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Implementing the Accrued Benefit Cost and Attained Age Normal Methods for Pension Fund Calculations

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Abstract- Pension fund management often faces challenges arising from uncertainties in actuarial variables, such as retirement age, years of service, salary levels, and interest rates. Inaccurate calculations may result in fund deficits or impose excessive contribution burdens on companies. This study aims to identify the optimal method for calculating pension funds to ensure the maximization of pension program benefits. The research employs secondary data from a limited liability company, with documentation as the primary data collection instrument. The data include employees' dates of birth, dates of registration for work, employment commencement dates, and wage records. The analysis focuses on normal contributions, actuarial liabilities, and fund accumulation using the Accrued Benefit Cost (ABC) and Attained Age Normal (AAN) methods. The results indicate that the AAN method generates higher normal contributions than the ABC method, making it more effective in preventing pension fund deficits. Conversely, the ABC method offers a more evenly distributed cost allocation throughout participants' working periods. The findings suggest that the differences in results between the two methods are influenced by the length of service and the salary levels of participants.

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1. Introduction

Working is a physical and mental activity that is a human activity in everyday life (Rahmi, 2020). The purpose of a person working is to be able to meet the needs of clothing, shelter and food. Work is not always

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there for everyone, where many things cause people to stop working, one of which is age and physical limitations.

Human physical conditions also have limitations in doing work, the older a person is, the more their physical condition will decline and go hand in hand with productivity in working (Kamisasi, 2018). A person who works for a company must have conditions that have been set by the company. One of them is a certain age limit, where when workers enter the age limit that has been set, they will stop working, and also stop earning income (Tatyana & Padmi, 2020).

As a form of social security from the company where someone works, a pension fund is provided which is useful for ensuring the financial well-being of individuals when entering retirement. Pension funds are long-term financial programs designed to provide income for participants after retirement, ensuring financial security and stability in old age (Sembiring, 2016; Setiawan, 2017). Proper management of pension funds is essential to maintain fund solvency and meet future liabilities. According to (Huda & Heykal, 2010), pension fund is a collection of assets managed and run by an institution to produce pension benefits, namely periodic payments paid to participants at the time and method stipulated in the provisions that form the basis for organizing the pension fund. Payment of these benefits is linked to reaching a certain age. In Indonesia, pension fund operations are regulated by the Financial Services Authority (Otoritas Jasa Keuangan, 2022).

Pension funds provide a sense of security for individuals after entering retirement age and as one of the company's responsibilities (Izzati & Kartikasari, 2022). According to the Financial Services Authority, a pension fund is a legal entity that manages and runs programs that promise retirement benefits. In the context of a company, a pension fund functions as part of a resource management strategy human resources to attract and retain qualified workers (Otoritas Jasa Keuangan, 2022). However, pension fund management still faces various complex challenges, especially in the aspect of calculating accurate and sustainable actuarial liabilities. The calculation of pension contributions and liabilities is highly dependent on actuarial methods, which consider various factors such as age at entry, retirement age, years of service, salary growth, and interest rates (LeMaire et al., 1990). The calculation of actuarial liabilities is very necessary to build a life in the future and think about how to earn income to support the welfare of oneself and one's family in the future (Izzati & Kartikasari, 2022).

Problems in pension fund management often arise from a lack of comprehensive understanding of proper actuarial calculations. The determination of pension fund obligations involves multiple variables, such as participant age, length of service, salary level, and interest rate, each carrying its own uncertainty that can influence the results. Inaccurate estimation of these factors, often caused by the use of inappropriate or overly simplistic methods in pension fund analysis, can lead to funding shortages that threaten the sustainability of pension programs. To address these challenges, various actuarial cost methods have been developed over the years, including the Accrued Benefit Cost (ABC) method and the Attained Age Normal (AAN) method, each offering a distinct approach to allocating pension costs over participants' careers. This study examines the implementation of these two methods in order to identify the most suitable approach for optimizing pension program benefits while maintaining fund stability. To overcome these problems, it is necessary to calculate the proven and reliable actuarial method, such as Accrued Benefit Cost (ABC) and Attained Age Normal (AAN). The ABC method is a method with a total division of pension benefits that can be the participant's right if the participant works until the normal retirement age based on the completed work period (Sarina et al., 2024). This method takes an approach by distributing pension costs evenly during the participant's working period, namely based on the participant's age.

A number of previous studies have explored the use of various actuarial cost methods in different settings. For instance, Syahrini et al. (2020) calculated pension liabilities based on the Indonesian mortality table, emphasizing the critical role of accurate mortality assumptions. (Izzati & Kartikasari, 2022) developed an actuarial pension fund calculation system using Flask to streamline automated computations. (Gumilang, 2020) assessed premium calculations under the Entry Age Normal and Aggregate Cost methods, while (Sarina et al., 2024) utilized the ABC method to determine pension premiums for civil servants. A related study compared the Attained Age Normal (AAN) and Projected Unit Credit (PUC) methods in determining optimal premium rates for Indonesian civil servants based

on 2021 salary data and the Indonesian Mortality Table III (2011). The findings showed that AAN produced higher premiums than PUC. Although both methods are permissible under the *Standar Praktik Aktuaria Dana Pensiun* (SPA-DP) for defined benefit and defined contribution schemes, the study recommended AAN to reduce the risk of underfunding due to its higher premium values (Novi et al., 2024).

