Evaluating the Key Success Factors of "Merdeka" Curriculum: Evidence from East Nusa Tenggara, Indonesia

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Abstract

21st-century Education demands an adaptive system to prepare graduates for dynamic global changes. The "Merdeka" Curriculum in Indonesia is designed to meet these demands through learning based on the Pancasila Student Profile. Thus, this research aims to evaluate the key success factors of the implementation of "Merdeka" Curriculum at the Senior High School (SMA) level by using the CIPP (Context, Input, Process, Product) evaluation model combined with Structural Equation Modeling-Partial Least Squares (SEM-PLS). Data were collected through a survey of 110 respondents, including driving school facilitators, supervisors, principals, and teachers in Manggarai Regency, East Nusa Tenggara, Indonesia. The data analysis covers four dimensions of CIPP with 52 indicators. The study revealed that Context significantly influences Input (path coefficient 0.809) and that Input directly affects Process (path coefficient 0.648). However, the direct influence of Input on the Product is not significant (path coefficient 0.019), while Process is the primary mediator that connects Input and Product with significant influence (path coefficient 0.672). This research highlights the importance of Process as a key factor in implementing the "Merdeka" Curriculum. Policy support and initial readiness (Context) significantly contribute to resources (Inputs), but the success of implementation depends on the effectiveness of the implementation process in the field. In addition, the validity and reliability of the evaluation model showed adequate results, with modifications that improved the quality of measurements on each component. This research provides a theoretical contribution to the quality of "Merdeka" Curriculum implementation in Indonesia. Recommendations include strengthening teacher capacity through continuous training, improving infrastructure, and intensifying the monitoring of the learning process. The study also allows further exploration through a mixed-methods approach in regions with different contexts to generalize findings.

Keywords: independent curriculum, CIPP evaluation, SEM-PLS, 21st century education, senior high school

1. Introduction

Education in the 21st century is faced with various challenges and unpredictable changes. It requires the need for adaptation in the education system to ensure that graduates can cope with the uncertain pace of change (Šimunović & Vekić-Kljaić, 2024; Stuchlíková, 2016). The competency-based education approach that focuses on the development of critical, creative, communicative, collaborative, and digital literacy skills is one of the alternative education systems implemented in many countries (Choudhary, 2024; Kapasheva et al., 2024; Kariuki et al., 2023; Kiryakova, 2020). This adaptation is driven by the recognition that traditional educational methods focused on knowledge transfer are not enough to prepare students for the complexities of the 21st century. Indonesia, as a developing country, is also inseparable from these demands. One of the steps the Indonesian government has taken in the field of Education is implementing an independent curriculum called "Merdeka" Curriculum. The curriculum is designed to provide schools and educators with flexibility in structuring learner-centred learning appropriate to local contexts, individual interests, and future needs (Supianto et al., 2024; Wasehudin et al., 2023).

In the global context, the "Merdeka" Curriculum is relevant to international education trends. For example, the differentiation approach in the "Merdeka" Curriculum is in line with the education strategy in Finland, known as *personalized learning* (Roiha, 2023; Samsudi et al., 2024). Emphasis on formative assessments, such as *assessments for learning* in the "Merdeka" Curriculum, also has similarities with the education system in OECD countries (Leung & Scott, 2009; Wqfubwa, 2020). However, the "Merdeka" Curriculum is unique and aligns with the Indonesian

State's philosophy, where student character development is integrated into the Pancasila Student Profile. This uniqueness offers a new perspective in the global discourse on how the Curriculum can harmoniously integrate local and universal values. In the Pancasila Student Profile, the six main dimensions—faith and fear of God Almighty as well as noble character, global diversity, cooperation, independence, critical reasoning, and creativity—are designed to teach essential skills of the 21st century such as collaboration, critical thinking, creativity, and global competence. With this approach, the "Merdeka" Curriculum supports educational efforts to equip students with high adaptability amid dynamic global changes.

Along with its implementation at the school level, especially Senior High School (SMA), the effectiveness and success of this Curriculum are still questionable, especially regarding the fulfilment of educational goals, inputs, processes, and products. The success of the implementation of this Curriculum is highly dependent on the readiness and training of teachers, as well as the support of all stakeholders and access to adequate educational resources, especially in disadvantaged, frontier, and outermost areas (Amelia et al., 2024; Anggini et al., 2024; Marlina & Muharja, 2024). This condition requires a systematic evaluation to understand the effectiveness of implementing the "Merdeka" Curriculum and identify the obstacles faced during the implementation process.

