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Pension Reform in Indonesia: The Strategy to Reduce Pension Liabilities

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1.1. Research Background

The Mercer CFA Institute Global Pension Index (the Index) evaluates Indonesia's pension system as having low adequacy and sustainability. Regarding adequacy, Indonesia's civil service pension (CSP) payment is inadequate to support pensioners' living costs. Particularly for mid-level to senior officials, the pension benefits only comprise a modest portion of the overall take-home income earned by civil servants (Muliati, 2013). Regarding sustainability, Indonesia's public sector pension system faces serious challenges because of unfunded liabilities (Hadi et al., 2022).

Furthermore, a plot of the active civil servants by age based on data from the National Civil Service Agency (NCSA, 2024) shows 3,566,141 civil servants as of December 2024. Meanwhile, the number of pension beneficiaries was 2,913,731 people (814,313 from central government and 2,099,418 from local government) as of June 2024 (PT Taspen, 2024). Due to historical hiring trends, the current distribution peaks of active civil servants for the 41–60 cohort. CSP pensioners' growth rate is higher than the average growth rate of active civil servants (Muliati, 2013). Short-term increases in the pension bill will result from this wave of retirements.

Declining mortality and fertility rates have led to significant demographic changes in Indonesia. The United Nations Population Prospects shows that Indonesia's life expectancy at age 60 has increased to 18.6 years in 2020. It is expected to grow by another 3 years by 2040 (World Bank, 2020). If reforms are not implemented, rising life expectancy and high pension indexation will eventually increase the pension bill. However, the current retirement age of the CSP system in Indonesia is relatively low compared to life expectancy and remains unchanged. Currently, the standard retirement age for civil servants is 58 years old, but can be extended for certain positions to 60, 62, 65, or 70 years old based on the government's needs. The low retirement age results in a short contribution period but a longer period to receive benefits. It will also put significant pressure on the CSP system as fewer civil servants have to support the growing number of older people.

As a result, Indonesia's government has to reform its pension plan for civil servants. The sustainable reform of the pension system must consider the fiscal sustainability and adequacy of pension payments to meet the goals of income smoothing and poverty reduction (Grech, A.G., 2010; Grech, A.G., 2018). According to Ananta et al. (2021), the Indonesian government intends to switch the pension program from a defined-benefit (DB) to a defined-contribution (DC). However, Indonesia has to decide on several factors before creating a new system to replace the CSP system. A comprehensive approach to pension reform is

required to lower pension obligations and provide a well-designed pension system that offers a decent pension to all retirees.

1.2. Research Objectives

This study proposes a strategy for developing more sustainable pension liabilities in Indonesia's CSP system. The unsustainability of the public pension system can have significant consequences for Indonesia's economy. Thus, the government of Indonesia should reform it to prevent its bankruptcy. This study picked the Indonesian CSP system as its case study for two reasons. The first argument is that implementing reforms for a CSP system in Indonesia may be an example for other developing countries. Second, the researcher's advantage in obtaining access to the essential study data, as the researcher formerly worked in the government and dealt with CSP concerns, is the justification for selecting the Indonesian case. A suggestion for creating more manageable pension liabilities in Indonesia's CSP system is put forth in this research.

1.3. Research Questions and Hypotheses

The main research question is, "How and whether is it possible to reform the current Indonesian CSP system to be more sustainable in the long term?" The following research questions will be examined to answer this question:

a. How is the adequacy of the current Indonesian CSP system?
b. How high are the risks of the unsustainability of the current CSP system?
c. How can a more sustainable pension system be designed, and what is the cost?
d. What are the benefits of the new pension system, and what are the risks of achieving them?
e. Can Indonesia afford to reform its CSP system, considering the cost and benefit of reform with the various risk scenarios?.

Furthermore, the research hypotheses are as follows:

a. H1: Increasing the contribution rate positively impacts improving the long-term sustainability of the Indonesian CSP system.
b. H2: Increasing the retirement age positively impacts improving the long-term sustainability of the Indonesian CSP system.
c. H3: Increasing civil servants' salaries negatively impacts improving the long-term sustainability of the Indonesian CSP system.
d. H4: Reforming the pension system from a DB scheme to a new scheme is crucial to achieving the long-term sustainability of the Indonesian CSP system.
e. H5: Changing the pension benefits formula positively impacts improving the adequacy of the Indonesian CSP system.
f. H6: Investment return significantly impacts improving the adequacy of the Indonesian CSP system.

2. MATERIALS AND METHODS

2.1. Research Design

This study utilizes a mixed-methods approach to collect and analyze data by examining the issue through quantitative (secondary data analysis) and qualitative (interviews) methods. According to Creswell (2018), mixed-methods research involves gathering quantitative and qualitative data, integrating these two data types, and employing various research designs that may encompass philosophical assumptions and theoretical frameworks. This study posits that combining qualitative and quantitative data can yield insights beyond what each data source can provide.

This research employs a mixed-methods approach for two primary reasons. First, it helps balance the strengths and weaknesses of surveys and interviews, enhancing the overall credibility of the research (Creswell & Plano Clark, 2011; Bryman, 2016). The second advantage of a mixed-methods approach is that it "extends results beyond what can be achieved using a single method" (Grafton et al., 2011). While surveys provide valuable information about which groups are more likely to hold certain views, interviews delve deeper into individuals' perspectives. Therefore, in this study, a mixed-methods strategy yields more comprehensive answers to the research questions than could be achieved through a single methodology.

2.2. Data Sources and Data Collection

When discussing research methodologies, selecting appropriate data sources is crucial for the study. Based on the research objectives, this research identified two primary sources for data collection: interviews and secondary data sources. This study gathered primary data through interviews to understand public employees' and pensioners' perspectives and concerns regarding the adequacy and sustainability of Indonesia's current CSP system and the planning for pension reform.

Interviews

This study employed an interview-based research approach. A total of three interviews were conducted: with civil service pensioners, civil servants, key representatives from the Ministry of Finance of the Republic of Indonesia, and a representative from the World Bank.

The interviews with civil service pensioners took place in Kapuas Regency, Central Kalimantan Province, Indonesia, from March to June 2024. The interviews with civil service pensioners were also conducted in Tasikmalaya City, West Java Province, Indonesia, from October to December 2023. The researcher selected civil service pensioners based on their grades and final positions prior to

retirement. Eligible pensioners were contacted and encouraged to participate in the study. An interview protocol was implemented. Assurances were provided regarding ethical practices, including measures to maintain the anonymity and confidentiality of the interviewees.

The researcher interviewed 20 civil service pensioners as part of this study. A total of fifteen semi-structured interviews—ten with men and five with women—were carried out in Kapuas Regency to identify and characterize the diverse opinions and attitudes among pensioners regarding the adequacy of CSP plans. The interviewing process and its instruments received approval from the National Research and Innovation Agency (NRIA) Ethics Committee on Social Studies and Humanities, with clearance letter Number 213/KE.01/SK/03/2024. Additionally, five exploratory, semi-structured interviews were held in Tasikmalaya City to evaluate the adequacy of CSP plans, involving one female and four male participants.

Secondly, the researcher interviewed 14 Indonesian civil servants from various positions and grades online from July to September 2024. During these interviews, participants were asked about the adequacy of the CSP scheme and the Indonesian government's reform plans. Finally, online semi-structured interviews have been conducted with key figures. On October 30, 2024, the researcher interviewed Didik Kusnaini, the Director of Budget Regulation Harmonization at the Directorate General of Budget, the Ministry of Finance of the Republic of Indonesia. Additionally, the researcher interviewed Robert Palacios, a Lead Economist at the World Bank, on November 7, 2024. The researcher inquired about the adequacy, sustainability, and pension reform related to the CSP scheme.

Secondary data

Secondary data is the foundational information gathered to provide comprehensive details for implementing the CSP system in Indonesia. Since the CSP system is derived from government policy, official government documents are the primary sources deemed relevant and legitimate. This information and the relevant documents have been collected from several government agencies, such as the Ministry of Finance, the NCSA, PT Taspen, and the World Bank Report for the Indonesian government.

After gathering secondary data, the researcher conducted a simulation to reform the CSP system, primarily focusing on ensuring financial sustainability. The simulation aimed to explore a policy scenario that addresses the research questions related to this reform. Specifically, the simulation sought to answer several key research questions. The research questions will be examined further using a condensed mathematical model based on macroeconomic and microeconomic variables.

3. RESULTS AND DISCUSSION

3.1. Adequacy of the Indonesian Pension System

The researcher measures the adequacy of the Indonesian CSP system based on references from the literature review, assessing several factors such as benefits, replacement rate (RR), and home ownership. Therefore, the RR of pension benefits was used as the primary approach to assess the adequacy of the CSP scheme. The RR is calculated by dividing the individual's pension benefit by net pre-retirement earnings (take-home pay (THP)). According to Table 1, the RR of the interviewees ranges from 44% to 60% of their THP. Notably, all 20 respondents had an RR greater than 40%, which aligns with the recommendations of the International Labour Office (ILO).

Table 1.
Pension Benefits Compared to Basic Salary, THP, and RR.

No.	Code	Grade	Basic Salary (IDR)	EUR	Total Allowance (IDR)	EUR	THP (IDR)	EUR	Pension Benefits (IDR)	EUR	RR
1	N	IV/e	6,373,200	378.04	4,431,928	262.89	10,805,128	640.93	4,779,900	283.53	44.24%
2	F	IV/a	4,483,100	265.92	1,457,314	86.44	5,940,414	352.37	2,846,700	168.86	47.92%
3	L	II/d	3,877,500	230.00	1,372,530	81.41	5,250,030	311.42	2,909,300	172.57	55.41%
4	M	IV/c	5,687,200	337.35	1,810,888	107.42	7,498,088	444.76	4,272,600	253.44	56.98%
5	H	III/a	4,435,500	263.10	1,400,650	83.08	5,836,150	346.18	3,331,300	197.60	57.08%
6	G	III/b	4,623,200	274.23	1,426,928	84.64	6,050,128	358.88	3,477,100	206.25	57.47%
7	K	III/b	4,623,200	274.23	1,426,928	84.64	6,050,128	358.88	3,477,100	206.25	57.47%
8	A	III/d	5,022,500	297.92	1,532,830	90.92	6,555,330	388.84	3,772,100	223.75	57.54%
9	B	IV/a	5,235,000	310.52	1,562,580	92.69	6,797,580	403.21	3,936,800	233.52	57.91%
10	D	IV/a	5,235,000	310.52	1,562,580	92.69	6,797,580	403.21	3,936,800	233.52	57.91%
11	C	IV/a	5,399,900	320.31	1,585,666	94.06	6,985,566	414.36	4,050,000	240.23	57.98%
12	J	III/d	5,180,700	307.30	1,403,978	83.28	6,584,678	390.58	3,885,600	230.48	59.01%
13	I	IV/b	5,456,400	323.66	1,442,576	85.57	6,898,976	409.23	4,093,300	242.80	59.33%
14	O	II/d	3,877,500	230.00	1,012,530	60.06	4,890,030	290.06	2,909,300	172.57	59.49%
15	E	IV/b	5,628,300	333.85	1,466,642	87.00	7,094,942	420.85	4,221,300	250.39	59.50%
16	P	IV/b	5,456,400	323.66	1,563,576	92.75	7,019,976	416.40	3,908,200	231.82	55.67%
17	Q	III/c	4,671,600	277.11	1,128,704	66.95	5,800,304	344.06	3,219,600	190.98	55.51%
18	R	IV/c	5,687,200	337.35	1,595,888	94.66	7,283,088	432.01	3,956,200	234.67	54.32%
19	S	IV/c	5,687,200	337.35	1,595,888	94.66	7,283,088	432.01	3,956,200	234.67	54.32%
20	T	IV/b	5,456,400	323.66	1,563,576	92.75	7,019,976	416.40	3,908,200	231.82	55.67%

Sources: Government Regulation Number 5 Year (2024), Government Regulation Number 8 Year (2024), Presidential Decree Number 26 for the Year 2007, Presidential Decree Number 12 for the Year 2006.

Based on ILO criteria, the existing pension system provides a suitable income replacement for government officials in Indonesia, allowing them to achieve a decent standard of living after retirement and serving as recognition for their contributions. It is worth mentioning that the THP reflected in Table 1 does not include the regional performance allowance since the respondents retired before implementing the regional performance allowance rule.

I also asked the interviewees how well their CSP benefits supported their advanced needs, such as entertainment and travel, and their basic needs, such as food and housing. It was to gather information regarding the adequacy of these benefits. Table 2 indicates that all interviewees believed their pension payments would cover their basic needs. However, 80% of the respondents (16 out of 20) mentioned that their pensions only met their basic needs. Among the 20 interviewees, only four reported that their pensions addressed ongoing or advanced needs. Interestingly, despite being of different genders, two members from the Kapuas regency had the highest RR at almost 59% of their wages, while sharing the same job grade before retirement. Although they both held level IV positions, which is not the highest rank, their benefits placed them in the upper half of all respondents.

Table 2.

Perception of Interviewees about Financial Needs.