Despite both the ABC and AAN methods being well-established in actuarial practice, there remains a scarcity of studies that directly compare their outcomes using actual corporate pension fund data within the Indonesian context. Existing research predominantly investigates individual methods or alternative cost approaches without applying ABC and AAN to the same dataset for direct comparison. To fill this gap, the present study applies and contrasts the ABC and AAN methods in pension fund calculations for a limited liability company, aiming to identify the approach that best enhances pension program benefits while safeguarding fund sustainability.

2. Methods

This study was conducted through several sequential stages. The first stage was a literature review to obtain relevant information from books, journals, and theses related to the Accrued Benefit Cost (ABC) and Attained Age Normal (AAN) methods in pension fund calculations. The second stage involved data collection, in which secondary data were obtained from PT. Sukses Inti Makmur employee records in 2024. The data included participants' dates of birth, employment start dates, retirement ages, initial salaries, salary growth rates, and applicable interest rates. The third stage was the determination of mortality assumptions, where the Indonesian Mortality Table (TMI) IV 2019 was used for both male and female participants (Asosiasi Asuransi Jiwa Indonesia, 2019). The fourth stage consisted of data processing, including the calculation of annual salaries from the year of joining until retirement based on the projected salary growth rate, as well as determining annuity values and the present value of pension benefits. The fifth stage involved actuarial calculations using both the ABC and AAN methods. For each method, normal contributions, actuarial liabilities, and fund accumulation were calculated under the assumption of an initial fund value of zero. In the final stage, the results obtained from the two methods were compared to evaluate their effectiveness in optimizing pension benefits and maintaining fund sustainability.

Table 1 presents sample data of employees from the company and their entry ages into the pension fund program. Salary information is not displayed in the table for confidentiality reasons, but it is used as an input in the subsequent actuarial calculations.

Table 1. Sample employee data and entry ages into the pension fund program

Initial Name	Entry Age (a)
AH	28
CIS	22
CS	24
DF	23
DS	22
DY	28
E	20
L	25
RS	21
S	28

The ABC method is a method that shows pension benefits based on the length of service that has been given by the employee until the retirement calculation date, assuming a salary level projection until the retirement date. The accrued benefit cost method is characterized by the division of the total pension benefits that can be the participant's right if they work until the normal retirement age with the number of years of service that have been and will be carried out since starting work until the normal retirement age.

On the other hand, the AAN method calculates pension benefits based on the employee's length of service (from entering the program to retirement) and calculates normal contributions based on age on

the calculation date. This is an advantage of the Attained Age Normal method because it results in fewer actuarial liabilities than other methods (for pension fund institutions) while for participants, the amount of pension benefits is distributed evenly in the current year's contributions.

3. Results and Discussion

This study uses data from pension fund participants from PT. Sukses Inti Makmur, the data of which is obtained from BPJS employment. This data contains the entry age and retirement age of pension fund program participants, which is at the age of 56 years, where the initial pension fund in this company was formed on January 1, 2014, which is zero, and is stored in a deposit with a yield of 5.17% per month. Pension benefits = $1\% \times \text{Years of service} \times \text{Final Salary Pension}$. Assuming a salary increase of 3.46% per year.

An annuity is a series of fixed receipts or payments made at certain intervals. To calculate an annuity, you must first know the calculation of the discount function and the computation table using the mortality table. The type of mortality table used is the TMI IV 2019 mortality table. The interest rate used is 5%. The following is the calculation of the discount function:

$$v = \frac{1}{1+i} = \frac{1}{1+0,05} = 0,952380$$

After obtaining the discount function value, the annuity calculation for retirement age at 56 years can be carried out as follows:

$$\ddot{a}_{56} = \frac{N_{56}}{D_{56}}$$

And for the initial lifetime annuity in months the formula is as follows:

$$\ddot{a}_{56}^{(12)} = \ddot{a}_{56} - \frac{m-1}{2m}$$

with $m=12$

Thus, in calculating the initial lifetime annuity for a retirement age of 56 years, the values obtained are 14.12 for men and 14.90 for women.

(a) Implementing Accrued Benefit Cost Method

A worker's salary can be calculated by considering the salary increase and length of service. In this case, there was a salary increase of 3.46% per year. To calculate the final salary, the following formula is used:

$$Up_r = Up_x(1+s)^{r-1-x}$$

The final wages for the participants can be seen in [Table 2](#).