Previous studies have shown that curriculum evaluation in Indonesia is still descriptive, focusing more on presenting data without exploring the in-depth relationship between variables that affect the implementation of education policies (Astuti et al., 2024; Jasiah et al., 2024). This approach results in challenging evaluations to provide strategic inputs that can be used for more targeted decision-making. In the context of the "Merdeka" Curriculum, this evaluation is increasingly crucial considering that the Curriculum aims to provide flexibility to schools to develop learning based on the Pancasila student profile. However, various challenges, such as the readiness of educators to understand the concept of independent learning, the availability of adequate resources, and school acceptance of changes in the educational paradigm, are the main obstacles that must be overcome. Data from the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) shows that the level of readiness and implementation of the "Merdeka" Curriculum still varies between regions, with significant disparities.

Several studies suggest that a more comprehensive and systematic evaluation approach needs to be applied to measure the success of the "Merdeka" Curriculum. This approach should include an in-depth analysis of the synergy between the policy context (Context), resource inputs (Input), learning process (Process), and learning outcomes (Product), which is often known as the CIPP (Context, Input, Process, Product) evaluation model. For example, research conducted by the Center for Education Policy Research in 2023 revealed that schools with adequate resource support, continuous teacher training, and consistent implementation monitoring tend to show better student learning outcomes. The system approach in the evaluation of the Independent Curriculum not only aims to assess the achievement of results but also to identify factors that support or hinder the success of its implementation. This approach can help direct policies more effectively to create an inclusive and adaptive education system for change.

To overcome these problems, the CIPP (Context, Input, Process, Product) evaluation model is an ideal evaluation framework. The CIPP model allows for a holistic evaluation of curriculum implementation by examining the relationship between policy context factors, input resources, process effectiveness, and educational outcomes. However, in practice, the evaluation research of the "Merdeka" Curriculum using the CIPP model is still limited, especially in identifying the structural relationships between the evaluation components. Thus, this study filled this gap by integrating the CIPP evaluation model with the Structural Equation Modeling-Partial Least Squares (SEM-PLS) to evaluate Indonesia's "Merdeka" Curriculum implementation.

The SEM-PLS technique has the advantage of analyzing the structural relationships between latent variables, even with a relatively small sample size. This method is not only flexible in handling data that is not normally distributed but also able to provide more accurate results in understanding the interdimensional influence of CIPP evaluation. The use of SEM-PLS in evaluating the "Merdeka" Curriculum at the high school level is an innovative approach that has not been explored much in previous research.

This research aims to provide data-based recommendations that can help policymakers improve the implementation of the "Merdeka" Curriculum, especially at the high school level. The benefits of this research are not only theoretical but also practical. Theoretically, this research contributes to developing a curriculum evaluation model with an integrative approach between CIPP and SEM-PLS. Practically, the results of this study are expected to provide empirical insights into the dominant factors that affect the successful implementation of the "Merdeka" Curriculum so that it can be used as a basis for more effective and sustainable education policy decision-making.

2. Method

2.1 Research Design

The study was undertaken quantitatively with an evaluation approach. This study used the CIPP (Context, Input, Process, Product) model developed by Stufflebeam. The study was structured to provide a comprehensive overview of the relationship between CIPP components in implementing the "Merdeka" Curriculum. The data includes 52 indicators on the four dimensions of the CIPP. In the context component, there are 10 indicators such as school characteristics (C_1), challenge identification (C_2), and external party support (C_3), followed by an assessment of the relevance of the program to school culture (C_5) and community participation (C_8). The input component contains 12 indicators: resource readiness (I_2) and stakeholder participation (I_3). In comparison, the process component consists of 18 indicators, including activity implementation (PR_2), student participation (PR_4), and program monitoring through the Project Management Office (PMO) (PR_17). The product component includes 12 indicators, including learning (PD_1) and teacher empowerment (PD_8) as the primary implementation results.