No.	Code	Gender	Grade	Pension Benefits (IDR)	EUR	RR	Financial Needs
1	F*	Female	IV/a	2,846,700	168.86	47.92%	Basic
2	L*	Male	II/d	2,909,300	172.57	55.41%	Basic
3	O*	Male	II/d	2,909,300	172.57	59.49%	Basic
4	H	Male	III/a	3,331,300	197.60	57.08%	Basic
5	G	Female	III/b	3,477,100	206.25	57.47%	Basic
6	K	Male	III/b	3,477,100	206.25	57.47%	Basic
7	A	Female	III/d	3,772,100	223.75	57.54%	Basic
8	J	Male	III/d	3,885,600	230.48	59.01%	Basic
9	B	Male	IV/a	3,936,800	233.52	57.91%	Basic
10	D	Male	IV/a	3,936,800	233.52	57.91%	Basic
11	C	Male	IV/a	4,050,000	240.23	57.98%	Basic
12	I	Male	IV/b	4,093,300	242.80	59.33%	Continuous/Advanced
13	E	Female	IV/b	4,221,300	250.39	59.50%	Continuous/Advanced
14	M	Female	IV/c	4,272,600	253.44	56.98%	Basic
15	N	Male	IV/e	4,779,900	283.53	44.24%	Basic
16	P	Male	IV/b	3,908,200	231.82	55.67%	Basic
17	Q	Male	III/c	3,219,600	190.98	55.51%	Basic
18	R	Male	IV/c	3,956,200	234.67	54.32%	Continuous/Advanced
19	S	Female	IV/c	3,956,200	234.67	54.32%	Continuous/Advanced
20	T	Male	IV/b	3,908,200	231.82	55.67%	Basic

Source: Author's work

The interviewees discussed their quality of life before retirement and their reactions to the current pension situation. It was found that their expenses varied significantly prior to retirement. To manage their finances post-retirement, most male and female respondents anticipated an income loss and planned accordingly. One female interviewee, who reported a RR of 56%, stated, "My monthly pension is enough for daily needs." However, she recognized that her pension would not be sufficient for more significant expenses. It highlights that even though her RR exceeded the recommended 40%, the potential income decrease needed to be accounted for. Another female respondent, with an RR of 47.92%, attributed her

situation to low overall compensation, especially her base salary. Her pension payments amounted to only IDR 2,846,700, below the Kapuas Regency minimum wage of IDR 3,261,700.

Although they are more likely to reach RR objectives, level I and II pensioners have insufficient working-life income before and after retirement. The state income provided by the CSP plan benefit is more likely to be relied upon by low-income pensioners (levels I and II). They are unlikely to have as many options to turn their wealth into revenue or to cut costs, like real estate-related ones. The highest level of pensioners (IV/e) enjoy a "comfortable" quality of life while employed, particularly because they are granted a specific structural position. They acknowledge that because they will have a low RR, this group of pensioners finds it challenging to maintain a comparable level of life in retirement. They will not be able to continue living at the same level as before they retired.

Some interviewees still had bank loans during retirement since their income did not cover the expenditures from when they became civil servants. These loans can also be seen as another attempt to smooth their consumption by depending on more than just pension benefits. The necessity of regularly supporting other family members financially, as shown in the statement, "I have to support my family every month, although only a small amount," may also impact this smoothing. It is a crucial factor, as most aged pensions operate under the assumption that they will not have any dependent children in their families (Tanton et al., 2009).

Furthermore, the researcher asked the civil servant interviewees regarding the adequacy of the current pension benefits. According to the interview, 13 out of 14 interviewees believe that the current amount of CSP benefits is still inadequate to meet the needs of a decent living. A human resource auditor interviewee highlighted pensions based on levels and a sharp decline in income. He believed for those civil servants in the lower middle class, the current pension amount may be quite competitive. However, for middle to upper-class employees/positions, there is still a gap in conditions before and after active duty, with a sharp decline in income. Other interviewees have similar opinions on whether it is adequate or inadequate relative to each person. A personnel analyst interviewee said: " For civil servants in several agencies, when they are active, the highest component of their income comes from performance allowances, not their basic salary. Meanwhile, the basis for calculating pensions is from the basic salary; therefore, there will be a decrease in income when you retire. So, adjustments need to be made when transitioning from active to retired." Meanwhile, Echelon 2 argues:" It depends on lifestyle factors and the environment where you live and your needs also have an influence."

3.2. Sustainability of Indonesian CSP System

3.2.1. Sustainability of the Current CSP System.

According to the APBN (2021), contributions to pension benefits amounted to IDR 128,740.5 billion. In 2022, the contribution to pension benefit payments reached IDR 136,355.7 billion, reflecting a 5.9 percent increase compared to the outlook for 2021 (APBN, 2022). Pension benefit payments in 2023 totaled IDR 142,730.8 billion, an increase of 4.6 percent compared to the 2022 outlook. This rise in pension benefit payments corresponds with the growing number of pensioners (APBN, 2023).

For 2024, the planned allocation for pension benefit payments is IDR 146,514.3 billion, representing an increase of 2.7 percent compared to the outlook for 2023. While there is a consistent nominal increase in pension benefit payments each year, the pension burden as a percentage of GDP has remained stable or even decreased (APBN, 2024). According to Table 3, pension spending is projected to be around EUR 8.627 billion in 2024.

Table 3.
Pension Spending Compared to GDP, Government Income, and Employee Budget[1].

	Budget Year			
Description	**2021**	**2022**	**2023**	**2024**
Pension Spending	IDR 128.7 trillion (EUR 7.58 billion)	IDR 136.3 trillion (EUR 8.03 billion)	IDR142 trillion (EUR 8.405 billion)	IDR 146,5 trillion (EUR 8.627 billion)
GDP	USD 1.18 *trillion* (EUR 1,13 trillion)	USD 1.32 trillion (EUR 1,25 trillion)	USD 1.37 trillion (EUR 1.306 trillion)	USD 1.368 trillion (EUR 1.303 trillion)
Government Income	IDR 1,743 trillion (EUR 102.67 billion)	IDR 1,840 trillion (EUR 108.4 billion)	IDR 2,443 trillion (EUR 143.9 billion)	IDR 2,802 trillion (EUR 165 billion)
Taxes	IDR 1,444.5 trillion (EUR 85.06 billion)	IDR 1,506.9 trillion (EUR 88.73 billion)	IDR 2,016.9 trillion (EUR 118.77 billion)	IDR 2,309.9 trillion (EUR 136 billion)

[1] Employee budget is the budget allocation of Indonesian government in APBN (Indonesian National Budget) for paying the compensation in the form of money or goods given to civil servants, state officials, and retirees as well as honorary employees who will be appointed as government employees as compensation for work that has been carried out in order to support the tasks and functions of government organizational units (Regulation of the Minister of Finance Number 102/PMK.02/2018 of 2018 concerning Budget Classification).

Employee Budget	IDR 387.75 trillion (EUR 22.8 billion)	IDR 402.44 trillion (EUR 23.69 billion)	IDR 432.45 trillion (EUR 25.46 billion)	IDR 481.42 trillion (EUR 28.35 billion)
Percentage (GDP)	0.67%	0.64%	0.64%	0.66%
Percentage (Income)	7.38%	7.4%	5.8%	5.2%
Percentage (Taxes)	8.9%	9.04%	7.07%	6.3%
Percentage (Employee Budget)	33.2%	33.8%	33%	30.4%

Source: (APBN, 2021-2024), (World Bank Data, 2025), (BPS Statistics, 2025)

Based on the APBN, we can analyze how pension spending compares to government income, specifically tax revenue, as detailed in Table 3. Pension spending accounts for approximately 6-8% of government income, while taxes range from 6-9%. Although these percentages remain below 10%, Indonesia must adequately enhance its revenue to cover expenditures, particularly pension spending. Furthermore, we can also compare the pension spending to the employee's budget based on the data from APBN in Table 3. Although the percentage of pension spending is not significantly high compared to GDP and government revenue, the director of budget regulations harmonization at the Ministry of Finance stated that there are no concerns regarding the sustainability of the CSP system compared to the allocation for employee spending in the APBN. However, it is important to note that the percentage of pension spending is relatively high, at around 30%, compared to the employees' budget, as outlined in Table 3.

3.2.2. The Long-term Pension Sustainability

Based on the data of current pensioners from PT. Taspen and the data of civil servants from the NCSA, the researcher forecasts the amount of pension spending on CSP benefits in the future.

Formula/Forecasting Model

The fundamental equation of the well-known pay-as-you-go (PAYG) system can be expressed as follows (Barr, 2000; Börsch-Supan et al., 2016; Dedák & Fiser, 2024):

$$\tau(t)C(t)S(t)=B(t)P(t) \quad (1)$$

where:

τ: contribution rate

C: the number of civil servants

S: average salary of civil servants

B: average pension benefit

P: the number of pensioners

t: time

Therefore, the model of pension revenues is in the following:

$$\mathbf{PR(n)=CS(n)\times CR(n)\times AS(n)} \qquad \mathbf{(2)}$$

where:

PR(n) represents the pension revenues collected in the year of n,

CS(n) represents the number of CS in year n,

CR(n) is the contribution rate in year n

AS(n) represents the average annual salary for CS

Meanwhile, the model of pension expenditure is as follows:

$$\mathbf{PE(n) = P(n) \times AP(n)} \qquad \mathbf{(3)}$$

where:

PE(n) represents the pension expenditure in year n,

P(n) represents the number of CS pensioners in year n,

AP(n) represents the yearly average pension rate.

Therefore, the model of the yearly pension gap is as follow: $PG(n) = PR(n) - PE(n)$ where PG(n) stands for pension gap in year n. When $PG(n) < 0$, it indicates that there is a pension gap in year t, and the amount of the pension gap equals $-PG(n)$; when $PG(t) \geq 0$, it indicates that there is no gap in year n.

The Assumptions

To calculate the pension gap, it is necessary to set assumptions that include the growth of the number of civil servants, the growth of civil service pensioners, an assumption of an increase in take-home pay (base salary, performance allowance), a retirement age limit, and calculating pension benefits 14 times a year. According to NCSA (2024) statistics, civil servants have been declining yearly since 2015. Therefore, the researcher assumed the growth number of civil servants would be

zero in this calculation. In more detail, the assumptions used in the calculations of pension benefits are as follows:

Table 4.
Assumptions for Pension Benefits Calculations

No.	Components	Assumption
1.	Growth of the number of Civil Servants	zero rate
2.	Growth of Civil Service Pensioners	2%
3.	Salary increases	2.5% yearly
4.	Basic pension/Pension base	the last/final salary
5.	Civil servants' contribution rate	4.75%
6.	Accrual rate	2.5%
7.	Pension payment	14 months in a year

Source: Author's work

Calculation Result

According to Table 5, monthly pension payouts are expected to increase significantly from around IDR 10.596 trillion in 2026 to IDR 93.766 trillion by 2075, or a 7.85 times increase. On the other hand, monthly pension contributions increase at a significantly slower rate, rising from IDR 0.654 trillion to IDR 2.195 trillion (or about a 235% increase). Put otherwise, benefit payments increase at a rate that is almost three times higher than contributions. Total pension spending increases from IDR 148.352 trillion in 2026 to IDR 1,312.718 trillion in 2075 annually, while annual contributions increase from IDR 7.854 trillion to IDR 26.336 trillion. As a result, the disparity between inflows and outflows significantly increases.

By 2075, the pension gap—defined as annual benefits minus contributions—is projected to reach IDR 1,286.381 trillion, which represents a growth of 9.16 times from a starting point of approximately IDR 140.498 trillion in 2026. The difference between benefits and contributions, expressed as a percentage of contributions, decreases from 1,788.9% in 2026 to 4,884.5% in 2075. In 2026, contributions will cover only 5.29% of benefits, but by 2075, this coverage will drop to just 2.00%. This coverage ratio is illustrated in the "PR/PE" column of the table (where contributions are divided by benefits). This negative amortization, where payouts significantly exceed contributions, cannot continue indefinitely. Fiscal sustainability is threatened as the unfunded liability (the gap) must be compensated through other sources, such as debt and the general budget, especially as contributions fall short of projections.

Demographic changes are a significant driver of these trends. The number of pensioners is expected to double, rising from approximately 2.97 million in 2026 to about 7.84 million by 2075—a 2.64 times increase, or a 2.0% annual growth rate. Meanwhile, the contributor base, composed of civil servants, will remain constant at around 3.795 million. This situation leads to a dramatic reduction in the number of employees supporting each retiree. The deficit as a percentage of contributions nearly triples, while the absolute gap grows from IDR 140 trillion to IDR 1,286 trillion. There is a clear tipping point: by the 2040s, yearly benefit expenditures will surpass contributions by more than 20 times, and this trend will continue to increase. There is a constant increase in the deficit rather than a reversal in any given year. This pattern indicates high fiscal risk and unsustainability at current rates. When unfunded liabilities increase uncontrolled, the system is underfunded and "going broke," as numerous studies have observed.

According to Table 5, contributions fall behind benefits by an increasing amount. The financial burden will become intolerable without reforms (increasing contribution rates, expanding the workforce, cutting benefits, or introducing more funds). Since the government does not pay pension contributions regularly, the government will pay pension benefits (expenditure) directly by the APBN based on Government Regulation Number 20 of 2013. Meanwhile, the pension revenue (contribution) will go directly to PT Taspen as a pension fund to be invested. Therefore, the Indonesian government should regularly contribute to ensure the long-term sustainability of the civil servants' pension system. It is important to carefully examine a rate equivalent to the civil servants' contribution, or about 10% of their pay. According to Table 5, the hypothesis of this research, "H1: Increasing contribution rates positively impacts improving the long-term sustainability of the Indonesian CSP system," can be accepted. The Indonesian government should fund the program immediately to lower the unfunded liabilities.

In summary, the existing CSP system is associated with significant long-term risks. Therefore, the CSP programs in the medium and long term could pose risks if program reforms are not designed carefully, which can have a direct impact on the APBN. Also, most civil servants are in the 40–60 age range (NCSA, 2024), and the pension program will become a burden in several years. Therefore, appropriate policies would be necessary to prevent substantial pressure on the government budget.

Table 5.

