik system maintained by the Ministry of Education and Culture. In contrast, SMK N 2 Bukittinggi highlights its legacy of academic excellence, underscored by its ISO 9001 quality management certification and international partnerships through sister school collaborations. These institutions reflect a shared commitment to advancing vocational education in line with modern educational trends and active industry engagement. The government's designation of these schools as CEVHS has also led to increased investment in infrastructure and educational resources.

The findings of this study provide compelling evidence that agile leadership and school organizational culture significantly impact the development of CEVHS in Bukittinggi City. The correlation coefficient of 0.728 and a coefficient of determination of 53% suggest a strong and meaningful relationship between the variables. This aligns with previous research showing that school leaders who understand organizational dynamics and apply context-sensitive strategies can create sustainable added value (Day et al., 2016). Agile leadership, in particular, supports adaptive change and continuous improvement, which are essential for maintaining excellence in vocational schools (Kim et al., 2020).

Agile leadership is defined by its flexibility, responsiveness, collaboration, and adaptability to change. It fosters an organizational culture that supports innovation and continuous educational development (Attar & Abdul-Kareem, 2020c). Studies indicate that principals who exhibit agile leadership are more effective in improving school performance, and that teachers' perceptions of such leadership correlate positively with school effectiveness, although the effects may vary depending on school level and teacher experience (Yılmaz & Özgenel, 2023).

This study reinforces those findings by highlighting how agile school leaders in vocational settings contribute to a culture of innovation through the adoption of educational reform. Agile leadership enables alignment between strategic school visions and the practical needs of students, educators, and industry stakeholders (Chaerunnisa et al., 2022). In an era of dynamic educational demands, such leadership plays a pivotal role in driving school development through agile decision-making and collaborative environments.

Several core components define agile leadership, including adaptability, innovation, collaboration, and empowerment. Principals who embody these traits are better equipped to respond to shifts in policy and student needs. Agile leadership supports competency-based vocational education by empowering teachers to adopt entrepreneurial behaviors, promoting curriculum innovation, and strengthening collaboration (Baydar, 2023; Klopper & Pendergast, 2017; Kropp et al., 2016).

The strong positive correlation found in this study implies that agile leadership practices—marked by humility, vision, flexibility, and active engagement—are instrumental in developing CEVHS. Leaders who apply agile principles create environments that promote creativity, problem-solving, and continuous improvement. To support these outcomes, principals should receive ongoing training in strategic adaptation, change management, and staff empowerment.

School leadership encompasses complex responsibilities, including human resources, infrastructure, academic planning, and finance. Effective management in these areas requires strategic thinking, consistent evaluation, and a focus on organizational growth (Hamidah et al., 2024). In addition to operational efficiency, principals must also foster inclusive and collaborative school cultures by promoting open communication and mutual respect.

Organizational culture also plays a substantial role in shaping school development outcomes. A strong school culture built on shared values, mutual trust, and a growth mindset fosters a cohesive community where all stakeholders—teachers, students, and administrators—work together toward

common goals. Organizational culture not only influences internal collaboration but also supports the successful implementation of reform initiatives such as CEVHS (Holbeche, 2023).

Therefore, developing a resilient and adaptive school culture is essential. When teachers and staff feel connected to the school's mission and values, they are more motivated and committed to its success. A collaborative culture creates synergy and accelerates educational progress, particularly in meeting the objectives of national vocational strategies. This research confirms that a strong organizational culture contributes significantly to the realization of vocational excellence programs.

Furthermore, the integration of agile leadership and organizational culture offers a promising model for vocational school development. These elements collectively contribute to producing graduates who are not only job-ready but also capable of innovation and problem-solving—skills that are increasingly demanded in today's workforce. Establishing a competitive advantage through a combined leadership-culture approach can position CEVHS schools to excel both nationally and internationally.

Despite the significant influence of agile leadership and organizational culture—accounting for 53% of the variance in CEVHS development—there remains a considerable portion (47%) unexplained. This indicates the presence of additional factors that contribute to school development and merit further exploration. Potential influences may include teacher qualifications, access to learning resources, community and industry partnerships, and student demographic characteristics.

Future studies should investigate these unexplored factors to gain a more comprehensive understanding of what drives successful vocational school development. Exploring these areas will not only fill the current knowledge gaps but also provide more targeted strategies for improving the quality of vocational education in Indonesia.

In summary, this study underscores the critical roles of agile leadership and organizational culture in the development of CEVHS. School principals, as strategic leaders, must continuously develop their leadership competencies and foster inclusive, collaborative environments. By embedding these practices into school management, vocational institutions can better respond to change, drive innovation, and elevate educational outcomes. As emphasized by Siregar et al. (2024), effective school leadership consists of aligning people, organizational goals, and influence, while serving as the primary force for school transformation. With this approach, schools can enhance their competitiveness, contribute to national development goals, and ensure the success of vocational education in preparing skilled, future-ready graduates.

4. CONCLUSION

This study offers meaningful insights into the determinants that contribute to the development of Center of Excellence Vocational High Schools (CEVHS). Emphasizing agile leadership practices and cultivating a constructive school organizational culture enables educational institutions to foster environments conducive to innovation and enhanced learning outcomes. The findings confirm a statistically significant influence of both Agile Leadership and School Organizational Culture on the advancement of CEVHS. The magnitude of the contribution of these two variables is 53%, which indicates that adaptive and innovative leadership, as well as collaborative school organizational culture, play a key role in supporting the development of the CEVHS. Agile leadership helps create flexibility and innovation in school management, while a strong school organisational culture promotes synergy and productivity in achieving educational goals. To support the development of the CEVHS, it is recommended that school principals improve their agile leadership competencies and strengthen their school organisational culture.

This research provides empirically based suggestions for school administrators and policymakers. Emphasizing professional development programs that focus on agile leadership skills and fostering positive organizational cultures could significantly enhance CEVHS development. Schools could implement strategies to promote collaborative decision-making, encourage experimentation, and create

a culture of continuous improvement. Further, there could be consideration given to the development of tools to measure agile leadership and organizational culture within a school context, so that changes can be measured over time.

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