2.2 Participants

The study was conducted at senior high schools in Manggarai Regency, Indonesia. The study involved 110 respondents: Driving School Facilitators, Driving School Supervisors, Education Practitioners, Principals of Driving School Programs, and Senior High School (SMA) teachers. All respondents were taken purposively based on the criteria established: 1) respondents are teachers utilizing the "Merdeka" curriculum; 2) respondents are Driving School Facilitators; 3) respondents are Driving School Supervisors; 4) respondents are willing to participate in the study. Respondents were believed to understand the "Merdeka" Curriculum implementation in senior high schools.

2.3 Data Collection and Analyses

Data from the study were collected through a survey using valid and reliable research instruments. Data were analyzed using the SEM-PLS technique. It was selected based on theoretical considerations and research characteristics, especially with a relatively small sample number. SEM-PLS can handle research with relatively small sample sizes and analyze structural relationships between latent variables and complex indicators. This approach is more flexible than the covalent-based SEM method. It does not require assumptions of normality of data distribution considering the diversity of data distribution. In addition, SEM-PLS in this study can accurately measure the latent construct of every aspect of CIPP evaluation, including the relationship between the dimensions of Context, Input, Process, and Product. This technique could also estimate direct and indirect effects between variables according to the complexity of the evaluation model used. The analysis began with preparing the data by examining missing values and defining reflective constructs for each dimension. Relationships between constructs are defined through specific causal paths, such as Context to Input, Process, and Product. The PLS-SEM model is then estimated to obtain the path coefficient value, each indicator's loading factor, and the R-square. Measurement validity was tested using a loading factor (> 0.7), while path significance was analyzed through bootstrap 1000 iterations. Model modifications are carried out by eliminating indicators of each component that are poorly loaded to increase validity. Path diagrams are visualized to show the strength of relationships between constructs.

3. Results

Based on the results of a descriptive analysis, which is grouped into four components (C, I, PR, and PD), most of the indicators received a reasonably positive assessment. In component C (Context), the C_3 indicator (Support from External Parties) obtained the highest average (3,387), indicating that this indicator is rated higher than other indicators in the component. On the other hand, C_2 (Accuracy of School Challenge Identification) recorded the lowest average (2,784), although it was still in a relatively positive score range. In component I (Input), indicator I_9 (Student Empowerment and Active Engagement) got the highest average (3,342), which shows a reasonably good evaluation of the indicator. The I_1 (Needs Identification Process) obtained the lowest average (2.82), reflecting a slightly lower valuation than other indicators in the Inputs component. In the PR (Process) component, the PR_5 indicator (Utilization of Evaluation and Feedback) recorded the highest average (3,198), indicating that this indicator was considered more important.

In contrast, the PR_2 (Quality of Implementation of Learning Methods) with the lowest average (2,486) showed a lower assessment of this indicator compared to other indicators in the Process component. Meanwhile, in the PD (Product) component, indicator PD_12 (Significance of Differentiated Learning) obtained the highest average (3,252). In contrast, PD_3 (Increase in Student Participation and Attendance), with the lowest average (3,153), still showed a reasonably good assessment, although lower than other indicators in the Product component. The

descriptive statistics of the evaluation of the implementation of the Independent Curriculum as a whole are presented in the following figure.



Figure 1. Average Graph of Merdeka Curriculum Implementation

This descriptive data is further analyzed to identify the influence of various implementation components, which include Context, Input, Process, and Product. The results of SEM-PLS analysis, presented in Table 1, show a relationship between these components.

	Input	Process	Product
R^2	0.686	0.803	0.757
AdjR^2	0.683	0.799	0.750
Context	0.828	0.202	0.159
Input		0.721	0.045
Process			0.697

Table 1. Path Coefficient, Model Validity and Reliability

The R² value shows that the Process component has the most considerable variance explained by the ModelModel, which is 80.3%, followed by Product with 75.7% and Input with 68.6%. The strongest path is found in the relationship between Context and Input with a coefficient of 0.828, followed by Input to Process (0.721) and Process to Product (0.697). Meanwhile, the Input path to the Product (0.045) shows a much weaker contribution than other channels. It illustrates the dominant pattern of relationships between specific components in this model model. Regarding reliability and construct validity, the results show that the alpha values of Cronbach, rho, and rhoA for all components exceed the threshold of 0.7, indicating excellent internal reliability. The AVE value for most components also meets the convergence validity criteria, with values above 0.5, except for the Context component, which has an AVE value of 0.479. Although slightly below the threshold, other reliability values such as rhoC (0.899) and rhoA (0.896) still showed good consistency in measurements. It illustrates that the indicators on each component have a high degree of internal consistency, although the validity of the Context component needs further attention.