Prediction of Pension Gap of CSP Expenditure

Working Year	Year	Accrual Rate	Year of Service	Last Salary (Average)	Pensioners	Contribution Rate	Civil Servants	Basic Salary (Average)	Monthly Pension Expenditure (Benefits)	Annual Pension Expenditure (Benefits)	Monthly Pension Contribution (MPC)	Annual Pension Contribution (APC)	Pension Gap		PR/PE
													IDR	In percent of APC	
Year 0	2026	2.5%	30	4,753,950	2,972,006	4.75%	3,795,302	3,630,455	10,596,574,587,899	148,352,044,230,589	654,486,914,725	7,853,842,976,694	140,498,201,253,895	1788.91%	5.29%
Year 1	2027	2.5%	30	4,872,799	3,031,446	4.75%	3,795,302	3,721,216	11,078,718,731,649	155,102,062,243,081	670,849,087,593	8,050,189,051,111	147,051,873,191,970	1826.69%	5.19%
Year 2	2028	2.5%	30	4,994,619	3,092,075	4.75%	3,795,302	3,814,246	11,582,800,433,939	162,159,206,075,142	687,620,314,782	8,251,443,777,389	153,907,762,297,752	1865.22%	5.09%
Year 3	2029	2.5%	30	5,119,484	3,153,916	4.75%	3,795,302	3,909,603	12,109,817,853,683	169,537,449,951,560	704,810,822,652	8,457,729,871,824	161,079,720,079,737	1904.53%	4.99%
Year 4	2030	2.5%	30	5,247,471	3,216,994	4.75%	3,795,302	4,007,343	12,660,814,566,026	177,251,403,924,356	722,431,093,218	8,669,173,118,619	168,582,230,805,737	1944.62%	4.89%
Year 5	2031	2.5%	30	5,378,658	3,281,334	4.75%	3,795,302	4,107,526	13,236,881,628,780	185,316,342,802,915	740,491,870,549	8,885,902,446,585	176,430,440,356,330	1985.51%	4.79%
Year 6	2032	2.5%	30	5,513,125	3,346,961	4.75%	3,795,302	4,210,214	13,839,159,742,889	193,748,236,400,447	759,004,167,312	9,108,050,007,750	184,640,186,392,698	2027.22%	4.70%
Year 7	2033	2.5%	30	5,650,953	3,413,900	4.75%	3,795,302	4,315,470	14,468,841,511,191	202,563,781,156,668	777,979,271,495	9,335,751,257,943	193,228,029,898,724	2069.76%	4.61%
Year 8	2034	2.5%	30	5,792,226	3,482,178	4.75%	3,795,302	4,423,356	15,127,173,799,950	211,780,433,199,296	797,428,753,283	9,569,145,039,392	202,211,288,159,904	2113.16%	4.52%
Year 9	2035	2.5%	30	5,937,032	3,551,822	4.75%	3,795,302	4,533,940	15,815,460,207,847	221,416,442,909,864	817,364,472,115	9,808,373,665,377	211,608,069,244,487	2157.42%	4.43%
Year 10	2036	2.5%	30	6,085,458	3,622,858	4.75%	3,795,302	4,647,289	16,535,063,647,305	231,490,891,062,263	837,798,583,918	10,053,583,007,011	221,437,308,055,252	2202.57%	4.34%
Year 11	2037	2.5%	30	6,237,594	3,695,315	4.75%	3,795,302	4,763,471	17,287,409,043,257	242,023,726,605,596	858,743,548,516	10,304,922,582,186	231,718,804,023,409	2248.62%	4.26%
Year 12	2038	2.5%	30	6,393,534	3,769,222	4.75%	3,795,302	4,882,558	18,073,986,154,725	253,035,806,166,150	880,212,137,228	10,562,545,646,741	242,473,260,519,409	2295.59%	4.17%
Year 13	2039	2.5%	30	6,553,373	3,844,606	4.75%	3,795,302	5,004,622	18,896,352,524,765	264,548,935,346,710	902,217,440,659	10,826,609,287,910	253,722,326,058,801	2343.51%	4.09%
Year 14	2040	2.5%	30	6,717,207	3,921,498	4.75%	3,795,302	5,129,737	19,756,136,564,642	276,585,911,904,985	924,772,876,676	11,097,274,520,107	265,488,637,384,878	2392.38%	4.01%
Year 15	2041	2.5%	30	6,885,137	3,999,928	4.75%	3,795,302	5,257,981	20,655,040,778,333	289,170,570,896,662	947,892,198,593	11,374,706,383,110	277,795,864,513,552	2442.22%	3.93%
Year 16	2042	2.5%	30	7,057,265	4,079,927	4.75%	3,795,302	5,389,430	21,594,845,133,747	302,327,831,872,460	971,589,503,557	11,659,074,042,688	290,668,757,829,773	2493.07%	3.86%
Year 17	2043	2.5%	30	7,233,697	4,161,525	4.75%	3,795,302	5,524,166	22,577,410,587,333	316,083,748,222,657	995,879,241,146	11,950,550,893,755	304,133,197,328,902	2544.93%	3.78%
Year 18	2044	2.5%	30	7,414,540	4,244,756	4.75%	3,795,302	5,662,270	23,604,682,769,056	330,465,558,766,788	1,020,776,222,175	12,249,314,666,099	318,216,244,100,689	2597.83%	3.71%
Year 19	2045	2.5%	30	7,599,903	4,329,651	4.75%	3,795,302	5,803,827	24,678,695,835,048	345,501,741,690,677	1,046,295,627,729	12,555,547,532,751	332,946,194,157,926	2651.79%	3.63%
Year 20	2046	2.5%	30	7,789,901	4,416,244	4.75%	3,795,302	5,948,923	25,801,576,495,543	361,222,070,937,603	1,072,453,018,423	12,869,436,221,070	348,352,634,716,533	2706.82%	3.56%
Year 21	2047	2.5%	30	7,984,648	4,504,569	4.75%	3,795,302	6,097,646	26,975,548,226,090	377,657,675,165,264	1,099,264,343,883	13,191,172,126,597	364,466,503,038,667	2762.96%	3.49%
Year 22	2048	2.5%	30	8,184,264	4,594,660	4.75%	3,795,302	6,250,087	28,202,935,670,377	394,841,099,385,283	1,126,745,952,480	13,520,951,429,762	381,320,147,955,522	2820.22%	3.42%
Year 23	2049	2.5%	30	8,388,871	4,686,553	4.75%	3,795,302	6,406,339	29,486,169,243,380	412,806,369,407,314	1,154,914,601,292	13,858,975,215,506	398,947,394,191,808	2878.62%	3.36%
Year 24	2050	2.5%	30	8,598,593	4,780,285	4.75%	3,795,302	6,566,498	30,827,789,943,953	431,589,059,215,346	1,183,787,466,324	14,205,449,595,893	417,383,609,619,453	2938.19%	3.29%
Year 25	2051	2.5%	30	8,813,558	4,875,890	4.75%	3,795,302	6,730,660	32,230,454,386,403	451,226,361,409,645	1,213,382,152,983	14,560,585,835,791	436,665,775,573,854	2998.96%	3.23%
Year 26	2052	2.5%	30	9,033,896	4,973,408	4.75%	3,795,302	6,898,927	33,696,940,060,985	471,757,160,853,784	1,243,716,706,807	14,924,600,481,686	456,832,560,372,098	3060.94%	3.16%
Year 27	2053	2.5%	30	9,259,744	5,072,876	4.75%	3,795,302	7,071,400	35,230,150,833,759	493,222,111,672,631	1,274,809,624,477	15,297,715,493,728	477,924,396,178,903	3124.16%	3.10%
Year 28	2054	2.5%	30	9,491,237	5,174,334	4.75%	3,795,302	7,248,185	36,833,122,696,695	515,663,717,753,735	1,306,679,865,089	15,680,158,381,071	499,983,559,372,665	3188.64%	3.04%
Year 29	2055	2.5%	30	9,728,518	5,277,820	4.75%	3,795,302	7,429,389	38,509,029,779,395	539,126,416,911,531	1,339,346,861,716	16,072,162,340,598	523,054,254,570,933	3254.41%	2.98%
Year 30	2056	2.5%	30	9,971,731	5,383,377	4.75%	3,795,302	7,615,124	40,261,190,634,358	563,656,668,881,005	1,372,830,533,259	16,473,966,399,113	547,182,702,481,893	3321.50%	2.92%
Year 31	2057	2.5%	30	10,221,025	5,491,044	4.75%	3,795,302	7,805,502	42,093,074,808,221	589,303,047,315,091	1,407,151,296,591	16,885,815,559,090	572,417,231,756,001	3389.93%	2.87%
Year 32	2058	2.5%	30	10,476,550	5,600,865	4.75%	3,795,302	8,000,640	44,008,309,711,995	616,116,335,967,928	1,442,330,079,006	17,307,960,948,068	598,808,375,019,860	3459.73%	2.81%
Year 33	2059	2.5%	30	10,738,464	5,712,883	4.75%	3,795,302	8,200,656	46,010,687,803,891	644,149,629,254,468	1,478,388,330,981	17,740,659,971,769	626,408,969,282,699	3530.92%	2.75%
Year 34	2060	2.5%	30	11,006,926	5,827,140	4.75%	3,795,302	8,405,672	48,104,174,098,968	673,458,437,385,547	1,515,348,039,255	18,184,176,471,064	655,274,260,914,483	3603.54%	2.70%
Year 35	2061	2.5%	30	11,282,099	5,943,683	4.75%	3,795,302	8,615,814	50,292,914,020,471	704,100,796,286,589	1,553,231,740,237	18,638,780,882,840	685,462,015,403,749	3677.61%	2.65%
Year 36	2062	2.5%	30	11,564,151	6,062,557	4.75%	3,795,302	8,831,209	52,581,241,608,402	736,137,382,517,629	1,592,062,533,743	19,104,750,404,911	717,032,632,112,718	3753.16%	2.60%
Year 37	2063	2.5%	30	11,853,255	6,183,808	4.75%	3,795,302	9,051,989	54,973,688,101,584	769,631,633,422,181	1,631,864,097,086	19,582,369,165,034	750,049,264,257,147	3830.23%	2.54%
Year 38	2064	2.5%	30	12,149,586	6,307,484	4.75%	3,795,302	9,278,289	57,474,990,910,206	804,649,872,742,890	1,672,660,699,513	20,071,928,394,160	784,577,944,348,730	3908.83%	2.49%
Year 39	2065	2.5%	30	12,453,326	6,433,634	4.75%	3,795,302	9,510,246	60,090,102,996,621	841,261,441,952,692	1,714,477,217,001	20,573,726,604,014	820,687,715,348,678	3989.01%	2.45%
Year 40	2066	2.5%	30	12,764,659	6,562,306	4.75%	3,795,302	9,748,003	62,824,202,682,967	879,538,837,561,539	1,757,339,147,426	21,088,069,769,114	858,450,767,792,425	4070.79%	2.40%
Year 41	2067	2.5%	30	13,083,776	6,693,552	4.75%	3,795,302	9,991,703	65,682,703,905,042	919,557,854,670,589	1,801,272,626,112	21,615,271,513,342	897,942,583,157,247	4154.20%	2.35%
Year 42	2068	2.5%	30	13,410,870	6,827,423	4.75%	3,795,302	10,241,495	68,671,266,932,722	961,397,737,058,101	1,846,304,441,765	22,155,653,301,176	939,242,083,756,925	4239.29%	2.30%
Year 43	2069	2.5%	30	13,746,142	6,963,972	4.75%	3,795,302	10,497,533	71,795,809,578,160	1,005,141,334,094,240	1,892,462,052,809	22,709,544,633,705	982,431,789,460,539	4326.07%	2.26%
Year 44	2070	2.5%	30	14,089,795	7,103,251	4.75%	3,795,302	10,759,971	75,062,518,913,967	1,050,875,264,795,530	1,939,773,604,129	23,277,283,249,548	1,027,597,981,545,980	4414.60%	2.22%
Year 45	2071	2.5%	30	14,442,040	7,245,316	4.75%	3,795,302	11,028,970	78,477,863,524,552	1,098,690,089,343,730	1,988,267,944,232	23,859,215,330,786	1,074,830,874,012,940	4504.89%	2.17%
Year 46	2072	2.5%	30	14,803,091	7,390,223	4.75%	3,795,302	11,304,694	82,048,606,314,919	1,148,680,488,408,870	2,037,974,642,838	24,455,695,714,056	1,124,224,792,694,810	4596.99%	2.13%
Year 47	2073	2.5%	30	15,173,169	7,538,027	4.75%	3,795,302	11,587,312	85,781,817,902,248	1,200,945,450,631,470	2,088,924,008,909	25,067,088,106,907	1,175,878,362,524,570	4690.93%	2.09%
Year 48	2074	2.5%	30	15,552,498	7,688,788	4.75%	3,795,302	11,876,995	89,684,890,616,800	1,255,588,468,635,200	2,141,147,109,132	25,693,765,309,580	1,229,894,703,325,620	4786.74%	2.05%
Year 49	2075	2.5%	30	15,941,310	7,842,563	4.75%	3,795,302	12,173,919	93,765,553,139,865	1,312,717,743,958,110	2,194,675,786,860	26,336,109,442,320	1,286,381,634,515,790	4884.48%	2.01%

Source: Author's work

3.2.3. Sensitivity Analysis

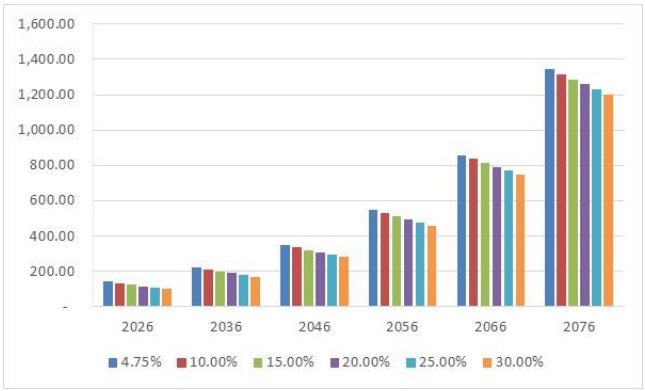
The previous calculations are determined on the baseline assumptions. In this section, the researcher applies sensitivity analysis[2] to assess how modifying actuarial assumptions affects forecast outcomes.

Sensitivity analysis on the contribution rate

The researcher simulated a sensitivity analysis to predict the pension gap of CSP expenditure with higher contribution rates than the current contribution rate of 4.75%. As illustrated in Figure 1, the future pension gap decreases if the contribution rate increases. Figure 1 shows that from 2026 to 2076, the increased contribution rate is expected to reduce the pension deficit compared to the baseline scenario. This pattern is explained by greater contribution rates enhancing pension revenue, resulting in a smaller pension gap.

Figure 1.

Pension Gap with Increase Contribution Rate (In Trillion IDR).



Source: Author's work

According to Figure 1, the CSP system is unsustainable in all contribution rate scenarios examined. At a 30% contribution rate, the shortfall is IDR 1,201 trillion by 2076. It indicates that increased contributions are lower rather than erasing the pension gap. The CSP system is still not fully funded since increasing contribution rates by six times (from 4.75% to 30%) only decreases the long-term shortfall by around 11% (from 1,345 trillion to 1,202 trillion IDR).

