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Intragenerational Dynamics in the Indonesian Oil Palm Growth Zone: The Resolution between Circular Dimensions and Human Capital

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Abstract: The community in the oil palm planting zone experiences intragenerational disappointment, due to feelings of alienation that add to the complexity of conflict resolution. We employed an experimental conflict resolution approach utilising Latent Class Analysis and ANOVA hypothesis testing to summarise research findings, a method which involves selecting descriptions of conflict classes and member variables, in order to depict intragenerational community characteristics that concern the perceptions and experiences of conflict within oil palm planting zones. The results indicate that groups categorised as "aggressive habitat threats" reflected concerns about environmental degradation and the potential eviction of small landholders. Meanwhile, the "job transition" group presented a potential for conflict in proportion to their aspirations for a decent life. However, conflicts do not always result in direct clashes. Conversely, community empowerment, including circular dimensions and human resources, acts as a catalyst that motivates intragenerational individuals to actively accelerate efforts to increase their capacity.

Keywords: oil palm expansion; intragenerational dynamics; circular dimensions; human capital dimension

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1. Introduction

The concept of expansion entails a perspective on change that involves accelerating capacity building and infrastructure equity [1]. The pace of expansion has significantly increased, coinciding with notable reforms in various domains, such as technology, trade, industrial agglomeration, and sustainable environmental development [2]. The concept of territorial expansion requires capacity-building cooperation that starts with community empowerment as its foundation [3]. The capacity-building expansion alliance has become a commitment-driven concept aimed toward achieving sustainable development goals (SDGs) through agreements and discussions on global cooperation [4]. Although commitment to SDGs has long been part of capacity building, rapid and massive expansion in the tropics, along with the derivative effects of biofuels, has raised concerns regarding intragenerational conflict dynamics. The impacts of commodity land expansion in oil palm growing zones on the environmental (circular) and production chain (human capital) dimensions are often debated and carried forward into the next generation. The current expansion order requires dynamic changes, due to the complexity of developmental factors in the circular and human capital dimensions.

Beyond the perspective of future expansion through the lens of sustainability, the next focal point, in alignment with SDG principles, is to explore pathways of socio-economic mobility across different generations within the same society (intragenerational), while addressing conflicts arising from the expansion of agricultural land for food production [5].

In cases of conflict over the expansion of oil palm land, intragenerational conflict dynamics that often arise and are significant include protests from various groups within the community, such as youth, farmers, and residents, who oppose the government in order to maintain natural forest reserves in oil palm plantations. Highlighting the causes of conflicts over the expansion of oil palm plantations in Indonesia, predictive data show that the oil palm area has expanded by around 16.38 million hectares. This expansion led to Crude Palm Oil (CPO) production, with an average yield of 3.97 tons per hectare [6]. The ownership rights of oil palm plantations in Indonesia are divided among three authorities. Community-owned oil palm plantations, which cover 8.94 million hectares, account for 41% of ownership rights and produce 16.7 million tons; state oil palm plantations cover 5.67 million hectares (29%), with a total output of 2.2 million tons; meanwhile, private oil palm plantations cover 5.94 million hectares (30%), with a production performance of 2.7 million tons [6]. Previous research records an increase in land use for oil palm plantations in Indonesia, in line with the high investment in and consumption of CPO every year, and it is estimated to grow by 17.14%, to an area of 2,049,790 hectares from 1,922,083 hectares [7]. Thus far, within a certain period, the expansion of oil palm plantations has doubled from the previous year.

Indonesia is one of the largest suppliers of natural resources, particularly palm oil, with stable export sales and consumption levels, making these resources key drivers of the country's economic growth. Its geographical advantage brings Indonesia's natural progress into the eyes of the world and helps to foster creative human management and an independent environment. While the policy around oil palm expansion in Indonesia has led to significant socio-economic benefits, it has also caused conflicts relating to intragenerational mobility. Land degradation, due to the expansion of oil palm plantations, has resulted in pros and cons [8]. On the one hand, the expansion of oil palm land supports production that generates state revenue, and, on the other hand, community dynamics between generations experience declines in social status [9]. Furthermore, the expansion of oil palm land is not sustainable, and improved human capital management policies are required to meet the standards of intragenerational dynamics that can prevent intragenerational mobility into poverty.

This research focuses on tracing the impacts of oil palm plantation land expansion in Jambi Province, Indonesia on intragenerational mobility over the past ten years. Previous research highlights that oil palm expansion activities must prioritise certification and improve the quality of food safety, as well as the balance of community adaptation [10,11]. The expansion of oil palm land can lead to land cover changes that affect demographic factors and local food availability [12]. The driving factors for the magnitude of oil palm expansion are related to the soaring demand for palm oil and the replacement of natural forests, which cause drainage loss and the release of carbon dioxide [13]. It is also believed that oil palm expansion has caused food scarcity and malnutrition problems in rural areas. The trend of oil palm expansion is primarily influenced by technological and political factors, rather than by social and environmental incentives [8,14]. This encourages a comprehensive approach, that takes into account social and environmental factors, to produce an efficient and effective palm oil market.

Given the significance of researching the conflicts experienced by intragenerational community groups in oil palm growth zones, enhancing both circular and human capital dimensions are among the ways toward improving capacity building and local welfare. To achieve a point of conflict resolution in intragenerational dynamics, in-depth research on the resolution between unrealised human capital and circular dimensions in oil palm growth zones is indispensable. A gap in the literature suggests that intragenerational communities of smallholder farmers face numerous agronomic welfare constraints and are lacking in institutional holder support, such as poor income distribution, environmental degradation, and inadequate human capital, which impedes the achievement of capacity-building potential [8,14]. Several recent studies have investigated human capital profitability as a determinant of productivity gains from oil palm farmers and residents in

Malaysia and Indonesia, using gross margin analysis [15–17]. Furthermore, several studies attempted to explore determinants of and variations in yield among agricultural practices within a circular management framework, identifying their correlations with smallholder household income [3]. Previous studies have undertaken a financial cost–benefit analysis, leveraging primary data sourced from three villages in Kalimantan by analysing the level of human resource efficiency for smallholder households living in oil palm areas with under-supported production schemes in West Sumatra [8].