To increase the convergent validity value of each component, especially the Context component, modifications were made to the measurement model by identifying indicators with a loading factor value of < 0.70. From the results of the identification, it was found that the indicators of understanding the school context (C_1), the accuracy of

identifying school challenges (C_2), and the timeliness of school context evaluation (C_10) had a loading factor value of <0.70. Likewise with the Input component, indicators such as the Process of identifying needs (I_1), resource readiness (I_2), and quality of physical and technological infrastructure (I_7) do not meet the criteria for loading factors (Table 2). These indicators show a low correlation with their latent construct and are considered for exclusion in the subsequent analysis process.

Table 2. Indicator with Loading Factor Value <0.70

Indicator	Component	Loading Factor
Context	C_1	0.3828
Input	I_1	0.5133
Context	C_2	0.5693
Input	I_7	0.5869
Context	C_10	0.6268
Input	I_2	0.6332

After modifying the measurement model, the analysis results show a reasonably strong relationship between the components. The R² and Adjusted R² (AdjR²) for each component describe the proportion of variance that the ModelModel can explain. The Input component has an R² of 0.655, which means that about 65.5% of the variance in the Input can be explained by the other components. For the Process component, the R² value is 0.784, which indicates that 78.4% of the variance in the Process can be explained. As for the Product, an R² of 0.764 indicates that the ModelModel can explain 76.4% of the variance in the Product. The AdjR² values for these three components are also relatively high, namely 0.652 for Input, 0.780 for Process, and 0.757 for Product. It shows good model accuracy after considering the number of variables in the ModelModel.

On the Path Coefficients side, the relationships between components also show significant patterns. Context considerably influences Inputs with a coefficient value of 0.809, but its effect on Process and Product is more negligible, 0.275 and 0.219, respectively. The Input component showed a significant effect on the Process with a value of 0.648, but its effect on the Product was almost insignificant, only 0.019. Meanwhile, Process significantly influenced Product with a value of 0.672, indicating that the relationship between Process and Product was quite strong.

This Model shows excellent reliability results. All components, namely Context, Input, Process, and Product, are highly reliable. The alpha, rhoC, AVE, and rhoA values for each component are all greater than 0.7, which indicates that these constructs have excellent consistency and accuracy in measuring relevant indicators. The results of this analysis show that the modified SEM-PLS model can be relied on to explain the relationship between variables and has high validity and reliability.

Table 3. Path Coefficient, Validity, and Reliability of Measurement Models after Modification	Table 3. Path Coefficient,	Validity, and	Reliability of	f Measurement	Models after Modification
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	Input	Process	Product
R^2	0.655	0.784	0.764
AdjR^2	0.652	0.780	0.757
Context	0.809	0.275	0.219
Input		0.648	0.019
Process			0.672

The results of the modification in the measurement model are proven to increase the validity of convergence and reliability of indicators that measure CIPP latent variables. It can be used as a basis for estimating the structural Model of the evaluation of the implementation of the Independent Curriculum within the framework of the CIPP evaluation model. Bootstrapping was carried out on the structural ModelModel with 1000 iterations to test the relationship between the evaluation components' significance. The results of the significant test are shown in the following figure.



Figure 2. Path Diagram Evaluation of the Implementation of Merdeka Curriculum Using the CIPP Model

Based on the results of bootstrapping the evaluation of the "Merdeka" Curriculum implementation using the CIPP (Context, Input, Process, Product) model, the estimated structural Model Model shows some significant relationships. In contrast, some others are not statistically significant. The relationship between Context and Input has a native path coefficient of 0.809 with a T-Statistical value of 23.974 and a 95% confidence interval of 0.742 to 0.872. Context significantly influences Inputs, with stable estimates based on bootstrap results. In addition, the relationship between Input and Process is also significant (T-Statistics 7.825) with a path coefficient of 0.648 and a confidence interval of 0.466 to 0.789, indicating the important contribution of Input to the implementation process.