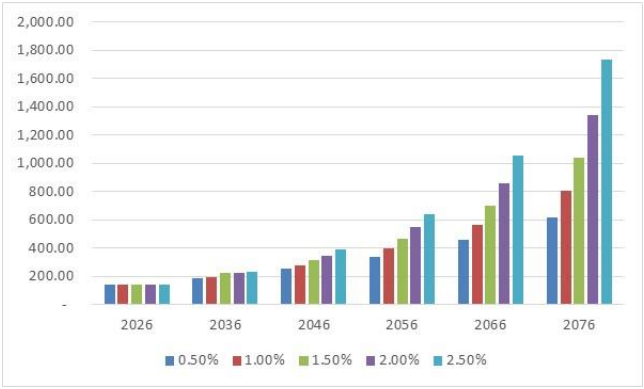
[2] Sensitivity analysis uses various methods to quantify how the uncertainty in a model's output is connected to the uncertainty in its inputs. Therefore, it allows us to analyze the robustness of numerical findings concerning input parameters, which is a precondition for making economic predictions from them ((Salciccioli, 2016); (Hermeling & Mennel, 2008).

Sensitivity analysis on the retirement age

The Indonesian government is considering extending the legal retirement age as a policy option to ensure pension sustainability. However, this strategy has political challenges. Considering the rising trend of life expectancy and longevity risk in Indonesia, I simulated the change in the pension gap when the legal retirement age is steadily raised in the future. In this simulation, the researcher sets the growth of civil service pensioners between 0,5% and 2,5% by assuming the government will increase the minimum retirement age from 58 to 60 years old. The intention is to simulate the long-term effects of slower versus faster rises in retirement age on the pension gap. In this case, a greater pensioner growth rate means larger pension payouts and a slower rise in the retirement age, which causes more individuals to retire earlier. In contrast, a lower pensioner growth rate results in fewer new pensioners years and smaller pension payouts since the retirement age rises faster.

Figure 2.

Pension Gap with Increase Retirement Age (In Trillion IDR).



Source: Author's work

According to Figure 2, if the legal retirement age is prolonged further (the growth of civil service pensioners below 2%), the pension gap will be less than that of the baseline scenario (2%) in 2026, 2036, 2046, 2056, 2066 and 2076, assuming all other parameters remain constant. Figure 2 shows that the pension gap grows significantly as the number of pensioners rises. Every ten years, pension liabilities increase by billions of rupiah when the retirement age is delayed, and the long-term sustainability of the pension system is significantly enhanced by raising the minimum retirement age faster (lower pensioner growth rate).

In terms of causality, increasing the retirement age implies increasing the number of contributors and decreasing the number of pensioners simultaneously, resulting in increased pension revenue and decreased pension expenditures, narrowing the

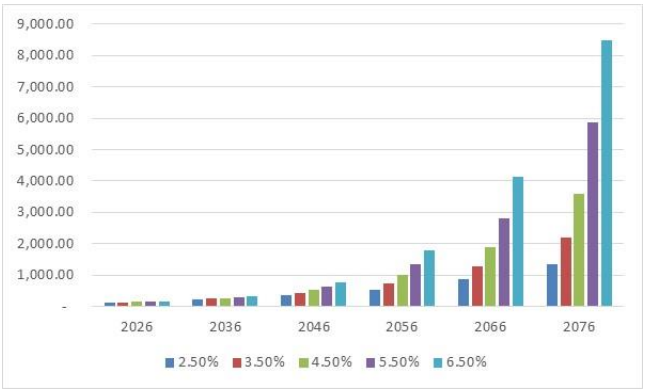
pension gap. Therefore, the hypothesis of this research, "H2: Increasing retirement age positively impacts improving the long-term sustainability of the Indonesian CSP system," can be accepted. In summary, one of the most important factors in pension reform is the growth rate of pensioners. By 2076, the difference in reform acceleration of even 1% (1.5% versus 2.5%) is greater by more than 690 trillion rupiah. It is advised that retirement age reform be implemented immediately to reduce future pension liabilities.

Sensitivity analysis on the salary growth

To improve the welfare of civil servants, the Indonesian government typically considers increasing their salaries, albeit this is not implemented every year, but rather depends on the budgetary capacity of the Indonesian budget. However, as previously stated, according to the regulations, increasing civil servants' salaries immediately increases civil service pensioners' pension benefits. As a result, in this analysis, the researcher simulated how much the salary rise of civil servants affects the pension gap of the CSP system.

Figure 3.

Pension Gap with Increase Salary Growth (In Trillion IDR).



Source: Author's work

According to Figure 3, higher salary growth significantly increases the pension gap. In 2076, the pension shortfall will be IDR 8,468 trillion, assuming a 6.5% wage growth rate. It is more than six times greater than 1,345 trillion at a 2.5% pay increase. In the CSP system, pension benefits depend on final salary; hence, better income growth results in larger final salary and yearly payouts. The contribution rate is constant (4.75%); hence, the gap between contributions and benefits expands dramatically.

The system is susceptible to salary growth assumptions. A slight increase in growth rate (e.g., 1%) results in an exponential increase in future pension gaps. For instance, in 2076, the margin between 5.5% and 6.5% rises from around 5.9

quadrillion to around 8.5 quadrillion, representing a 44% increase in only one point. The CSP system is particularly vulnerable to salary inflation risk. The CSP system will be severely underfunded without indexing payments to wage growth or modifying benefit calculations. Even aggressive increases in contribution rates may not be sufficient to keep up with significant pay growth. Therefore, according to this calculation, the hypothesis of this research, "H3: Increasing civil servants' salary negatively impacts improving the long-term sustainability of the Indonesian CSP system," can be accepted.

3.3. Designing and Modelling a Sustainable Indonesian CSP System.

Considering the increasing burden on the APBN with PAYG scheme, which impacts the sustainability of the CSP scheme, and also the adequacy of the CSP scheme, which means that the benefits received by the pensioners do not meet a decent, moderate standard of living; therefore, a review of pension program reform should be carried out to obtain a sustainable scheme in the long term and better pension benefits for civil service pensioners.

Regarding this problem, the researcher asked the civil servant interviewees about pension reform planning for the current CSP system. Based on the interview, a head of the institution's regional office in Yogyakarta argued, "The choice regarding reform of the CSP system is a choice regarding the financing method and pension program planned by the employer for its workers. The nature, benefits, membership, and retirement age limit are minor issues compared to these two major issues. These minor issues will depend on the financing method and pension program chosen." A mid-level human resources analyst from a government agency hopes that CSP reform will better guarantee civil servants' welfare when they retire. "If the government wants to replace the current CSP system (DB), then perhaps it can be combined, namely with the current contributions (DB) for all civil servants, but those who want to increase their contributions with a DC pattern are welcome."

Finally, the interviewee who usually drafts regulations believes that reforming the CSP system is important to ensure future pensioners' sustainability and welfare. He argues:" Despite the challenges, with a careful, participatory, and transparent approach, these reforms can bring significant benefits to civil servants and the sustainability of the state budget. Changing the CSP system from DB to DC can help reduce the burden on the state budget and provide cost certainty. However, this change also brings significant challenges, including uncertainty about civil servants' benefits and investment risks. With the right measures, such as education, gradual transition, and investment support, the government can better manage these changes and ensure the success of pension system reform."

Furthermore, the director of budget regulation harmonization, the Ministry of Finance, realized these critical conditions of sustainability of the CSP system.

Therefore, he explains that the Indonesian government wants to review and reform the pension program for civil servants because the assumptions used to design the program are no longer relevant to current conditions. Nevertheless, the Indonesian government remains careful in determining programs and financing schemes (APBN, 2024). Changes to the pension system have significant fiscal implications and are very long in duration and broad in scope. The costs incurred are strongly correlated with the projected benefits that will be provided. Therefore, the consideration must be comprehensive. The government is continuing to perfect the study of the design of the new civil servant pension system (The director of budget regulation harmonization, 2024).

He then argues that the government's consideration in designing the new program is the ability to pay contributions for civil servants as participants, the regional government as the employer, and the amount of the RR. Income disparities between civil servants also need attention (The director of budget regulation harmonization, 2024). To fulfill the government's consideration, there are some alternatives to reforming the pension system: parametric and systemic reforms. The Indonesian government should combine parametric and systemic reforms.

Parametric reforms

To make the current pension system more sustainable in the long term and provide better pension benefits for civil service pensioners, some parametric reforms need to be done, including increasing the contribution rate, because there is only a very small contribution. In addition, he explained that "One of the package pieces was folding in the allowances to increase the (pensionable) base. For some people, it would at least increase the adequacy. However, we also advocated raising the retirement age gradually. And that would also increase adequacy over time because if you have more years of accrual then your RR will be higher when you finally retire." (The World Bank lead economist, 2024).

The Lead economist of the World Bank argued more about retirement age by stating: "There is no real justification for not having the same retirement age. Life expectancy has been increasing and is expected to continue to increase. So, the retirement duration has been going up. So, if you build that into the reform, it makes it more affordable because of the pension side. On the wage side, it is a different calculation. However, you can have a lower contribution rate with the same target RR if the retirement age increases over time".

Systemic reforms

Meanwhile, several systemic reform alternatives exist to change the current DB scheme to a new one. According to the World Bank report (2020), eight combinations of systemic reform alternatives for the Indonesian government based on these policy choices: whether to restrict the scheme to new civil servants, whether to have a pure DC or a hybrid model, and whether to integrate with the

national scheme. Based on the various alternative reforms, the researcher analyzes the possible choices of a new pension system for the Indonesian CSP system, that is: NDC scheme; DC scheme; and integration of the current system with the MPP system.

According to the Lead economist of the World Bank, "The NDC approach has some advantages in terms of the link between the contributions and the benefits, the incentives, and the automatic increase of the retirement age because the way it works is that you accumulate this notional balance and then convert it into an annuity and that annuity is converted based on the life expectancy at that time in the future. So, in a way, it is an automatic adjustment taking place." However, the NDC scheme has a negative side. Lead economist of the World Bank argues that "NDC is not addressing the sustainability problem, the fundamental sustainability problem of continuing to have and let grow your unfunded pension liability". Therefore, if the Indonesian government wants to apply the NDC scheme, He suggested that the NDC scheme has to be linked to some interest rate. "It can be wage bill growth, wage growth, or average wage growth. This growth is stable. The Indonesian government need to find a way to make sure that the interest rate should be more stable than wage bill growth or average wage growth".

Regarding the DC scheme, Indonesia should consider the investment risk. The Lead Economist of the World Bank argues, "the key question is what are the risks associated with the different types of pension schemes? If Indonesia were to move from the current DB to a pure DC, then they would be individual workers would now be assuming all of the investment risks. What you can do to take care of that, of course, is to have rules about how that money can be invested. What they have done in some countries is they have made it a very conservative investment portfolio, but that results in lower returns, and lower returns would result in lower RR. So, if you want to have a target RR that is similar to the DB scheme, but you do not have a lot of risks, then you have to have a much bigger contribution to the scheme".

The Lead economist of the World Bank then argued, "I think if it were to be applied only for a new CS, then it is very easy to afford. As long as it manages its overall fiscal policy responsibility and does not also expand the size of the government budget dramatically, then it should be affordable, even in the longer term". However, Indonesia has to prepare many budgets for paying transition costs from the DB scheme to the DC scheme: "Of course, the government has this double burden of transition where it has to pay both the old pensions that came out of the DB scheme and the contributions to the DC scheme as the employer. So, at some point that will become a challenge around maybe 25-30 years from now. That will become the highest point of the sum of the two costs, maybe earlier, and then it will start to fall. And so, in the long run, it will save the government money. So, I think it is a sensible idea".

Furthermore, in the case of Indonesia, the Lead economist of the World Bank stated that the one with the most advantage is the integration of new civil servants with the MPP scheme. "They (Indonesia) go to the other route, which would be to have an integration, then they would be partly in the DB scheme and partly in the DC scheme. I think this hybrid approach is probably one that we favor. It also brings with it the benefits of integration with the MPP scheme. So, that might be a good place to balance the two types of risks. So, I think that would probably be the scenario that had the most advantages in terms of both sustainability and adequacy".

3.4. Simulation of New Pension System (DC Scheme).

Based on the explanation of the costs and benefits of a new pension system above, the researcher thought the Indonesian government would switch the CSP program for new civil servants from a DB scheme to a DC scheme. It is not integrated with the MPP system. It means the current civil servants are still in the CSP scheme, while the private employees are still in the MPP scheme. Therefore, based on the data of civil servants from the NCSA, the researcher forecasts the amount of pension spending on CSP benefits in the DC scheme.

Formula/Forecasting Model

The model of pension revenues is as follows:

$$\mathbf{PR(n) = CS\ contributions + Government\ contribution} \quad \mathbf{(4)}$$

Where:

CS contributions = CS (n) × CR (n) × AT (n)

Government contribution = CR (n) × AT (n)

$$\mathbf{Investment\ returns = Interest\ rate\ x\ PR\ (n)} \quad \mathbf{(5)}$$

Where:

PR(n) represents the pension revenues collected in the year of n,

CS(n) represents the number of CS in year n,

CR(n) is the contribution rate in year n

AT (n) represents the average annual take-home pay (THP) for CS

Therefore, Pension fund balance = PR(n) + Investment returns

Meanwhile, the model of pension expenditure is as follows:

$$\mathbf{PE(n) = P(n) \times AP\ (n)} \quad \mathbf{(6)}$$

Where:

PE(n) represents the pension expenditure in year n,

P(n) represents the number of CS pensioners in year n,

AP(n) represents the yearly average pension rate.

The Assumptions

To calculate the pension spending of CSP benefits in the DC scheme, the researcher sets the assumptions that include take-home pay (base salary, performance allowance), retirement age limit, the amount of new participants contributions and government contributions, growth in the number of employees, and calculating pension benefits 14 times a year. The researcher assumes the DC scheme for new civil servants in this simulation. Based on NCSA (2024), the number of new civil servants will be around 250,407 in 2025. The government's contribution is 10% since the researcher assumed that 10% represents the middle rate, 5% is too low, and more than 10% is too high, given that the government still has to pay pension spending for the current DB scheme. Table 6 below summarizes the assumptions for options 1 to 4.