While numerous studies have previously explored factors linking human capital and circular dimensions as capacity-building methods in oil palm land zones, there is a clear need for more discussion on the nexus between intragenerational dynamics and conflicts arising from oil palm land expansion. Therefore, this study aims to fill this gap by investigating the classification of conflict categories within intragenerational dynamics using circular and human capital dimensions. Additionally, it delves deeper into how socio-economic and environmental factor analysis can effectively influence the management of conservative agricultural expansion practices.

Here, we examine intragenerational conflict dynamics to provide insight into community mobility before and after oil palm expansion. This assessment is essential for a comprehensive evaluation of human resource development and circular resilience, mainly focusing on the success of oil palm expansion in Jambi Province.

1.1. In-Depth Study of the Relativity of Oil Palm Expansion

Land expansion involves transforming an area's original use, frequently resulting in conflicts that revolve around policies regarding the value of land use [15]. The expansion of oil palm plantations, for instance, entails converting land to allocate resources, primarily for the production of derivative commodities [16]. The conversion to oil palm land around villages and protected forest areas is intended to support the development of the agricultural and trade sectors. This expansion is inevitable due to the pivotal role that the economic use of oil palm plantation land plays, as opposed to land used for forest conservation [17]. As an economic source, oil palm plantation land is a strategic vessel and production factor for increasing economic growth [18]. The palm oil commodity is described as a vital energy source, with various utilities, to meet human consumption needs [13].

The conversion of oil palm plantation land is an example of land rent assessment practices, which tend to generate high marginal values compared to agroforestry land conversion [19]. The theory of the land lease model highlights the flexibility in differences in the values of land function based on economic concentration and agglomeration location. Aligned with agricultural practices, the land rent model suggests that agricultural land has economic location characteristics that can lead to high investment potential and rental value [19]. Additionally, the land rent model in agricultural practice also has a sub-type category for land, which is divided into productive, less productive, and functionally unproductive land, thus affecting the calculation unit of marginal rental profit [20]. In general, the land lease model in the expansion of oil palm plantations starts with the sale of land, during which part of the profits from the management of capital assets are allocated for review purposes, such as revitalising production facilities and building a one-stop industry [21]. Business profit on the scale of oil palm commodities is significant in achieving longevity [22].

According to several decades of analysis concerning the transfer of added value to oil palm commodities, such a transfer usually coincides with a decline in people's happiness levels. This decline is influenced by fluctuations in raw material production—as well as land availability, which results in the loss of income capacity for farming households [23]. A large number of interests in the expansion of oil palm plantations has resulted in an overlap between the conflicting views of intragenerational dynamics and priority goals among institutional parties, investors, and the government in utilising oil palm land expansion [24].

1.1.1. The Relativity of Oil Palm Expansion to Intragenerational Dynamics: Circular Dimensions

The Environmental Kuznets Curve theory highlights several interconnecting indicators that influence the future of human welfare, aiming to effectively manage environmental quality and mitigate pollution concentrations [25]. The Kuznets hypothesis model states that prolonged degradation reflects the declining level of human ethics in exploiting the environment by utilising the biomass test obtained from industrial combustion residues as a sustainable adoption of externalities [26]. Similarly, in the future, land expansion in agricultural and plantation areas must take segmentation measures to ensure fair and equitable environmental conservation rules. The Kuznets model of long-term externality factors forces penta-helix institutions to rehabilitate and eliminate the exploitation of natural resources that damage the identity cycle of environmental purity for future sustainability [27].

It is essential to motivate the current intragenerational population to master science and technology that takes into account the recycling cycle to improve the environmental quality index [27]. The environmental quality index has become one of the regulated performance indicators in assessing green issues for environmental activities, based on the relative use of natural resources in a sustainable manner [28]. Furthermore, sources from Virginia Commonwealth University (VCU) reported that the reference for formulating the environmental quality index model is to measure ecological condition factors, including water, air, and soil quality; waste pollution production; biological degradation; and population. The leading indicators used in the environmental quality index include river water quality, air quality, and forest cover [29]. However, in its stages, the formulation of the environmental quality index, which began in 2009, continues to undergo several adjustments and revisions [30].

The environmental quality index is an index that provides an overview of socio-demographic and environmental activities through the environmental capacity support managed by government agencies, budget allocations, regional regulations, human resources, and infrastructural facilities [31,32]. The environmental quality index model entails inputs and outputs in the components that support the ecological balance mechanism [33]. According to the input model, environmental quality views the population as the cause of environmental degradation, due to the role population plays as an element that suppresses environmental balance [33]. The assumptions of this model also link to demographic factors, which explain that, the higher the population in an area, the stronger the pressure on the carrying capacity of the environment. Meanwhile, the output model suggests that environmental quality is the feedback from actors or individuals who influence the creation of social and economic activities in sustaining fundamental changes [34]. Changes due to social and economic activities can push each form of adaptation in different directions, directly affecting environmental degradation [16].