The relationship between Context and Process shows significance with a path coefficient of 0.275 and a T-Statistic value of 3.186. Although the value is smaller than other paths, the 95% confidence interval is in the positive range (0.123 to 0.464), which indicates that Context has a positive and significant effect on the Process. However, the relationship between Context and Product was insignificant (T-Statistics 1.919) because the confidence interval included negative values (-0.013 to 0.435). Similarly, the relationship between Input and Product has a T-Statistic

value of 0.146 and a confidence interval that includes negative values (-0.221 to 0.264), indicating that the influence of Input on Product is not strong enough to be considered significant.

The relationship between Process and Product showed a significant influence, with a path coefficient of 0.672, a T-statistic value of 5.306, and a 95% confidence interval of 0.410 to 0.922. It indicates that Process is a key variable influencing the results (Product) of implementing the independent curriculum.

The structural Model generated from the analysis shows good enough reliability for the relationship between Context, Input, and Process. In contrast, the direct relationship to the Product relies more on the Process as a mediator. A consistent bootstrap distribution indicates the stability of the estimated results. The next step is to test the significance of the specific influence of each component on the other components. This test is to see if there is a direct and indirect influence between components. The results of the specific effect test show that the direct relationship between Context and Input has a significant influence with a path coefficient of 0.809. A t-statistic of 23.974 and a confidence interval of 95% (0.742–0.872) confirm that this effect is statistically significant. It shows that the initial condition or Context plays a vital role in influencing the Input needed to implement the Independent Curriculum. The stability of this estimate is also reflected in the bootstrap average value (0.813), which is very close to the original estimate.

These results show that Context strongly contributes to Input, highlighting the importance of factors such as policy, environmental support, and early readiness in supporting curriculum implementation. In contrast, the direct relationship between Input and Product shows a path coefficient of 0.019 with a T-statistic of 0.146, which is not statistically significant. The 95% confidence interval (-0.221 to 0.264) includes zero, indicating the absence of strong evidence for this relationship. The indirect effect (Context \rightarrow Input \rightarrow Product) was also insignificant, with a T-statistic of 0.145 and a confidence interval that included zero (-0.179 to 0.216). Therefore, further exploration is needed on the role of Process or other factors as mediators in influencing the relationship between Input and results in implementing the Independent Curriculum.

Testing the indirect effects of Input on the Product through the Process shows significant value. This indirect effect has a coefficient of 0.436 with a T-statistic of 4.644, indicating strong statistical significance. The 95% confidence interval (0.258–0.626) does not cover zero, confirming this significant relationship. The stability of the results is also seen from the bootstrap average (0.436), which is very close to the original estimate. This finding confirms that Process is the main path that connects Input with results in implementing the Independent Curriculum. In addition, the affirmation of Process as an important component is also found in the coefficient of direct relationship between Process and Product of 0.672, T-statistic of 5.425, and confidence interval of 95% (0.420–0.900), which does not include zero. With the role of Process, Input can have a more meaningful impact on the final result. Therefore, strengthening process aspects, such as implementing teaching and learning activities, mentoring strategies, and continuous evaluation, is the primary key to supporting the successful implementation of the "Merdeka" Curriculum.

4. Discussion

The results of the study show that the implementation of the "Merdeka" Curriculum at the Senior High School (SMA) level in Manggarai Regency, East Nusa Tenggara Province, has a significant relationship pattern between the components of Context, Input, Process, and Product in the CIPP evaluation model. The main findings show that Context significantly influences Input (path coefficient 0.809, T-statistic 23.974), and Input has a strong relationship with Process (path coefficient 0.648, T-statistic 7.825). On the other hand, the Input's direct influence on the Product was insignificant (path coefficient 0.019, T-statistic 0.146). The indirect relationship through the Process is the primary key, with a significant mediating effect from the Input to the Product through the Process (coefficient 0.436, T-statistic 4.644). The Process component also strongly influences the Product (coefficient 0.672, T-statistic 5.425). It emphasizes the importance of the Process in successfully implementing the "Merdeka" Curriculum.