Table 6.

Assumptions for Pension Benefits Calculations (DC Scheme) Options 1 – 4.

Number	Components	Assumptions			
		Option 1	Option 2	Option 3	Option 4
1	Growth of the number of Civil Servants	Zero rate	Zero rate	Zero rate	Zero rate
2	The number of new civil servants	250,407	250,407	250,407	250,407
3	Income (Take Home Pay)				
	a. Salary	Increase 2.5% yearly	Increase 2.5% yearly	Increase 2.5% yearly	Increase 2.5% yearly
	b. Performance allowance	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%
4	Pension base	Last/final salary	Last/final salary	Last/final salary	Last/final salary
5	Age of civil servant	25 years old	25 years old	25 years old	25 years old
6	Retirement age	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)
7	Civil servants' contribution rate	5%	10%	5%	10%
8	Government's contribution rate	10%	10%	10%	10%
9	Interest rate of return on investments	5%	5%	3%	3%
10	Pension payment	14 months in a year	14 months in a year	14 months in a year	14 months in a year

Source: Author's work

For options 5 – 8, the researcher assumes the pension base is the combination of the last salary and performance allowance. Table 7 below summarizes the assumptions for options 5 to 8:

Table 7.
Assumptions for Pension Benefits Calculations (DC Scheme) Option 5 – 8

Number	Components	Assumptions			
		Option 5	Option 6	Option 7	Option 8
1	Growth of the number of Civil Servants	Zero rate	Zero rate	Zero rate	Zero rate
2	The number of new civil servants	250,407	250,407	250,407	250,407
3	Income (Take Home Pay)				
	a. Salary	Increase 2.5% yearly	Increase 2.5% yearly	Increase 2.5% yearly	Increase 2.5% yearly
	b. Performance allowance	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%	150% from salary (salary: performance allowance = 40%:60%
4	Pension base	Combination of last/final salary and performance allowance	Combination of last/final salary and performance allowance	Combination of last/final salary and performance allowance	Combination of last/final salary and performance allowance
5	Age of civil servant	25 years old	25 years old	25 years old	25 years old
6	Retirement age	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)	58, 60, 62, 65, 67, 60, 75 (based on job position)
7	Civil servants' contribution rate	5%	10%	5%	10%
8	Government's contribution rate	10%	10%	10%	10%
9	Interest rate of return on investments	5%	5%	3%	3%
10	Pension payment	14 months in a year	14 months in a year	14 months in a year	14 months in a year

Source: Author's work

Calculation Result

Option 1

According to the RR analysis, the pension benefits provided in Option 1 are generally insufficient for civil servant pensioners. The maximum RR is 0.36 (36%) at a retirement age 75, significantly below the ILO's minimum recommendation of 40%. Currently, the RR stands at only 19% because the retirement age is set at 58. Most values fall within the range of 0.00 to 0.30 (30%), indicating that, without additional sources of income, most retirees would face a substantial decrease in their income. Overall, the pension benefits are inadequate for maintaining the same standard of living after retirement.

Option 2

According to the calculations, the pension benefits specified in Option 2 are superior to those in Option 1. The maximum RR is 0.49 (49%) with a retirement age of 75 years, which exceeds the ILO's minimum recommendation of 40%. However, the pension benefits in Option 2 are still inadequate. For the current retirement age of 58, the RR only reaches 25%, with most values falling between 0.00 and 0.30 (30%). As a result, many pensioners are likely to experience a significant reduction in their income..

Option 3

The RR implies that Option 3's pension benefits are lower than Option 1's. With a 75-year-old retirement age, the maximum RR is 0.21 (21%)—much less than the ILO's recommended minimum of 40%. Despite that, considering the current

retirement age is 58, the RR is only 13%. The researcher advises against this option since the pension benefits indicated in the table are insufficient to maintain the same quality of life after retirement.

Option 4

As with Option 3, Option 4's RR is less than Option 1's. The highest RR is 0.21 (21%) at a 75-year-old retirement age, significantly below the ILO's suggested minimum of 40%. Additionally, the RR is only 18% since the present retirement age is 58.

In summary, it indicates that the budget predictions for the government are similar across DC scheme options 1 to 4, as the government contribution remains at 10% of the total salary for new civil servants. However, as previously calculated, Options 1 to 4 do not provide sufficient pension benefits for civil service pensioners, as the RR for these options falls below the ILO's suggested minimum of 40%.

Additionally, the Indonesian government is still obligated to fund the current CSP system, which operates under a DB scheme for existing civil servants. The government's budget predictions for this obligation are detailed in Table 8 below. This table shows a significant reduction in the pension gap compared to the figures presented in Table 5. Specifically, while Table 5 shows the pension gap expanding from 140 trillion IDR in 2026 to 1,286 trillion IDR by 2075, Table 8 reports a decrease in the pension gap from 138 trillion IDR in 2026 to 404 trillion IDR in 2075.

Table 9 illustrates the total budget for the Indonesian government under the implementation of options 1 to 4 compared to the budget without reforming the current system, as detailed in Table 8. According to Table 9, the Indonesian government will incur higher pension spending (resulting in a deficit) during the first six years of implementing options 1 to 4. However, from 2033 onward, there will be a surplus in government spending for pension payments. It indicates that the sustainability of the pension scheme would improve with the proposed options. Therefore, the sustainability of the new CSP system is expected to be better than that of the current CSP system without pension reform.

Table 8.

Government Budget Prediction of CSP Expenditure (DB Scheme) After Reform (IDR)

Working Year	Year	Accrual Rate	Year of Service	Last Salary (Average)	Pensioners	Contribution Rate	Civil Servants	Basic Salary (Average)	Monthly Pension Expenditure (Benefits)	Annual Pension Expenditure (Benefits)	Monthly Pension Contribution	Annual Pension Contribution	Pension Gap		PR/PE
													IDR	%	
Year 0	2026	2.5%	30	4,753,950	2,931,362	4.75%	3,719,396	3,630,455	10,451,662,782,419	146,323,278,953,869	641,397,176,430	7,696,766,117,160	138,626,512,836,709	1801.10%	5.26%
Year 1	2027	2.5%	30	4,872,799	2,947,123	4.75%	3,645,008	3,721,216	10,770,553,284,710	150,787,745,985,937	644,283,463,724	7,731,401,564,687	143,056,344,421,250	1850.33%	5.13%
Year 2	2028	2.5%	30	4,994,619	2,961,081	4.75%	3,572,108	3,814,246	11,092,102,155,350	155,289,430,174,894	647,182,739,311	7,766,192,871,728	147,523,237,303,166	1899.56%	5.00%
Year 3	2029	2.5%	30	5,119,484	2,973,301	4.75%	3,500,666	3,909,603	11,416,326,862,121	159,828,576,069,696	650,095,061,638	7,801,140,739,651	152,027,435,330,045	1948.78%	4.88%
Year 4	2030	2.5%	30	5,247,471	2,983,849	4.75%	3,430,652	4,007,343	11,743,244,976,185	164,405,429,666,590	653,020,489,415	7,836,245,872,980	156,569,183,793,610	1998.01%	4.77%
Year 5	2031	2.5%	30	5,378,658	2,992,785	4.75%	3,362,039	4,107,526	12,072,874,172,656	169,020,238,417,190	655,959,081,617	7,871,508,979,408	161,148,729,437,782	2047.24%	4.66%
Year 6	2032	2.5%	30	5,513,125	3,000,170	4.75%	3,294,799	4,210,214	12,405,232,231,185	173,673,251,236,595	658,910,897,485	7,906,930,769,815	165,766,320,466,780	2096.47%	4.55%
Year 7	2033	2.5%	30	5,650,953	3,006,062	4.75%	3,228,903	4,315,470	12,740,337,036,539	178,364,718,511,547	661,875,996,523	7,942,511,958,280	170,422,206,553,267	2145.70%	4.45%
Year 8	2034	2.5%	30	5,792,226	3,010,519	4.75%	3,164,325	4,423,356	13,078,206,579,188	183,094,892,108,636	664,854,438,508	7,978,253,262,092	175,116,638,846,544	2194.92%	4.36%
Year 9	2035	2.5%	30	5,937,032	3,013,595	4.75%	3,101,038	4,533,940	13,418,858,955,896	187,864,025,382,549	667,846,283,481	8,014,155,401,771	179,849,869,980,777	2244.15%	4.27%
Year 10	2036	2.5%	30	6,085,458	3,015,344	4.75%	3,039,017	4,647,289	13,762,312,370,312	192,672,373,184,361	670,851,591,757	8,050,219,101,079	184,622,154,083,282	2293.38%	4.18%
Year 11	2037	2.5%	30	6,237,594	3,015,818	4.75%	2,978,237	4,763,471	14,108,585,133,563	197,520,191,869,876	673,870,423,920	8,086,445,087,034	189,433,746,782,842	2342.61%	4.09%
Year 12	2038	2.5%	30	6,393,534	3,015,066	4.75%	2,918,672	4,882,558	14,457,695,664,857	202,407,739,308,004	676,902,840,827	8,122,834,089,926	194,284,905,218,078	2391.84%	4.01%
Year 13	2039	2.5%	30	6,553,373	3,013,138	4.75%	2,860,299	5,004,622	14,809,662,492,085	207,335,274,889,190	679,948,903,611	8,159,386,843,330	199,175,888,045,859	2441.06%	3.94%
Year 14	2040	2.5%	30	6,717,207	3,010,081	4.75%	2,803,093	5,129,737	15,164,504,252,420	212,303,059,533,885	683,008,673,677	8,196,104,084,125	204,106,955,449,760	2490.29%	3.86%
Year 15	2041	2.5%	30	6,885,137	3,005,942	4.75%	2,747,031	5,257,981	15,522,239,692,933	217,311,355,701,066	686,082,212,709	8,232,986,552,504	209,078,369,148,562	2539.52%	3.79%
Year 16	2042	2.5%	30	7,057,265	3,000,763	4.75%	2,692,090	5,389,430	15,882,887,671,200	222,360,427,396,796	689,169,582,666	8,270,034,991,990	214,090,392,404,806	2588.75%	3.72%
Year 17	2043	2.5%	30	7,233,697	2,994,590	4.75%	2,638,249	5,524,166	16,246,467,155,917	227,450,540,182,835	692,270,845,788	8,307,250,149,454	219,143,290,033,381	2637.98%	3.65%
Year 18	2044	2.5%	30	7,414,540	2,987,463	4.75%	2,585,484	5,662,270	16,612,997,227,521	232,581,961,185,293	695,386,064,594	8,344,632,775,127	224,237,328,410,166	2687.20%	3.59%
Year 19	2045	2.5%	30	7,599,903	2,979,423	4.75%	2,533,774	5,803,827	16,982,497,078,810	237,754,959,103,335	698,515,301,885	8,382,183,622,615	229,372,775,480,720	2736.43%	3.53%
Year 20	2046	2.5%	30	7,789,901	2,970,510	4.75%	2,483,098	5,948,923	17,354,986,015,566	242,969,804,217,925	701,658,620,743	8,419,903,448,917	234,549,900,769,008	2785.66%	3.47%
Year 21	2047	2.5%	30	7,984,648	2,960,762	4.75%	2,433,436	6,097,646	17,730,483,457,187	248,226,768,400,624	704,816,084,536	8,457,793,014,437	239,768,975,386,187	2834.89%	3.41%
Year 22	2048	2.5%	30	8,184,264	2,950,216	4.75%	2,384,768	6,250,087	18,109,008,937,317	253,526,125,122,433	707,987,756,917	8,495,853,083,002	245,030,272,039,431	2884.12%	3.35%
Year 23	2049	2.5%	30	8,388,871	2,938,907	4.75%	2,337,072	6,406,339	18,490,582,104,477	258,868,149,462,677	711,173,701,823	8,534,084,421,875	250,334,065,040,802	2933.34%	3.30%
Year 24	2050	2.5%	30	8,598,593	2,926,870	4.75%	2,290,331	6,566,498	18,875,222,722,711	264,253,118,117,950	714,373,983,481	8,572,487,801,774	255,680,630,316,176	2982.57%	3.24%
Year 25	2051	2.5%	30	8,813,558	2,914,139	4.75%	2,244,524	6,730,660	19,262,950,672,221	269,681,309,411,094	717,588,666,407	8,611,063,996,882	261,070,245,414,212	3031.80%	3.19%
Year 26	2052	2.5%	30	9,033,896	2,900,747	4.75%	2,199,634	6,898,927	19,653,785,950,017	275,153,003,300,234	720,817,815,406	8,649,813,784,868	266,503,189,515,367	3081.03%	3.14%
Year 27	2053	2.5%	30	9,259,744	2,886,725	4.75%	2,155,641	7,071,400	20,047,748,670,562	280,668,481,387,861	724,061,495,575	8,688,737,946,899	271,979,743,440,962	3130.26%	3.10%
Year 28	2054	2.5%	30	9,491,237	2,872,103	4.75%	2,112,528	7,248,185	20,444,859,066,426	286,228,026,929,960	727,319,772,305	8,727,837,267,660	277,500,189,662,299	3179.48%	3.05%
Year 29	2055	2.5%	30	9,728,518	2,856,912	4.75%	2,070,278	7,429,389	20,845,137,488,942	291,831,924,845,189	730,592,711,280	8,767,112,535,365	283,064,812,309,824	3228.71%	3.00%
Year 30	2056	2.5%	30	9,971,731	2,841,179	4.75%	2,028,872	7,615,124	21,248,604,408,865	297,480,461,724,110	733,880,378,481	8,806,564,541,774	288,673,897,182,336	3277.94%	2.96%
Year 31	2057	2.5%	30	10,221,025	2,824,933	4.75%	1,988,295	7,805,502	21,655,280,417,033	303,173,925,838,464	737,182,840,184	8,846,194,082,212	294,327,731,756,252	3327.17%	2.92%
Year 32	2058	2.5%	30	10,476,550	2,808,200	4.75%	1,948,529	8,000,640	22,065,186,225,036	308,912,607,150,497	740,500,162,965	8,886,001,955,582	300,026,605,194,915	3376.40%	2.88%
Year 33	2059	2.5%	30	10,738,464	2,791,007	4.75%	1,909,558	8,200,656	22,478,342,665,881	314,696,797,322,339	743,832,413,699	8,925,988,964,382	305,770,808,357,957	3425.62%	2.84%
Year 34	2060	2.5%	30	11,006,926	2,773,378	4.75%	1,871,367	8,405,672	22,894,770,694,674	320,526,789,725,434	747,179,659,560	8,966,155,914,722	311,560,633,810,712	3474.85%	2.80%
Year 35	2061	2.5%	30	11,282,099	2,755,337	4.75%	1,833,940	8,615,814	23,314,491,389,287	326,402,879,450,011	750,541,968,028	9,006,503,616,338	317,396,375,833,673	3524.08%	2.76%
Year 36	2062	2.5%	30	11,564,151	2,736,909	4.75%	1,797,261	8,831,209	23,737,525,951,044	332,325,363,314,617	753,919,406,884	9,047,032,882,612	323,278,330,432,005	3573.31%	2.72%
Year 37	2063	2.5%	30	11,853,255	2,718,116	4.75%	1,761,316	9,051,989	24,163,895,705,407	338,294,539,875,695	757,312,044,215	9,087,744,530,583	329,206,795,345,112	3622.54%	2.69%
Year 38	2064	2.5%	30	12,149,586	2,698,980	4.75%	1,726,089	9,278,289	24,593,622,102,658	344,310,709,437,216	760,719,948,414	9,128,639,380,971	335,182,070,056,245	3671.76%	2.65%
Year 39	2065	2.5%	30	12,453,326	2,679,523	4.75%	1,691,568	9,510,246	25,026,726,718,597	350,374,174,060,358	764,143,188,182	9,169,718,258,185	341,204,455,802,173	3720.99%	2.62%
Year 40	2066	2.5%	30	12,764,659	2,659,764	4.75%	1,657,736	9,748,003	25,463,231,255,232	356,485,237,573,243	767,581,832,529	9,210,981,990,347	347,274,255,582,896	3770.22%	2.58%
Year 41	2067	2.5%	30	13,083,776	2,639,723	4.75%	1,624,582	9,991,703	25,903,157,541,480	362,644,205,580,718	771,035,950,775	9,252,431,409,304	353,391,774,171,415	3819.45%	2.55%
Year 42	2068	2.5%	30	13,410,870	2,619,420	4.75%	1,592,090	10,241,495	26,346,527,533,872	368,851,385,474,201	774,505,612,554	9,294,067,350,646	359,557,318,123,555	3868.68%	2.52%
Year 43	2069	2.5%	30	13,746,142	2,598,874	4.75%	1,560,248	10,497,533	26,793,363,317,254	375,107,086,441,561	777,990,887,810	9,335,890,653,724	365,771,195,787,837	3917.90%	2.49%
Year 44	2070	2.5%	30	14,089,795	2,578,101	4.75%	1,529,043	10,759,971	27,243,687,105,505	381,411,619,477,072	781,491,846,805	9,377,902,161,665	372,033,717,315,407	3967.13%	2.46%
Year 45	2071	2.5%	30	14,442,040	2,557,120	4.75%	1,498,462	11,028,970	27,697,521,242,243	387,765,297,391,402	785,008,560,116	9,420,102,721,393	378,345,194,670,009	4016.36%	2.43%
Year 46	2072	2.5%	30	14,803,091	2,535,947	4.75%	1,468,493	11,304,694	28,154,888,201,548	394,168,434,821,666	788,541,098,637	9,462,493,183,639	384,705,941,638,027	4065.59%	2.40%
Year 47	2073	2.5%	30	15,173,169	2,514,598	4.75%	1,439,123	11,587,312	28,615,810,588,681	400,621,348,241,531	792,089,533,580	9,505,074,402,965	391,116,273,838,566	4114.82%	2.37%
Year 48	2074	2.5%	30	15,552,498	2,493,088	4.75%	1,410,341	11,876,995	29,080,311,140,812	407,124,355,971,369	795,653,936,482	9,547,847,237,779	397,576,508,733,591	4164.04%	2.35%
Year 49	2075	2.5%	30	15,941,310	2,471,433	4.75%	1,382,134	12,173,919	29,548,412,727,748	413,677,778,188,475	799,234,379,196	9,590,812,550,349	404,086,965,638,126	4213.27%	2.32%