1.1.2. The Relativity of Oil Palm Expansion to Intragenerational Dynamics: Human Capital Dimension

In the current thriving era of palm oil, new challenges lead to the role of intragenerational mobility as a pivotal driver for welfare enhancement. Taking this challenge into consideration when striving to achieve the indicators outlined in the Sustainable Development Goals (SDGs) is necessary, primarily through the efficacious utilisation of human capital. The progress of intragenerational mobility is linked to the level of assimilation of science and technology. This integration serves as a conduit for transferring human capital knowledge from the younger generation to fuel the development of future human resources [35]. The paradigm of human capital or skilled resource theory was initiated in the 1960s to 1970s and is one of the economic indicators used to measure human cognitive degrees [36]. The human capital theory argues that human knowledge and skills are the basis of added value in achieving productivity, competitive advantage, and behaviours that encourage successful organisational management to achieve potential and efficient produc-

tion performance [37]. Additionally, the concept of human capital provides a fundamental response to the contribution of socio-economic development [38,39].

The human development index serves as an indicator of human capital success in intragenerational mobility, as evidenced by direct transfers in education and health allocations [36]. Attention to the income indicator of intragenerational mobility, using the Intragenerational Income Elasticity (IGE) measure, is crucial for achieving the value of the human development index [40]. The human development index is a numerical formulation of achievement that explains the components of effective development, which consist of education, health, and intragenerational income sub-sectors, all of which influence the dimensions of human productivity levels [41]. The perspective gained from the human development index becomes a broad selection process for the role of intrageneration as an improvement that leads to empowering human capital [35]. The quality level of enhancing human capital in education, health, and income for intragenerational mobilisation is influenced by the value of the benefits gained from abilities or skills, such as the equal distribution of economic resources, productivity components, and cultural socialisation [35,40,41]. Streamlining the power strategy of human development comes from the growing movement of characteristics and the influence of factors related to culture, society, and economy [42]. The three dynasties of this relationship influence other factors, such as the political conditions of democracy, social capital, the availability of capital, and the cycle of scientific institutions [43].

Furthermore, the stages of the economic pace experience a complicated and slow reincarnation, such as the oil palm project, which is an economic substance emphasising the development paradigm of industrial land infrastructural expansion [44]. The consequence of the pollution level from oil palm land expansion has changed the legitimacy of government policy plans by favouring the distribution of pro-poor assistance in overcoming social and economic disparities [45]. The government's immediate role is to protect intragenerational mobility income from a weak position by evaluating the basis of welfare through aggregate spending to restore social infrastructure in the education and health sectors [46]. This stage of the economic growth rate is marked by the autonomy of the government expenditure budget, which is fixed, but is more focused on developing programs related to social welfare and involving the availability of the government budget to distribute social security in the community [47].

Empirical research proves that the demonstration of human capital, in addition to accelerating the circulation of the country's economy, can accommodate the intragenerational income mobility factor [48–50]. Human capital relates to disseminating technological capacity and controlling social and cultural progress instruments [51]. Clarifying intragenerational social status will change, and be beneficial in increasing, the degree of the welfare of others. Intragenerational social capital has the highest predicate when knowledgeable individuals transfer technological and cultural developments they have studied in other countries [52].

2. Materials and Methods

2.1. Member Variable Data Statistics Site

This research aims to strengthen the mixed method of collecting data on household or intragenerational resident characteristics in five districts in Jambi Province. Sample observation points were located in areas with a minimum distance of 200 metres between residential areas, community access, and oil palm plantation trends. The proposed sample data collection uses a two-stage redaction round, where the first redaction starts by random sampling in five districts, based on the formation of a proportionally sized sample distributed in the oil palm growth zone land area. The selected sample areas were 136 community groups, divided into productive age ranges (young age, or ranging from 9 to 50 years old) using the parameters of a multi-procedure experimental test sample [40]. The second redaction, reviewing the changes in data each year in the time series before 2023 on intragenerational population characteristics, was compiled by collecting secondary

data from national statistics in the form of the Indonesian Family Life Survey (IFLS) general report, the published literature from the Central Bureau of Statistics, and the Ministry of Environment.

Primary and secondary data collection were processed pairwise and selectively based on the five scenarios of circular dimension and human capital factor measurement assumptions, listed as member variables, including age, gender, income, household occupation, education, health, and environmental management index. The percentage of member variable ratio data in Table 1, calculated using the sample population by age type of intragenerational households involved in the circular dimension and the human resource factor measurement to test the relativity of the member variable output.

Table 1. Statistical summary of study member variables.

Type of Household Characteristics Intragenerational	Study Member Variables						
	Age (%)	**Gender (%)**	**Income per Capita (%)**	**Education per Level (%)**	**Health Adoption (%)**	**Small Farmer Work (%)**	**Management Index Environment (%)**
Young household (9–17 years)	25.67	32.13	15.48	26.92	29.48	47.28	27.95
Pre-employment household (17–25 years)	26.31	30.21	26.93	25.72	27.74	15.75	31.28
Labour force household (25–35 years)	46.17	28.46	57.38	21.07	28.16	57.62	24.93
Elderly household (>50 years)	21.31	23.57	42.70	29.87	31.92	89.21	30.72

Sampling data and secondary reports are the observational sources of structural description data that provided a comprehensive analysis of intragenerational community change in five districts in Jambi Province over time. The characteristics of intragenerational household families, with an average age range 9–50 years, were material for substantial research data. This study hypothesised both environmental and human capital capacity dimensions, according to the experience of participating in the management of oil palm production and the life category dimensions of intragenerational household families coexisting with the era of oil palm expansion.

2.2. Representative Combination of Analytical Methods

This study aims to establish the categorisation of the conflict resolution class group and to analyse the correlation hypotheses between the circular and human capital dimensions concerning the coverage of oil palm expansion. Specifically, we aim to scrutinise whether significant disparities exist between intragenerational groups regarding conflict resolution for oil palm expansion within the circular and human capital dimensions.

Our objective is to understand the hypothetical relationships between expenditure and income (from the perspectives of education, health, and livelihoods), as well as the impacts of routine socio-economic activities on the availability of infrastructure in which to form sustainable human capital. In addition, we analyse the asset side of the conflict description, focusing on externalities and environmental degradation. These insights allow us to identify the conflict classes of intragenerational dynamics, thus clarifying the member variable hypothesis regarding the impacts of circular dimension and human capital factors on the growth of oil palm land expansion.