These findings are consistent with previous research showing that policy support and relevant contexts contribute to curriculum implementation inputs (Roiha, 2023; Samsudi et al., 2024). In addition, the importance of the Process in mediating the relationship between inputs and outcomes is in line with studies that highlight that the success of Education is highly dependent on the quality of the implementation of the learning process (Choudhary, 2024; Wqfubwa, 2020). However, the results of this study also make a new contribution by showing that direct Input does not significantly influence the results, indicating the need for Process as a key component. In implementing the "Merdeka" Curriculum, these results underscore the importance of policy contexts such as government support, school environment readiness, and local relevance in creating practical Input. Furthermore, the implementation process, such as applying effective learning methods, continuous evaluation, and feedback, becomes the main link

that converts Input into expected results. In this case, the system-based evaluation (CIPP) theory is confirmed, where each component has an interrelated role in determining the success of implementation (Ludy et al., 2016; Sayed Muna & Kalam, 2021).

The direct relationship between Input and Product can be insignificant due to the unavailability of resources or the less optimal quality of available infrastructure (Mohanasundaram, 2018). Consequently, the results of curriculum implementation are highly dependent on the success of the implementation process in the field. It highlights the need for interventions that strengthen teacher capacity, program monitoring, and consistent evaluation to ensure that existing inputs can be used effectively to support learning outcomes (Bazyar, 2015).

The findings of this study enrich the CIPP evaluation theory by emphasizing that the Process is an important mediator in the relationship between inputs and outcomes. It provides a new perspective that while Context and Input are important, the success of implementation is highly dependent on the effectiveness of the implementation process (Jawabreh & Gunduz, 2021). This study also shows that structural relationship analysis through SEM-PLS can provide in-depth insights into the relationship between evaluation components. Practically, these findings are relevant for policymakers and education practitioners in improving the implementation of the Independent Curriculum. The focus should be on building teacher capacity through continuous training, optimizing student-centred learning strategies, and monitoring more intensive process processes. In addition, there needs to be a more equitable allocation of resources to ensure that each school has adequate support to implement this Curriculum effectively (Palupi, 2018).

Although there are several positive implications, this study has limitations in the sample scope, which only includes schools in one particular region, so generalizing the results needs to be done carefully. In addition, some indicators in the measurement model have less than optimal validity, especially in the Context component, which can affect the accuracy of the estimation. The quantitative approach has also not fully captured the dynamics of implementation in the field, which requires further exploration through a qualitative approach. Therefore, for future studies, it is recommended to expand the scope of the sample to other regions with different levels of disparity to improve the generalization of the findings. A mixed-method approach must also be considered to capture more in-depth qualitative aspects of implementing the Independent Curriculum. In practical terms, policymakers are advised to improve the quality of teacher training, provide adequate supporting infrastructure, and ensure a consistent monitoring and evaluation system to support the successful implementation of the Curriculum in various local contexts.

5. Conclusion

This study evaluates the implementation of the Independent Curriculum at the Senior High School (SMA) level using the CIPP evaluation model combined with SEM-PLS. The results show that the Context component significantly influences the Input, which affects the Process, with the Process acting as the primary mediator connecting the Input and the Product. It confirms that the effectiveness of the implementation process is a key factor in the success of curriculum implementation. The analysis shows that policy support, resource readiness, and implementation of a quality learning process are critical elements to achieve optimal outcomes. The findings also underline that Inputs do not significantly influence the Product, but their contribution depends on the success of the Process as a liaison. It has important implications for policymakers and education practitioners to focus more on teacher capacity building, continuous process monitoring, and resource optimization.

In terms of methodology, integrating the CIPP and SEM-PLS models has provided an in-depth structural analysis of the relationship between evaluation components. This approach is relevant to other educational contexts that require comprehensive evaluation. This research makes a theoretical contribution to developing a system-based and practical curriculum evaluation framework for efforts to improve the implementation of the Independent Curriculum. However, the limitations of this study include the limited scope of the sample in one region and the need for qualitative exploration to capture the dynamics of implementation in the field. Future studies are suggested to expand the geographical scope and adopt a mixed-method approach to improve the validity and generalization of the findings. These conclusions reflect the need to strengthen the process dimension as the core of successful implementation and provide strategic guidance for more effective education policy decision-making.

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