Source: Author's work

Table 9.

Comparison of Government Spending for CSP Payments:
DC Scheme Options 1-4 (Reform) versus DB Scheme (No Reform)

Working Year	Year	Annual Pension Contribution DB Scheme (No Reform)	Annual Pension Contribution with DB scheme (Reform)	DC Option 1-4 (Reform)	Total Government Spending (Reform)	Surplus/Defisit	In percent of No Reform
Year 0	2026	7,853,842,976,694	7,696,766,117,160	1,064,301,935,079	8,761,068,052,240	(907,225,075,546)	-11.55%
Year 1	2027	8,050,189,051,111	7,731,401,564,687	1,090,909,483,456	8,822,311,048,144	(772,121,997,032)	-9.59%
Year 2	2028	8,251,443,777,389	7,766,192,871,728	1,118,182,220,543	8,884,375,092,271	(632,931,314,882)	-7.67%
Year 3	2029	8,457,729,871,824	7,801,140,739,651	1,146,136,776,056	8,947,277,515,708	(489,547,643,884)	-5.79%
Year 4	2030	8,669,173,118,619	7,836,245,872,980	1,174,790,195,458	9,011,036,068,437	(341,862,949,818)	-3.94%
Year 5	2031	8,885,902,446,585	7,871,508,979,408	1,204,159,950,344	9,075,668,929,752	(189,766,483,167)	-2.14%
Year 6	2032	9,108,050,007,750	7,906,930,769,815	1,234,263,949,103	9,141,194,718,918	(33,144,711,169)	-0.36%
Year 7	2033	9,335,751,257,943	7,942,511,958,280	1,265,120,547,830	9,207,632,506,110	128,118,751,833	1.37%
Year 8	2034	9,569,145,039,392	7,978,253,262,092	1,296,748,561,526	9,275,001,823,618	294,143,215,774	3.07%
Year 9	2035	9,808,373,665,377	8,014,155,401,771	1,329,167,275,564	9,343,322,677,336	465,050,988,041	4.74%
Year 10	2036	10,053,583,007,011	8,050,219,101,079	1,362,396,457,453	9,412,615,558,533	640,967,448,478	6.38%
Year 11	2037	10,304,922,582,186	8,086,445,087,034	1,396,456,368,890	9,482,901,455,924	822,021,126,263	7.98%
Year 12	2038	10,562,545,646,741	8,122,834,089,926	1,431,367,778,112	9,554,201,868,038	1,008,343,778,703	9.55%
Year 13	2039	10,826,609,287,910	8,159,386,843,330	1,467,151,972,565	9,626,538,815,895	1,200,070,472,014	11.08%
Year 14	2040	11,097,274,520,107	8,196,104,084,125	1,503,830,771,879	9,699,934,856,004	1,397,339,664,103	12.59%
Year 15	2041	11,374,706,383,110	8,232,986,552,504	1,541,426,541,176	9,774,413,093,680	1,600,293,289,430	14.07%
Year 16	2042	11,659,074,042,688	8,270,034,991,990	1,579,962,204,705	9,849,997,196,695	1,809,076,845,992	15.52%
Year 17	2043	11,950,550,893,755	8,307,250,149,454	1,619,461,259,823	9,926,711,409,277	2,023,839,484,478	16.94%
Year 18	2044	12,249,314,666,099	8,344,632,775,127	1,659,947,791,318	10,004,580,566,445	2,244,734,099,654	18.33%
Year 19	2045	12,555,547,532,751	8,382,183,622,615	1,701,446,486,101	10,083,630,108,716	2,471,917,424,035	19.69%
Year 20	2046	12,869,436,221,070	8,419,903,448,917	1,743,982,648,254	10,163,886,097,171	2,705,550,123,900	21.02%
Year 21	2047	13,191,172,126,597	8,457,793,014,437	1,787,582,214,460	10,245,375,228,897	2,945,796,897,700	22.33%
Year 22	2048	13,520,951,429,762	8,495,853,083,002	1,832,271,769,822	10,328,124,852,824	3,192,826,576,938	23.61%
Year 23	2049	13,858,975,215,506	8,534,084,421,875	1,878,078,564,067	10,412,162,985,943	3,446,812,229,563	24.87%
Year 24	2050	14,205,449,595,893	8,572,487,801,774	1,925,030,528,169	10,497,518,329,943	3,707,931,265,951	26.10%
Year 25	2051	14,560,585,835,791	8,611,063,996,882	1,973,156,291,373	10,584,220,288,255	3,976,365,547,536	27.31%
Year 26	2052	14,924,600,481,686	8,649,813,784,868	2,022,485,198,658	10,672,298,983,525	4,252,301,498,160	28.49%
Year 27	2053	15,297,715,493,728	8,688,737,946,899	2,073,047,328,624	10,761,785,275,524	4,535,930,218,204	29.65%
Year 28	2054	15,680,158,381,071	8,727,837,267,660	2,124,873,511,840	10,852,710,779,500	4,827,447,601,571	30.79%
Year 29	2055	16,072,162,340,598	8,767,112,535,365	2,177,995,349,636	10,945,107,885,001	5,127,054,455,597	31.90%
Year 30	2056	16,473,966,399,113	8,806,564,541,774	2,232,445,233,377	11,039,009,775,151	5,434,956,623,962	32.99%
Year 31	2057	16,885,815,559,090	8,846,194,082,212	2,288,256,364,211	11,134,450,446,423	5,751,365,112,667	34.06%
Year 32	2058	17,307,960,948,068	8,886,001,955,582	2,345,462,773,316	11,231,464,728,898	6,076,496,219,169	35.11%
Year 33	2059	17,740,659,971,769	8,925,988,964,382	2,404,099,342,649	11,330,088,307,031	6,410,571,664,738	36.13%
Year 34	2060	18,184,176,471,064	8,966,155,914,722	2,464,201,826,215	11,430,357,740,937	6,753,818,730,126	37.14%
Year 35	2061	18,638,780,882,840	9,006,503,616,338	2,525,806,871,871	11,532,310,488,209	7,106,470,394,631	38.13%
Year 36	2062	19,104,750,404,911	9,047,032,882,612	2,588,952,043,668	11,635,984,926,279	7,468,765,478,632	39.09%
Year 37	2063	19,582,369,165,034	9,087,744,530,583	2,653,675,844,759	11,741,420,375,343	7,840,948,789,691	40.04%
Year 38	2064	20,071,928,394,160	9,128,639,380,971	2,720,017,740,878	11,848,657,121,849	8,223,271,272,311	40.97%
Year 39	2065	20,573,726,604,014	9,169,718,258,185	2,788,018,184,400	11,957,736,442,586	8,615,990,161,428	41.88%
Year 40	2066	21,088,069,769,114	9,210,981,990,347	2,857,718,639,010	12,068,700,629,357	9,019,369,139,757	42.77%
Year 41	2067	21,615,271,513,342	9,252,431,409,304	2,929,161,604,985	12,181,593,014,289	9,433,678,499,053	43.64%
Year 42	2068	22,155,653,301,176	9,294,067,350,646	3,002,390,645,110	12,296,457,995,756	9,859,195,305,420	44.50%
Year 43	2069	22,709,544,633,705	9,335,890,653,724	3,077,450,411,238	12,413,341,064,961	10,296,203,568,744	45.34%
Year 44	2070	23,277,283,249,548	9,377,902,161,665	3,154,386,671,519	12,532,288,833,184	10,744,994,416,364	46.16%
Year 45	2071	23,859,215,330,786	9,420,102,721,393	3,233,246,338,307	12,653,349,059,700	11,205,866,271,087	46.97%
Year 46	2072	24,455,695,714,056	9,462,493,183,639	3,314,077,496,764	12,776,570,680,404	11,679,125,033,652	47.76%
Year 47	2073	25,067,088,106,907	9,505,074,402,965	3,396,929,434,184	12,902,003,837,149	12,165,084,269,758	48.53%
Year 48	2074	25,693,765,309,580	9,547,847,237,779	3,481,852,670,038	13,029,699,907,817	12,664,065,401,763	49.29%
Year 49	2075	26,336,109,442,320	9,590,812,550,349	3,568,898,986,789	13,159,711,537,138	13,176,397,905,182	50.03%

Source: Author's work

Based on these calculations, hypothesis 4 of this research, "H4: Reforming the pension system from the DB scheme to the new scheme has a crucial role in achieving the long-term sustainability of the Indonesian CSP system," can be accepted. However, the adequacy of pension benefits under these options remains a concern, as they do not provide sufficient support to maintain the same standard of living after retirement. Consequently, the researcher suggests that these options should not be selected, despite their potential for better sustainability.

Option 5

Option 5 calculates the pension base as the sum of the last salary and performance allowance. The RR claims that the pension benefits provided in Option 5 are higher than those in Options 1 through 4. The RR stands at 40%, which aligns with the minimum 40% recommended by the ILO for a retirement age of 54. However, the RR increases to 48% when the retirement age is 58, reaching 91% at a retirement age of 75. According to calculations, the average pension benefits are sufficient to maintain a steady standard of living after retirement.

Option 6

The calculation indicates that the pension benefits in Option 6 are significantly better than those in Option 5. This difference arises from the higher contribution rate for civil servants in Option 6, which is set at 10%, compared to 5% in Option 5. The RR for different retirement ages is as follows: 64% at the current retirement age of 58, 69% at age 60, 85% at age 65, and 91% at age 75. These pension benefits are generally adequate to maintain a stable quality of life during retirement. However, the 10% contribution rate will considerably reduce civil servants' THP. Therefore, the researcher recommends adopting this option, but emphasizes that the Indonesian government should communicate this plan to all new civil servants before its implementation.

Option 7

According to the calculations, the RR for pension benefits provided by Option 7 is lower than those offered by Option 5, assuming a 3% interest rate of return on assets and all other assumptions remain consistent. The RR is currently 33%, below the ILO recommended minimum of 40% for the retirement age of 58. However, the RR increases to 41% at the retirement age of 65 and 52% at 75. The researcher suggests avoiding Option 7 since the RRs are mostly below 40%, signaling that the pension payments may not be adequate to sustain a similar quality of life after retirement.