The hypothesis above delineates our study's categorisation into human capital and circular dimension groups. The methodology employed to clarify these distinctions involves fusing the two following techniques: Latent Class Analysis (LCA) and ANOVA. This combination serves the purpose of selecting preference labels and evaluating class group categories. It focuses on identifying significant correlations during tests to distin-

guish differences in group indicators within the human capital and circular dimensions pertaining to the intragenerational population's standard of living.

This research utilises the arithmetic series tool to produce accurate data validation outputs, as well as the operation of WINMIRA 2001 and STATA. The combination of Latent Class Analysis and ANOVA further helped to assess conflict resolution distribution across circular and human resource dimensions. This resolution includes all instances of conflict adaptation between intragenerational communities and oil palm expansion. For the first measure, we described the LCA analysis on the human capital and circular dimensions through the formal requirements of class indicators, based on base case descriptions, by considering the implications of the Bayesian information test (BIC), the entropy term, the likelihood ratio test (LMR-LRT), and the bootstrap ratio test (BLRT). The general requirements for determining an excellently indexed LCA model is a BIC criterion within the minimum value and a higher entropy projection [53].

This research uses the LCA technique to identify emerging patterns in the preferences and conflict behaviours of intragenerational dynamics through the circular and human capital dimensions of oil palm land expansion. The formulation of emerging conflict preference patterns in the measurement of intragenerational conflict for the circular dimension includes five classes, as follows: "smallholder land exploitation", "aggressive habitat threats", "CO_2 emission intensity", "warming temperature/climate", and "food scarcity". The conflict preference classes, "social capital pressure", "job shifts", "inequality in education", "health", and "financial crises", are included in the conflict class analysis of the human capital dimension. Secondly, we began a comparative analysis of the circular dimension and human capital conflict classes to test the significance levels of member variables, measured by sum percentage of intragenerational household population characteristics through one-way and two-way ANOVA tests, hypothesised as follows [23]:

$$H_0 : \mu_1 = \mu_2 = \mu_3,$$
$$H_A : \mu_1 = \mu_2 = \mu_3,(\text{one-way ANOVA test})$$
$$H_0 : \mu_a = \mu_b = \mu_c = \mu_d = \mu_e,$$
$$H_A : \mu_a = \mu_b = \mu_c = \mu_d = \mu_e,(\text{two-way ANOVA test})$$

To test the group differences between class label coefficients and member variables, we analysed detailed correlations by performing two-way ANOVA detection related to hypothesis testing, as follows:

H_0 : There is no significant difference between member variables in the circular and human capital dimension conflict class groups;

H_A : There are significant differences between the member variables in the circular and human capital dimension conflict class groups.

The experimental class test design describes cases of conflict originating from the expansion of oil palm plantations, concerning intragenerational community living standards. This description is drawn from the consideration of both circular and human resource dimensions. These two dimensions influence the well-being and prosperity values, shaped by environmental development policies and socio-economic and environmental factors intrinsic to the intragenerational community [35].

3. Results

3.1. Characteristics of Sample Member Variables

Corrections to the experimental data were submitted in July 2023, sourced from the Indonesian Life Survey (IFLS) and affiliated green environmental agencies. The observations encompassed a quota of n = 136 samples, drawn from the intragenerational household conflict panel, all based on the formulations of case descriptions.

Scenarios incorporating member variables were projected through the characteristics of developmental indicators within the circular and human capital dimensions of intragenerational households in Jambi. These variables included age status, gender, income range, household smallholder work, education, health, and environmental quality index,

as per Jambi's official statistics centre. The selection of intragenerational age levels spanned from 9 to 50 years, covering the broadest possible range. This range was chosen as the target variable for this experiment, representing a typical intervention, as identified by the intragenerational community panel. The summary of indicators was customised to meet the requirements of the indicator quota, ensuring comprehensive coverage. Table 2 presents the distribution of sample member variable characteristics, resulting from replication as test attributes in the combination analysis experiment. Sampling means and median grouping attribute variable members are assumed to be based on the components of circular and human capital indicators. The quota scale of this study uses intervals of consideration for sample characteristic factors, which are encrypted secondary reference data representing experimental member variables.

Table 2. Characteristics of the primary member variables and IFLS quota (n = 136).

Member Variables (n = 136)	Measurement of Member Variables	Mean	Std. Dev
Age	Year of birth (range)	1.73	65–116
	Age (mean/median)	0.58	44/58
Gender	Male	0.36	34.5
	Female	1.46	54.8
Income per-capita	<IDR 1000	0.14	12.9
	IDR 1000—IDR 5000	1.57	63.9
	IDR 5000—IDR 7500	0.49	39.2
	>IDR 7500	1.62	71.3
Household farm work	Local male farmers	0.60	46.53
	Local female farmers	0.26	32.16
	Migrant farmers	0.17	27.74
	Renting farmers	0.18	20.19
Education level	Not in school or currently attending primary school	0.09	0.13
	Attending middle school	0.11	18.6
	Upper secondary level	0.38	41.1
	Continuing higher education	0.34	30.7
Health adoption	Sanitation and nutrition fulfilment	0.19	21.6
	Treatment history	0.21	22.5
	Number of treatments in medical institutions	0.12	18.7
	Medical equipment costs	0.37	35.1
Environmental quality index	Settlement rainfall/climate	0.59	49.4
	Local ecosystem wisdom	1.30	50.31
	Water and soil sanitation	0.31	31.92

Note: The primary data and IFLS experimental statistics are explored based on the latest 2023 census data for Jambi Province.

3.2. Combination Analysis Results

The number of sample observations varies between the circular and human capital dimensions, encompassing 136 test areas. Some individuals within these dimensions hold favourable opinions about the human capital aspect, irrespective of the conflicts that frequently arise within the community. These individuals provided detailed answers, expressing how they benefit from the presence of oil palm plantation companies. They further elucidated why most intragenerational households lean towards empowerment programs initiated by corporate entities.

A contrasting viewpoint emerges within the circular dimension. This perspective argues that companies exploit the legitimacy of environmental values, such as "sailing ships", which experience exploitation within formal development frameworks. This interpretation dichotomises the primary scenarios of intragenerational household conflict into the two following directions: is the formal development of oil palm area advantageous or detrimental? Consequently, this study differentiates five latent classes. The classification separates two experimental logs, including class labels (dimensional conflict case descriptions) and member variables (IFLS sample attributes).

Latent class testing experiments were carried out to predict the comparison of heterogeneous attributes within intragenerational oil palm conflicts across the circular and human capital dimensions. The probability module of latent class criteria is realised by a validity test that informs the logit variance for each conflict research class in two dimensions. The innovation of the LCA module uses a multivariate regression algorithm for the statistical inversion of member variables, described in Table 2. The comparison of member variables estimated by the LCA label module aims to develop heterogeneous category information that assesses subjective paradigm measures of oil palm expansion and intragenerational households, considering both circular dimensions and human capital. Member variables, including age, gender, household farmer occupation, income, education, health adoption, and environmental quality index, were input into the partial model formulation.

The individual model for each latent class input is equivalent, based on Bayesian conditional information (BIC), the entropy term, likelihood information (LMR-LRT), and bootstrap consistency (BLRT), showing the best-fitting comparison model as the preference scale with the lowest value. The information from the four latent class constituent criteria has shown that the model provisions are accurate, and class frequency strengthens class independence. Table 3 presents the information on the latent class model criteria, indicating the convergence of the number of parameters (n.p.) for the model variant. Furthermore, the comparative analysis in Table 3 also accompanies the withdrawal of separate latent classes, suggesting a combined correlation model of the five classes of intragenerational conflict in the oil palm growth zone for the circular dimension and the five classes of the human capital dimension.

Table 3. Comparison of latent class model criteria.

		Circular Dimension				Human Capital Dimension			
Latent Class	**n.p.**	**BIC**	**Entropy**	**LMR-LRT**	**BLRT**	**BIC**	**Entropy**	**LMR-LRT**	**BLRT**
1	40	12.745	12.132	−6321	12.221	12.153	13.237	−4237	13.357
2	55	11.872	11.768	−3541	11.373	12.081	11.716	−2140	12.232
3	64	13.562	11.261	−2527	15.132	11.471	11.432	−5130	14.683
4	86	12.434	14.287	−8307	11.234	16.290	12.370	−4525	11.765
5	113	11.267	11.017	−1268	12.311	11.805	10.164	−5012	10.349

Note: n.p.—number of parameters, BIC—Bayesian information criterion, Entropy—preference term, LMR-LRT—Lo–Mendell–Rubin likelihood ratio test, BLRT—bootstrap likelihood ratio test.

The subsequent analysis phase employed a series of ANOVA tests, as formulated in the hypothesis analysis section, denoted as H_0 and H_A. Within the circular dimension, the analysis of the variable sample examines the hypothesised points of the environmental index degree, which are only partially influenced. This is due to the limited foundational understanding of conflicts related to the reciprocity of circular life. On the contrary, significant information emerged between the two dimensions, indicating that the interplay between the supply of human capital substantially influences the dynamics of the intragenerational population, by 77%. Respondents from the five Jambi districts collectively expressed strong relevance across the three following principal factors: per capita income, educational level, and health adoption.

Regarding conflicts involving human capital factors, specifically the variable coefficient concerning household farmers' work type, the analysis supports two labels, involving age and gender within the intragenerational society. This alignment with the H_A hypothesis was subsequently confirmed. However, while this confirmation supports the H_A, it is important to note that the aggregated member variables' standard deviation values indicate a comprehensive heterogeneity significance value.

The hypotheses outlined in the ANOVA formulation were further utilised to ascertain the presence of an actual difference in means among class member variables (Table 4). This effect illuminates the outcomes stemming from observations that eliminate the significance

of member variables, achieved by evaluating the hypotheses' appropriateness across both the circular and human capital dimensions.

Table 4. ANOVA logit results for member variables (n = 136).

Variables	Circular Dimension		Human Capital Dimension	
	Coefficient	**Standard Error**	**Coefficient**	**Standard Error**
Intragenerational age	1.239 *	0.034	4.260 ***	0.341
Gender type	−0.040 *	0.172	0.041 ***	1.892
Income per capita	0.039 *	2.571	−0.017 ***	2.401
Domestic farm workers	0.032 ***	1.763	0.035 ***	2.307
Level of education	0.214 ***	1.811	−0.019 ***	1.259
Health adoption	0.371 ***	2.058	0.037 ***	0.107
Environmental quality index	0.398 ***	2.413	−2.243 ***	0.053
Standard deviation	**Coefficient**	**Standard error**	**Coefficient**	**Standard error**
Intragenerational age	2.365 ***	0.742	4.234 ***	0.170
Gender type	−0.232	0.175	2.161 **	0.340
Income per capita	0.253 *	0.231	0.034	0.263
Domestic farm workers	−0.014	0.073	1.129 **	0.311
Level of education	0.521 **	0.106	1.521 ***	0.524
Health adoption	0.915 ***	0.803	2.485 ***	0.003
Environmental quality index	0.714 ***	0.207	0.170 ***	0.150

Note: ***; **; and * denote significance at $p > 0.001$; $p > 0.01$; and $p > 0.05$ parameters.