Option 8

Since the interest rate of return assumption for Option 8 is 3%, which is lower than the 5% assumed for Option 6, the retirement results (RR) indicate that the pension benefits offered by Option 8 are significantly lower than those provided by Option 6. At the current retirement age of 58, the RR stands at 44%. It increases to 47% by age 60, rises to 54% at age 65, and reaches 69% at age 75. On average,

the pension benefits from either option could support a stable standard of living in retirement. Additionally, considering the uncertain investment climate in Indonesia, the 3% interest rate of return for Option 8 may be a more reasonable assumption than the 5% for Option 6.

According to the calculations presented, Options 5 to 8 offer greater adequacy of pension benefits for civil service pensioners compared to Options 1 to 4. It is primarily because the pension base in Options 5 to 8 includes the sum of the last salary and performance allowance. As a result, we can accept the hypothesis of this research, " H5: Changing the pension benefits formula positively impacts improving the adequacy of the Indonesian CSP system." However, it is important to note that the annual budget projections for Options 5 to 8 are significantly higher than those for Options 1 to 4. In addition to implementing the DC scheme under Options 5 to 8, the Indonesian government will still need to honor the current CSP system, which operates under the DB scheme for existing civil servants. Table 10 outlines the total budget implications for the Indonesian government if Options 5 to 8 are adopted compared to the budget without reforming the current system.

Based on Table 10, the Indonesian government will experience higher pension spending (resulting in a deficit) during the first 19 years of implementing Options 5 to 8. However, it is projected that by 2046, there will be a surplus in government spending for pension payments. Although the sustainability of the pension scheme for Options 5 to 8 may take longer to achieve compared to Options 1 to 4, the adequacy of pension benefits will be better in Options 5 to 8. Therefore, this reform strategy aims to achieve the adequacy and sustainability of the CSP scheme simultaneously.

Table 10.
Comparison of Government Spending for CSP Payment
Between DC Scheme Options 5-8 (Reform) and DB Scheme (No Reform)

Working Year	Year	Annual Pension Contribution DB Scheme (No Reform)	Annual Pension Contribution with DB Scheme (Reform)	DC Option 5-8 (Reform)	Total Government Spending (Reform)	Surplus/Defisit	In percent of No Reform
Year 0	2026	7,853,842,976,694	7,696,766,117,160	2,660,754,837,699	10,357,520,954,859	(2,503,677,978,165)	-31.88%
Year 1	2027	8,050,189,051,111	7,731,401,564,687	2,727,273,708,641	10,458,675,273,328	(2,408,486,222,217)	-29.92%
Year 2	2028	8,251,443,777,389	7,766,192,871,728	2,795,455,551,357	10,561,648,423,085	(2,310,204,645,696)	-28.00%
Year 3	2029	8,457,729,871,824	7,801,140,739,651	2,865,341,940,141	10,666,482,679,792	(2,208,752,807,968)	-26.12%
Year 4	2030	8,669,173,118,619	7,836,245,872,980	2,936,975,488,644	10,773,221,361,624	(2,104,048,243,005)	-24.27%
Year 5	2031	8,885,902,446,585	7,871,508,979,408	3,010,399,875,861	10,881,908,855,269	(1,996,006,408,684)	-22.46%
Year 6	2032	9,108,050,007,750	7,906,930,769,815	3,085,659,872,757	10,992,590,642,572	(1,884,540,634,823)	-20.69%
Year 7	2033	9,335,751,257,943	7,942,511,958,280	3,162,801,369,576	11,105,313,327,856	(1,769,562,069,912)	-18.95%
Year 8	2034	9,569,145,039,392	7,978,253,262,092	3,241,871,403,815	11,220,124,665,907	(1,650,979,626,515)	-17.25%
Year 9	2035	9,808,373,665,377	8,014,155,401,771	3,322,918,188,911	11,337,073,590,682	(1,528,699,925,305)	-15.59%
Year 10	2036	10,053,583,007,011	8,050,219,101,079	3,405,991,143,634	11,456,210,244,713	(1,402,627,237,702)	-13.95%
Year 11	2037	10,304,922,582,186	8,086,445,087,034	3,491,140,922,224	11,577,586,009,258	(1,272,663,427,072)	-12.35%
Year 12	2038	10,562,545,646,741	8,122,834,089,926	3,578,419,445,280	11,701,253,535,206	(1,138,707,888,465)	-10.78%
Year 13	2039	10,826,609,287,910	8,159,386,843,330	3,667,879,931,412	11,827,266,774,742	(1,000,657,486,833)	-9.24%
Year 14	2040	11,097,274,520,107	8,196,104,084,125	3,759,576,929,697	11,955,681,013,823	(858,406,493,715)	-7.74%
Year 15	2041	11,374,706,383,110	8,232,986,552,504	3,853,566,352,940	12,086,552,905,444	(711,846,522,334)	-6.26%
Year 16	2042	11,659,074,042,688	8,270,034,991,990	3,949,905,511,763	12,219,940,503,753	(560,866,461,066)	-4.81%
Year 17	2043	11,950,550,893,755	8,307,250,149,454	4,048,653,149,557	12,355,903,299,011	(405,352,405,256)	-3.39%
Year 18	2044	12,249,314,666,099	8,344,632,775,127	4,149,869,478,296	12,494,502,253,423	(245,187,587,324)	-2.00%
Year 19	2045	12,555,547,532,751	8,382,183,622,615	4,253,616,215,254	12,635,799,837,868	(80,252,305,117)	-0.64%
Year 20	2046	12,869,436,221,070	8,419,903,448,917	4,359,956,620,635	12,779,860,069,552	89,576,151,519	0.70%
Year 21	2047	13,191,172,126,597	8,457,793,014,437	4,468,955,536,151	12,926,748,550,588	264,423,576,009	2.00%
Year 22	2048	13,520,951,429,762	8,495,853,083,002	4,580,679,424,555	13,076,532,507,556	444,418,922,206	3.29%
Year 23	2049	13,858,975,215,506	8,534,084,421,875	4,695,196,410,168	13,229,280,832,044	629,694,383,462	4.54%
Year 24	2050	14,205,449,595,893	8,572,487,801,774	4,812,576,320,423	13,385,064,122,196	820,385,473,697	5.78%
Year 25	2051	14,560,585,835,791	8,611,063,996,882	4,932,890,728,433	13,543,954,725,315	1,016,631,110,476	6.98%
Year 26	2052	14,924,600,481,686	8,649,813,784,868	5,056,212,996,644	13,706,026,781,512	1,218,573,700,174	8.16%
Year 27	2053	15,297,715,493,728	8,688,737,946,899	5,182,618,321,560	13,871,356,268,460	1,426,359,225,268	9.32%
Year 28	2054	15,680,158,381,071	8,727,837,267,660	5,312,183,779,599	14,040,021,047,260	1,640,137,333,811	10.46%
Year 29	2055	16,072,162,340,598	8,767,112,535,365	5,444,988,374,089	14,212,100,909,454	1,860,061,431,144	11.57%
Year 30	2056	16,473,966,399,113	8,806,564,541,774	5,581,113,083,441	14,387,677,625,216	2,086,288,773,897	12.66%
Year 31	2057	16,885,815,559,090	8,846,194,082,212	5,720,640,910,527	14,566,834,992,740	2,318,980,566,351	13.73%
Year 32	2058	17,307,960,948,068	8,886,001,955,582	5,863,656,933,291	14,749,658,888,873	2,558,302,059,195	14.78%
Year 33	2059	17,740,659,971,769	8,925,988,964,382	6,010,248,356,623	14,936,237,321,005	2,804,422,650,764	15.81%
Year 34	2060	18,184,176,471,064	8,966,155,914,722	6,160,504,565,538	15,126,660,480,260	3,057,515,990,803	16.81%
Year 35	2061	18,638,780,882,840	9,006,503,616,338	6,314,517,179,677	15,321,020,796,015	3,317,760,086,825	17.80%
Year 36	2062	19,104,750,404,911	9,047,032,882,612	6,472,380,109,169	15,519,412,991,781	3,585,337,413,131	18.77%
Year 37	2063	19,582,369,165,034	9,087,744,530,583	6,634,189,611,898	15,721,934,142,481	3,860,435,022,553	19.71%
Year 38	2064	20,071,928,394,160	9,128,639,380,971	6,800,044,352,196	15,928,683,733,167	4,143,244,660,993	20.64%
Year 39	2065	20,573,726,604,014	9,169,718,258,185	6,970,045,461,000	16,139,763,719,186	4,433,962,884,828	21.55%
Year 40	2066	21,088,069,769,114	9,210,981,990,347	7,144,296,597,525	16,355,278,587,873	4,732,791,181,242	22.44%
Year 41	2067	21,615,271,513,342	9,252,431,409,304	7,322,904,012,464	16,575,335,421,767	5,039,936,091,575	23.32%
Year 42	2068	22,155,653,301,176	9,294,067,350,646	7,505,976,612,775	16,800,043,963,421	5,355,609,337,755	24.17%
Year 43	2069	22,709,544,633,705	9,335,890,653,724	7,693,626,028,095	17,029,516,681,818	5,680,027,951,887	25.01%
Year 44	2070	23,277,283,249,548	9,377,902,161,665	7,885,966,678,797	17,263,868,840,462	6,013,414,409,085	25.83%
Year 45	2071	23,859,215,330,786	9,420,102,721,393	8,083,115,845,767	17,503,218,567,160	6,355,996,763,627	26.64%
Year 46	2072	24,455,695,714,056	9,462,493,183,639	8,285,193,741,911	17,747,686,925,550	6,708,008,788,506	27.43%
Year 47	2073	25,067,088,106,907	9,505,074,402,965	8,492,323,585,459	17,997,397,988,424	7,069,690,118,483	28.20%
Year 48	2074	25,693,765,309,580	9,547,847,237,779	8,704,631,675,095	18,252,478,912,874	7,441,286,396,706	28.96%
Year 49	2075	26,336,109,442,320	9,590,812,550,349	8,922,247,466,973	18,513,060,017,321	7,823,049,424,998	29.70%

Source: Author's work

In conclusion, this simulation indicates that the DC scheme offers the advantage of achieving long-term sustainability for the Indonesian CSP system. The government budget required to implement this option is lower than that of the PAYG system. However, regarding adequacy, the DC scheme can provide a reasonable pension benefit, depending on factors such as the pension benefits

formula, contribution rate, and investment returns. Consequently, a higher contribution rate, a larger pension base for calculating benefits, and better investment returns will collectively ensure a more comfortable pension for pensioners in the future.

Additionally, the DC scheme presents several risks that must be addressed, including investment risks. The Indonesian government should improve its investment strategies for pension fund management to enhance financial returns and mitigate the government's direct financial burden.

Sensitivity Analysis

The preceding sensitivity analysis estimated the impact of changing actuarial assumptions on the pension gap of the current Indonesian CSP system. In this section, the researcher uses sensitivity analysis to forecast how changing actuarial assumptions will influence the RR of the pension benefits under the new DC system if implemented.

Sensitivity analysis on the investment return

To measure the adequacy of the new DC scheme, the researcher simulated a sensitivity analysis to predict the RR of CSP pension benefits with an investment return rate from 1% to 6%, with the contribution rate of civil servants is constant at 10%.

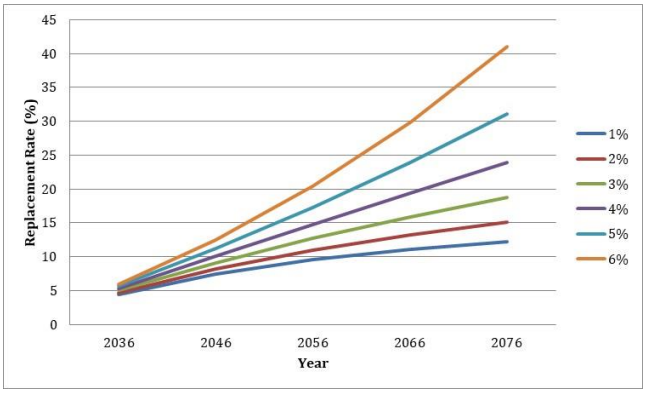
Options 1 – 4

According to Figure 4, RR improves significantly with higher returns: with a 1% return, RR in 2076 is just 12.25%, but at a 6% return, RR in 2076 is a much healthier 41.03%. Between 2036 and 2076, higher-return scenarios result in higher replacement rate growth: at 1% return, RR increases by 7.8 percentage points, while at 6% return, RR increases by around 35.1 percentage points. It demonstrates that investment return is among the most important determinants of benefit adequacy in DC schemes.

However, with a 1% or 2% return, replacement rates remain much below 20%, which is insufficient for retirement. It indicates a significant sensitivity to market underperformance. In the actual world, such returns would require pensioners to rely more on family and social pensions or to keep working. DC schemes are quite sensitive to investment performance. As a result, cautious asset allocation and guaranteed returns are required. Although higher returns significantly enhance adequacy, the RR of these decisions is only 41.03%, with an investment return of 6% in 2076 after 50 years of implementation. This finding validated the prior decision not to pursue options 1 - 4 for the new CSP system.

Figure 4.

Replacement Rate with Various Investment Return Rate for Options 1 – 4



Source: Author's work

Options 5 – 8

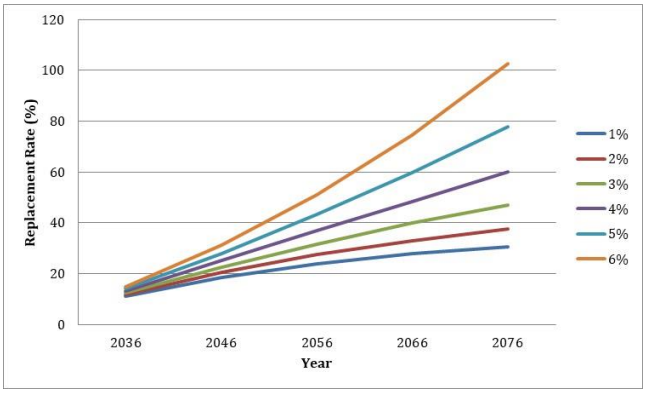
Option 5-8 will achieve significantly higher RR than Option 1-4 due to the pension benefits formula, which includes a performance allowance. According to Figure 5, the RR in 2036 is already above 11%, even with a 1% return, which is 2.5 times higher than in Options 1-4. In 2076, the RR reaches 30.63% (1% return) and 102.56% (6% return). By 2076, a 1% increase in return corresponds to a 6-10 percentage point rise in RR—compound return at work.