3.3. Final Simulation Comparison

The WINMIRA tool's latent class criterion logit module generates post-primordial classes to calculate conflict efficacy constructs across both dimensions. Notably, the value highlighting differences between class categories becomes a pivotal calculation unit for member variables exhibiting significant threshold coefficients. Tables 5 and 6 present partial class separation within the two dimensions, blending latent class comparisons and variations in member variables. The final confidence interval (CI) value, 95%, represents the highest level of confidence for both the circular and human capital dimensions.

Table 5. Simulation of latent classes and member variables for circular dimension experiments.

Latent Class	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**
Labels	Exploitation of smallholder land	Aggregative habitat threat	CO^2 emission intensity	Heating temperature/climate	Food scarcity
Class details	18.5%	36.7%	24.7%	21.4%	12.4%
Membership variables: Coefficient Two-way ANOVA test					
Intragenerational age	43.298 *** (0.948)	22.605 ** (0.159)	4.13 (5.95)	48.465 ** (0.632)	38.13 ** (0.126)
Gender type	63.369 *** (0.110)	21.120 *** (0.167)	3.28 (6.59)	27.481 *** (0.774)	111.25 (0.144)
Income per capita	−1.849 (0.267)	109.97 ** (0.892)	0.02 (0.30)	102.98 ** (0.765)	219.95 ** (−0.150)
Domestic farm workers	23.35 * (0.520)	35.754 *** (0.369)	3.45 (0.146)	52.442 ** (−0.184)	194.26 (0.122)
Level of education	82.857 (0.955)	20.313 (0.198)	4.08 (4.82)	42.570 (0.564)	123.14 (0.135)
Health adoption	26.22 * (0.823)	26.526 ** (0.290)	4.76 *** (0.532)	73.615 (0.516)	78.32 *** (0.112)
Environmental quality index	27.428 *** (0.275)	−0.161 (0.241)	0.62 * (0.114)	−0.342 (0.302)	1.405 *** (0.118)

Note: ***; **; and * denote significance at $p > 0.001$; $p > 0.01$; and $p > 0.05$ parameters.

Table 6. Latent class simulation and member variables for the human capital dimension experiment.

Latent Class	Class 1	Class 2	Class 3	Class 4	Class 5
Labels	Social capital pressure	Job shifts	Education inequality	Health inequality	Financial crisis
Class details	19.3%	31.7%	27.6%	21.7%	12.6%
Membership variables: Coefficient Two-way ANOVA test					
Intragenerational age	1.037 (0.274)	0.403 *** (0.262)	5.87 * (0.104)	1.563 *** (0.222)	3.126 *** (0.327)
Gender type	2.364 *** (0.278)	0.378 ** (0.283)	6.25 * (0.981)	1.609 *** (0.221)	3.120 *** (0.335)
Income per capita	2.171 *** (0.367)	1.756 *** (0.910)	1.24 (0.403)	−1.338 (0.185)	5.680 *** (0.549)
Domestic farm workers	4.209 *** (0.193)	1.105 *** (0.689)	4.43 ** (0.281)	2.693 *** (0.557)	7.111 *** (3.131)
Level of education	5.326 *** (0.123)	−0.613 (0.221)	1.23 (0.081)	2.849 *** (0.399)	0.872 *** (3.223)
Health adoption	5.263 *** (0.143)	0.992 *** (0.883)	1.27 (0.324)	−7.169 (0.192)	3.246 *** (4.264)
Environmental quality index	2.384 *** (0.355)	0.638 *** (0.903)	3.74 ** (0.261)	1.109 *** (0.549)	3.659 *** (0.416)

Note: ***; **; and * denote significance at $p > 0.001$; $p > 0.01$; and $p > 0.05$, parameters.

The comprehensive description of the latent class bears labels for class identification, delineating the characteristic preferences of their member variables. Thematic attributes of latent classes encompass data on conflict identification in the circular dimension, including "smallholder land exploitation", "aggressive habitat threats", "CO_2 emission intensity", "warming temperature/climate", and "food scarcity". Similarly, class labels for the human capital dimension are arranged based on the following conflict identification data: "social capital pressure", "job shifts", "inequality in education", "health", and "financial crises".

Following class labelling, the member variable model results were subjected to repeated regression to attain a comparison at the experimental simulation's endpoint. The heterogeneity of the member variable with the highest estimates is represented by grey shading with a light hue in the model coefficients.

Table 5 presents the latent class labels and member variables for the circular dimension experiments. Analysing the class breakdown in the context of intragenerational conflicts arising from the expansion of oil palm land, the distribution of poaching events can be observed. This distribution highlights the heightened sensitivity of the class exhibiting the highest conflict level, namely "aggressive habitat threats" (score = 36.7%). The "CO_2 emission intensity" class (score = 24.7%) is associated with conflicts concerning air quality in settlements and habitats, often stemming from the practices involved in palm oil production that contribute to greenhouse gas effects.

The perceived importance of the "warming temperature/climate" class (score = 21.4%) represents the community's sustained concern about the segmentation of palm oil production. Furthermore, the environment's diminished carrying capacity complicates the work conducted by household farmers as they navigate the challenges posed by oil palm production activities. These activities, aimed at fertilising sections of cultivated land, often involve the extraction of groundwater droplets. The preference for the class "smallholder land exploitation" (score = 18.5%) impacts smallholder work in the industry. This class has significant relevance in determining associated coefficients.

Lastly, the class labelled "food scarcity" (score = 12.4%) demonstrates relatively insignificant correlations, along with its two member variables: the type of farmers' work and per capita income. Although its susceptibility to the relationship between distinct member variables is acknowledged, this attribute consistently maintained similarity to the class variable test labels.

As outlined in Table 6, the positive coefficient of the member variable in the human resources dimension supports class dynamics. This observation pertains to the class labelled "job shift" (score = 31.7%). This preference for the class label exhibits strong adaptability within the context of intragenerational conflict certification, particularly for labourers or smallholders who oversee a third of their land. Previously, authoritative bodies took the initiative to facilitate job opportunities for the local community. However, when these efforts fail to align with welfare resolutions, intragenerational conflicts that target gaps in the quality of life for indigenous populations arise.

This class exerts a significant influence across all indicators of class involvement in conflict distribution, including the labels "education inequality" (score = 27.6%), health (score = 21.7%), social capital pressure (score = 19.3%), and financial crisis (score = 12.6%). The articulation of several member variables led to meaningful assumptions within classes 1 to 5, except for the variable related to the environmental quality index. This finding implies that respondents align with the chosen "job shift" class, exerting influence over the work history of smallholder farmers. The sensitivity of the five classes to intragenerational conflicts concerning agricultural population welfare indicates its significant impact.

The analysis from LCA class identification and ANOVA comparison explains that representative class attributes yield pertinent and varied outcomes in describing intragenerational conflicts across the two dimensions.

Before intragenerational conflict information became available, most input came from survey distribution. Nearly 70% of respondents expressed negative opinions regarding environmental conflicts. At the same time, only 30% discussed conflicts in the human development sector. Residents believe that establishing formal land agreements is accompanied by the increasing development of essential public facilities.

In conceptualising intragenerational conflicts within the two dimensions, the type of farm household work emerges as a particularly relevant variable segment; it serves as a benchmark for conflict sustainability, in comparison to the number of produced sectors. Member variable characteristics related to socio-economic scenarios and environmental indices are integrated into decisions, adding to the potential heterogeneity of preference groups. In estimating member variable analysis, the coefficients and significance levels fluctuate when the class under consideration is part of the preference profile.

4. Discussion

4.1. Description of Intragenerational Conflict: Circular Dimensions and Human Capital

This article presents findings from a comprehensive examination of respondents' experiences within the intragenerational context. Our study identifies points of resolution, through adept control management within both circular and human capital dimensions, by reviewing the class preferences related to conflicts arising from oil palm expansion.

Specifically, we describe the combined analysis results through a circular scheme that investigates the root causes of conflicting intragenerational population dynamics. The conclusions drawn from respondents' contributions underscore that the highest frequency of conflicts within oil palm expansion pertains to the circular dimension. Regrettably, some palm oil companies persist in concealing potential environmental risks.

This study argues that environmental factors wield significant influence, bearing profound implications for the sustainability of intragenerational population dynamics. As such, identifying the class label "aggressive habitat threat" garners the foremost priority, aligning with the expectations outlined in the test minutes. While the authorities' politics have protected politics and laws on the use of environmental resources [54], the continued expansion of oil palm land is increasingly leading to environmental habitat degradation.

The Jambi region still adheres to exploitative resource extraction for achieving a competitive advantage that requires more natural resources. Aggregative land clearing directly changes natural substances, such as water, air, and soil, and indirectly increases the class label "temperature or climate warming" [55]. The perception of a threat to environmental resilience will occur shortly if the oil palm expansion plan is carried out simultaneously

with the conversion of commodity land [54]. The instability of oil palm expansion causes damage to the composition of biodiversity cells in forest land, shrubs, and residential fields, as evidenced by changes in the class factor "CO_2 emission intensity" [11,56,57]. The appendix in Table 7, below, illustrates data from five Jambi districts on intragenerational dynamics across circular dimensions before and after oil palm expansion.

Table 7. Latent class simulation and member variables for the circular dimension experiment.

Circular Dimension Coverage	Percentage Transition Dynamics	
	Household 1 (Before Expansion)	**Household 2 (After Expansion)**
Environmental indigenous culture	24.76%	64.77%
Empowerment of local wisdom environment	1.55%	1.96%
Water and soil sanitation	85.09%	82.45%
Fulfilment of nutrition and food nutrition	55.13%	55.9%

Note: The results of primary and environmental quality index data are processed.

Interestingly, the class answers "smallholder land exploitation" and "food scarcity" emerge from the lived experiences of marginalised intragenerational populations. This dynamic experience is called land grabbing in rural communities, where corporations destroy people's residential houses, burn food swale land, and forcibly evict indigenous people [56]. Households highlight the expansion of oil palm area as an essential reason for forced mobility, because the shift not only includes social and physical elements, but also the dynamics of mental resolution of environmental quality [58]. As previously suggested, incentives for oil palm management must be designed to prioritise environmental resilience and the sustainable use of protected settlement areas [59].

The class label "job shift" profile underscores conflict resolution by focusing on the future development of intragenerational human capital. The household work variable type notably influenced the preferences of the informant recipient class. This influence is evident after investigating information regarding the palm oil production sector.

Shifting work units can be interpreted as a strategy to balance class goals related to "education and health inequality". This is because support for human resource certification depends on the extent to which different intragenerational age groups can benefit from implementing these two fundamental attributes.

There is substantiation for the claim that the CPO oil unit company strives to establish capacity by targeting education (37%) and health (19%) initiatives as reciprocal services through which to address patent loss. Detailed discussions held with palm oil entrepreneur informants and respondents regarding the coverage of this scheme indicated that 86% of the sample emphasised the significance of enhancing human capital development. This emphasis stems from the realisation that certain companies necessitate conflict resolution measures to compromise with the community.

This study critiques the "social capital pressure" experienced by the marginalised class, which results in the inability of impoverished households to meet their financial needs independently. This situation corresponds to the preferences of the "financial crisis" class [21]. Generally, the younger generation's involvement in the palm oil sector is driven by the aim to enhance their households' economic and financial statuses.

This analysis recommends that 89% of conflict resolution efforts should prioritise providing educational and health opportunities for impoverished households. This approach signifies a reciprocal expansion of the oil palm industry to elevate social status. Another crucial aspect is assessing well-being through the lens of health status, which serves as an indicator of cognitive measurement within society. By ensuring the availability of health facility equipment to impoverished households, the promotion of nutritional sanitation and overall nutrition can be facilitated, contributing to human capital development [60].