However, low returns remain risky. Even with higher assumptions, at a 1% return, the RR in 2076 is only 30.6%, which is insufficient for middle-income employees. Adequacy standards of 40-60% RR are only surpassed if returns exceed 4%. As a result, we can accept the hypothesis of this research, "H6: Investment return significantly impacts improving the adequacy of the Indonesian CSP system."

Options 5-8 have more significant pensions than Options 1-4, but they are still at risk from underperformance. Based on Figure 5, I found that a high RR is feasible with high returns. As a result, it encourages the Indonesian government to pursue long-term investment initiatives. In general, options 5-8 outperform options 1-4. As a result, I recommend applying options 5-8 as the basis for reform. However, these options require a real investment return of 4-5% or more to achieve a 50% RR.

Figure 5.

Replacement Rate with Various Investment Return Rate for Options 5 – 8



Source: Author's work

3.5. Reforms of the CSP System with the Various Risk Scenarios

Based on the calculation and interview with a Lead economist of the World Bank and a Director of the budget regulation harmonization at the Ministry of Finance, the Indonesian Government can afford to reform the current CSP system from a DB scheme to a new scheme with several conditions. According to the lead economist of the World Bank, the new scheme is better applied only to a new civil servant. If Indonesian wants to add a new scheme for the existing civil servants, then that would be a more immediate cost.

The simulation predicts that the Indonesian government will either incur a large deficit or greater pension spending in the early to mid-stage phases of introducing the DC system for new civil servants. Nonetheless, it is anticipated that government spending on pension payments will be surplus by 2046. As a result, the DC scheme gives the Indonesian CSP system the benefit of long-term sustainability. Compared to the PAYG system, this option requires a smaller government budget to implement. On the other hand, based on variables including the pension benefits formula, contribution rate, and investment results, the DC scheme may offer a respectable pension benefit in terms of adequacy. Therefore, a more comfortable pension for pensioners in the future will be ensured by a higher contribution rate, a larger pension base for calculating payments, and better investment returns.

Furthermore, the Director of budget regulation harmonization at the Ministry of Finance argues that the Indonesian Government has not implemented pension reform because the ability of employees and the Regional Government to pay

contributions is the Government's primary concern. He also wants the Regional Government to pay the contributions for pension expenditure. The Director of Budget Regulation Harmonization at the Ministry of Finance believed salary reform should be implemented before pension reform. However, the Lead economist of the World Bank argued, "Ideally, I would the Indonesian government to do both salary reforms and pension reforms at the same time" (Appendix 8). He also suggested the Indonesian Government include the allowances as part of the pension base and look at the total compensation for designing the best policy for civil servants: "Of folding in the allowances as part of the pensionable wage that is sort of a wage bill reform that has an impact on ultimate pension. So, I say the total compensation should be looked at as a what are the incentives for CS to join and to stay there".

Regarding the possibility of the Indonesian Government reforming the CSP system by considering the costs and benefits of reform with various risk scenarios, the Director of budget regulation harmonization at the Ministry of Finance mentioned: "It depends on the work program priorities decided by the President." He added, "The Ministry of Finance with other related agencies have created simulations with several existing scenarios. The scenario and its implications are currently being refined to be presented at a limited cabinet meeting." In addition, he believed that "Apart from technical considerations, it is also necessary to study the implications from a political perspective. Support from parliament is necessary. It will influence the decision on whether the option is revolutionary or partial".

In summary, the following are the results of this research, which the researcher hopes can help the Indonesian government achieve the adequacy and sustainability of the CSP system.

Table 11.
Results of The Research

	Research Goals	**Data Used**	**Method Used**	**Result**
Q1	How is the adequacy of the current Indonesian CSP system?	Primary data	Interviews	The research findings reveal that the current pension system provides an income that allows a reasonable RR based on the ILO standards. However, the problem is the low civil servants' salaries as the pension

				base; therefore, the pension benefit is too low to support retirees' cost of living.
Q2	How high are the risks of the unsustainability of the current CSP system?	- Primary data - Secondary data	- Interviews - Simulation	The government's financial contribution to the pension system has become a heavy burden, with pension payments increasing steadily over the past decade.
Q3	How can a more sustainable pension system be designed, and what is the cost?	Primary data	Interviews	The study proposes transitioning from a DB to a DC system to address these issues. A DC system would reduce pension liabilities. The study also recommends parametric reforms, such as increasing the retirement age, adjusting pension benefits based on salary history, and increasing employee contribution rates. Pension fund management should also be improved through better investment strategies to enhance financial returns and reduce the government's direct financial burden.
Q4	What are the benefits of the new pension system and what are the risks of achieving them?	- Primary data - Secondary data	- Interviews - Simulation	The study emphasizes that reforming Indonesia's CSP system is essential for achieving long-term financial sustainability. Transitioning to a DC system and implementing parametric reforms would help reduce pension liabilities, improve pension adequacy, and ensure the

				government can meet its future pension obligations.
Q5	Can Indonesia afford to reform its CSP system considering the cost and benefit of reform with the various risk scenarios?	- Primary data - Secondary data	- Interviews - Simulation	This study recommends that the new scheme be applied only to new civil servants; salary and pension reform should be implemented simultaneously and included as the Indonesian government's work program priorities. In addition, it is necessary to study the implications from a political perspective. Political and societal obstacles must be handled carefully to implement these reforms successfully.
H1	Increasing contribution rates positive impacts improving the long-term sustainability of the Indonesian CSP system.	Secondary data	Simulation	Accepted
H2	Increasing retirement age positively impacts improving the long-term sustainability of the Indonesian CSP system.	Secondary data	Simulation	Accepted
H3	Increasing civil servants' salary negatively	Secondary data	Simulation	Accepted

	impacts improving the long-term sustainability of the Indonesian CSP system.			
H4	Reforming the pension system from the DB scheme to the new scheme has a crucial role in achieving the long-term sustainability of the Indonesian CSP system.	Secondary data	Simulation	Accepted
H5	Changing the pension benefits formula positively impacts improving the adequacy of the Indonesian CSP system.	Secondary data	Simulation	Accepted
H6	Investment return significantly impacts improving the adequacy of the Indonesian CSP system.	Secondary data	Simulation	Accepted

Source: Author's work

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

Indonesia's CSP system has recently shown low adequacy and sustainability. Regarding adequacy, the CSP benefits are inadequate to support pensioners' costs of living. Meanwhile, regarding sustainability, Indonesia's CSP system faces serious challenges because of unfunded liabilities. Consequently, Indonesia's government has to reform its CSP scheme to achieve sustainability and provide a decent pension benefit to all pensioners.

This study aimed to provide a strategy for developing more sustainable pension liabilities in Indonesia's CSP system. This objective is accomplished through the research findings. The finding from the first question is that the current pension system provides an income that allows a reasonable RR based on the ILO standards. However, the problem is the low civil servants' salaries as the pension base; hence, the average income is too low to allow the pensioners to save, and the level varies.

The finding from the second question is that the sustainability of the CSP system compared to GDP is relatively stable below 1%, as the percentage of government revenue is quite significant, around 6-8%. However, it is high compared to the employee's budget, around 30%. Meanwhile, according to the simulation, the researcher forecasted the pension spending of CSP benefits to be very large. These pension liabilities are a burden on future generations. The medium and long-term CSP programs could pose risks if program reforms are not designed carefully; therefore, appropriate policies are needed.

Furthermore, the third question is whether pension program reform should be carried out to obtain a sustainable scheme in the long term and better pension benefits for civil service pensioners. Changes in the pension system have significant fiscal implications and are very long in duration and broad in scope. Therefore, the consideration must be comprehensive. To fulfill the requirements in designing a pension program, the Indonesian government should do a combination of parametric and systemic reform at the same time.

The fourth question concerns the benefits and drawbacks of the new pension system and its risks. The DC scheme limits the size of unfunded liability. However, Indonesia should consider the investment risk, a large budget for transition costs, and the higher contribution rate for implementing the DC scheme. The simulation in this study demonstrated the substantial budget for transition costs for implementing the DC scheme towards reality. The simulation predicts that when the DC scheme is first introduced for new civil servants, the Indonesian government will have to spend more on pensions. Nonetheless, the government will have extra money to spend on pension payments in the future. As a result, the

DC scheme gives the Indonesian CSP system the benefit of long-term sustainability. Compared to the PAYG system, this option requires less government budget to implement. On the other hand, the DC scheme might provide a decent pension benefit in terms of adequacy, depending on factors including the pension benefits formula, contribution rate, and investment outcomes. The last question is regarding Indonesia's affordability in reforming its CSP system, considering the cost and benefit of reform with the various risk scenarios. The Indonesian government can afford to reform the current CSP system from a DB scheme to a new scheme with several conditions.

According to the findings of all questions, the main research question: "How and whether is it possible to reform the current Indonesian CSP system to be more sustainable in the long term?" can be answered. The Indonesian government can reform the CSP system with several conditions. According to the results of the qualitative and quantitative analysis, the hypothesis of this research can be accepted. Reforming the CSP system is an important step to ensure future pensioners' sustainability and welfare. Changing the CSP system from DB to new systems can reduce the burden on the national budget and provide cost certainty. However, this change also brings significant challenges, including uncertainty about civil servants' benefits and investment risks. With the proper measures, such as gradual transition and investment support, the government can better manage these changes and ensure the success of pension system reform.

Finally, this research provides a novel contribution to the literature and the development of the Indonesian CSP systems. The results of this research have the potential to be a valuable lesson. They could be a starting point for the Indonesian government (Indonesian policymakers) and other nations looking to improve their pension systems.

4.2. Recommendations

According to the research findings, Indonesia's CSP system faces serious challenges because of unfunded liabilities. Therefore, the research has several recommendations for the Indonesian government regarding pension reform of the CSP scheme:

1. The pension base of the CSP scheme should be changed from basic salary to performance allowances to improve its adequacy and provide an income that allows a reasonable RR based on the ILO standards.
2. The research forecasts that the amount of pension spending on CSP benefits will be very large in the future and could be a burden on future generations. Therefore, with carefully designed and appropriate policies, pension reform should be implemented as soon as possible.
3. Changes to the pension system have major fiscal implications, are very long in duration, and are very broad in scope. Therefore, the consideration must be comprehensive.

4. The Indonesian government should combine parametric and systemic reform at the same time. The alternative to several new pension schemes has benefits, drawbacks, and risks. The Indonesian government could choose the best scheme that has more benefits, fewer drawbacks, and lower risks.
5. The Indonesian government can afford to reform the current CSP system from DB to a new scheme with several conditions: the new scheme is applied only for a new CS, the Indonesian government reforms the civil service salary system and pension reform simultaneously, and pension reform becomes the work program priorities of the president or government.

4.3. Limitations

The dissertation identifies several limitations that may impact the findings and their generalizability:

1. Data Availability and Scope

The research is based on interview data from a limited sample of Indonesian civil servants and pensioners. Therefore, it may not fully represent the broader population of Indonesian civil servants and pensioners.

2. Assumption-Based Modeling

The mathematical model used to simulate pension reform outcomes is built on several assumptions, including projections of future economic growth, demographic trends, and the stability of government policy. Any deviation from these assumptions could compromise the accuracy and reliability of the model's projections.

3. Political and Social Sensitivities

Pension reform is a politically sensitive issue. The study emphasizes that successful reform requires strong political support from the government, parliament, and civil servants. However, political resistance and social unrest may delay or prevent the implementation of the proposed reforms.

4. Economic and Market Risks

The suggested transition to a DC system exposes the pension system to market risks. Factors such as poor investment returns, economic downturns, and inflation could diminish the value of pension funds, potentially undermining the system's financial sustainability.

5. Transition Costs

Transitioning from a DB system to a DC system involves significant financial and administrative costs. The research acknowledges that covering these expenses may strain the government's budget in the short to medium term, despite potential long-term benefits.

5. NEW SCIENTIFIC RESULTS

The study presents several new scientific results that contribute to the field of pension reform and financial sustainability. These scientific results provide a comprehensive framework for pension reform in Indonesia, which could be applied to other developing countries facing similar pension system challenges.

1. Simulation of a Mathematical Model for Pension Revenues and Expenditures for Indonesia.

The research simulated a mathematical model to forecast pension revenues and expenditures in Indonesia's CSP system under a DC scheme. The model calculates pension revenues as the sum of civil servants' and government contributions, adjusted by the average annual THP and contribution rate. Pension expenditures are computed based on the number of pensioners and the yearly average pension rate. This approach provides a clearer projection of pension spending and funding requirements.

2. Simulation of Different Pension Reform Scenarios for Indonesia.

The research introduces eight alternative pension reform scenarios, including combinations of DB and DC schemes, hybrid models, and integration with Indonesia's MPP. The simulation results highlight each approach's benefits, drawbacks, and risks, providing empirical evidence to support policymaking decisions.

3. Proposal for Combining Parametric and Systemic Reforms.

A significant new finding is a recommendation to combine parametric and systemic reforms. This hybrid reform approach aims to achieve sustainability and adequacy in Indonesia's pension system.

4. Identification of Political and Economic Preconditions for Successful Reform in Indonesia.

The study identifies key political and economic conditions required for successful pension reform, including salary reform, political support from parliament, and prioritization of pension reform in the government's work program.

5. Quantitative Evidence Supporting Transition to a DC Scheme.

The research provides quantitative evidence that transitioning to a DC scheme would reduce the government's unfunded liabilities and improve the long-term sustainability of Indonesia's CSP system. The simulation shows that the highest financial pressure would occur around 15-25 years after implementation, after which the financial burden would gradually decrease.

6. LIST OF PUBLICATIONS

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