Tables 8 and 9 provide a detailed comparative design of the respondent sample, composed of class preferences regarding intragenerational dynamic conflicts from the human

capital perspective. Until now, human capital has been the focus of social development change agents, in the belief that it cultivates a prosperous intragenerational mentality. This study adds value by demonstrating human capital as a tool that bolsters individual competition through skills, knowledge, and work proficiency [58,60,61].

Table 8. Latent class simulation and member variables for the human capital dimension experiment within the education sector.

The Scope of the Human Capital Dimension of the Education Sector	Household 1 (Before Expansion)	Household 2 (After Expansion)
School enrollment of male students	0.80	0.81
School enrollment of female students	1.11	1.23
Dropout rate for male students	3.62	4.25
Dropout rate of female students	3.87	0.96
Education expenditure of poor households (IDR/school-attending child)	300.600	650.400

Note: The results of primary and IFLS data are processed.

Table 9. Latent class simulation and member variables for the human capital dimension experiment within the health sector.

The Scope of the Human Capital Dimension of the Health Sector	Household 1 (Before Expansion)	Household 2 (After Expansion)
Dietary diversity (gram)	5.145	2.436
Number of calories (kkal/day)	2.916	3.840
Household food expenditure (IDR/year)	13.265	52.836
Hospital facility fees (IDR/year)	143.260	521.034
Health centre facility fees (IDR/year)	3.742	15.677

Note: The results of primary and IFLS data are processed.

4.2. Study Limitations

This study acknowledges limitations in its preliminary examination, methodology, and research findings. Firstly, while the phenomenon of intragenerational conflict over oil palm expansion is often found in some of the largest oil palm-producing regions in Indonesia, especially in the Jambi region, extrapolating these findings to other major oil palm-producing areas requires further investigation. In addition, potential data bias arises from the data collection and selection of observation objects used in our data processing analysis. Therefore, a reduction that eliminates unnecessary data for the representation of the sample and population is necessary.

Secondly, the results underlying these findings relied solely on variance methods. This involved a combined approach using Latent Class Analysis and ANOVA to investigate the correlation between circular dimensions and human capital in the context of intragenerational community conflict over oil palm expansion. However, both LCA and ANOVA have limitations pertaining to the inclusion of only basic model assumptions and accuracy in identifying conflict groups. Thirdly, the generalisability of the findings, which has been assumed as a framework for discussion, is also limited by the subjectivity of the studied population. This is followed by the minimal IFLS data collection, which also affects the analysis of the findings' generalisability and validity.

For academic development, this study highlights the importance of expanding the geographical scope and sample, as well as using more complex analytical methods to ensure the findings' validity and compatible generalisation. Future research can expand the focus to consider external factors influencing intragenerational conflicts related to oil palm expansion, such as government intervention, environmental resilience, and socio-economic factors.

5. Conclusions

This exposure study investigated class preferences within the dynamics of intragenerational conflict by developing member variable assumptions, based on indicators such as education, health, smallholder employment, and environmental performance allocation. These assumptions were drawn from the principles of circular dimension management control resolution and human resources. The sample design involved case-based sampling, utilising the descriptions of intragenerational communities in Jambi, specifically those coexisting within the growth zone of oil palm production. The simulation of latent classes identified a combination of member development variables, including intragenerational age, gender, per capita income, type of smallholder farmer, education, health adoption, and environmental index. Each member variable coefficient represents the incorporation of latent class preferences into circular dimensions and human capital conflict labels.

The analysis of latent preference classes has identified circular conflicts directed at "aggressive habitat threats," suggesting an urgent need to address issues like illegal promotion or destruction of living ecosystem networks. These incidents often occur due to changes in land titling practices. Considering the circular dimensions of land extraction, companies need to replace their environmental tax contributions to prevent the continuation of arbitrary alleged conflict cases. They should also consider the impact of production scale on the future coexistence of intragenerational residents within the region.

This study delved deeper into the conflict dimension, presenting different views on the human capital aspect. Despite the limited sample size, focusing on intragenerational population conflicts, a significant finding emerged on the latent preference class label "job shift" that remains prevalent among small intragenerational farming households. This class label preference underscores one of the strongest flexibilities of intragenerational conflict certification, particularly for workers or small farmers who lack the resources to manage commodity land.

This research builds upon a comprehensive review of existing empirical studies, leveraging their findings as the basis for including sample characteristics that optimise the assessment of conflict class preferences. The findings hold significant relevance for policy decision makers, NGOs, and environmental safety organisations. This research also aims to improve the country's business development balance by considering both the circular and human resource dimensions, contributing to frame resolutions for saving conflict areas, thereby preventing continued loss of life. Moreover, emphasising the resolution of capacity building through the inclusion of a section on argument literacy offers a valuable framework for future interventions, specifically within the context of circular dimensions and human capital in conflict resolution.

Predicting the overall consequences of oil palm land expansion on intragenerational communities presents a significant challenge. This study has identified promising avenues for mitigating these conflicts. Firstly, a circular management strategy for higher land expansion practices suggests that protecting a designated area of intragenerational community habitat within the oil palm growth zone can be achieved using less land, thus reducing pressure on the forest resource environment. Secondly, better human capital outcomes also improve the economic viability of oil palm expansion activities, potentially promoting capacity building within intragenerational communities. The findings from this study show that the improvements in both circular dimensions and human capital in Jambi Province significantly affect the regulation of expansion conflicts, paving the way for sustainability-based agricultural resolution policies. Developing different policy recommendations that target both circular and human capital dimensions can promote more responsible agricultural management implications for conflict resolution due to oil palm expansion, focusing on environmental sanitation and local community welfare.

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