Table 2. Amount of Final Wage Amount at Retirement Using Accrued Benefit Cost

Initial Name	Up_r
AH	Rp 17.536.981,34
CIS	Rp 15.362.491,26
CS	Rp 15.787.355,40
DF	Rp 28.509.552,69
DS	Rp 18.434.989,51
DY	Rp 11.971.207,99
E	Rp 11.971.207,99
L	Rp 26.634.555,62
RS	Rp 14.304.630,11
S	Rp 10.187.149,79

Pension benefits are determined based on the last salary received multiplied by the length of service. Since the salary is paid monthly, the calculation incorporates a monthly annuity, which is then multiplied by the discount factor and the applicable interest rate. To determine the present value of pension benefits for a retirement age of 56 years, with a predetermined annuity for a participant named AH, the following formula is applied:

$$\begin{aligned}
B_r &= 12\alpha(r-a)Up_r\ddot{a}_r^{12}B_{56} \\
&= 12(1\%)(56-28)(17.536.981.34)(14,12)B_{56} \\
&= 832.065.094,21
\end{aligned}$$

Next, pension benefits for other participants can be seen in [Table 3](#).

Table 3. The Amount of Benefit Using Accrued Benefit Costs

Initial Name	B_r
AH	Rp 832.065.094,21
CIS	Rp 769.110.544,75
CS	Rp 790.381.020,09
DF	Rp 1.352.673.141,39
DS	Rp 874.672.270,05
DY	Rp 567.989.673,04
E	Rp 599.328.724,78
L	Rp 1.333.437.216,47
RS	Rp 678.701.947,95
S	Rp 483.342.690,63

After determining the pension benefits, the calculation of benefit units is performed using the following formula, subject to the condition that $r \neq a$.

$$b_x = \frac{B_r}{(r-a)} = \frac{12Up_r\alpha(r-e)\ddot{a}_r^{(12)}}{(r-a)}$$

The calculation for a participant named AH yields the following benefit units.

$$\begin{aligned}
b_{28} &= \frac{B_{56}}{(56-28)} \\
b_{28} &= 29.716.610,51
\end{aligned}$$

The amount of benefit units for other participants can be seen in [Table 4](#).

Table 4. The Amount of Benefit Units Using Accrued Benefit Cost

Initial Name	b_x
AH	Rp29.716.610,51
CIS	Rp22.620.898,37
CS	Rp24.699.406,88
DF	Rp40.990.095,19
DS	Rp25.725.655,00
DY	Rp20.285.345,47
E	Rp16.648.020,13
L	Rp43.014.103,76
RS	Rp19.391.484,23
S	Rp17.262.238,95

Subsequently, the normal contribution can be determined based on the pension benefit calculations obtained in the previous step. The normal contribution amount is calculated using the following formula:

$$NC_x = \frac{D_r^{(\tau)}}{D_x^{(\tau)}}(b_x)$$

The calculation for a participant named AH yields the following normal contribution amount:

$$\begin{aligned}
NC_{28} &= \frac{D_{56}^{(\tau)}}{D_{28}^{(\tau)}}(b_{28}) \\
NC_{28} &= \frac{5913,47}{25131,7}(29.716.610,51) \\
NC_{28} &= 6.992.293,47
\end{aligned}$$

These calculations were performed using Microsoft Excel, allowing the annual data for each participant to be generated automatically for the entire projection period. The same approach is applied to all participants to obtain their respective normal contribution amounts consistently and efficiently.

At the time of paying the actuarial liabilities, the participant's age increases by one year because the payment is made at the end of the year. For example, AH, who was 28 years old when he enrolled in the pension fund, is considered 29 years old at the end of the first year. The amount of actuarial liabilities for participant AH is calculated using the following formula:

$$\begin{aligned} AL_{29} &= NC_{29}(x - a) \\ AL_{29} &= (7.346.683,49)(29 - 28) \\ AL_{29} &= 7.346.683,49 \end{aligned}$$

The annual accumulation of funds is calculated using the following formula:

$$\begin{aligned} F_{2011} &= F_{2011-1} + TNC_{2011} + IR_{2011} - TAB_{2011} \\ F_{2011} &= F_{2011-1} + TNC_{2011} + (TNC_{2011} * 5.17\%) \\ &\quad + (F_{2011-1} * 5.17\%) - TAB_{2011} \\ F_{2011} &= 10.118.612,12 \end{aligned}$$

In 2038, an employee named S retired and received compensation equivalent to his pension benefits.

The calculation of the fund accumulation for that year is as follows:

$$\begin{aligned} F_{2038} &= F_{2038-1} + TNC_{2038} + IR_{2038} - TAB_{2038} \\ F_{2038} &= F_{2038-1} + TNC_{2038} + (TNC_{2038} * 5.17\%) \\ &\quad + (F_{2038-1} * 5.17\%) - TAB_{2038} \\ F_{2038} &= Rp. 3.383.606.697,11 \end{aligned}$$

The calculation results are presented in [Table 5](#).

Table 5. Amount of Annual Fund Accumulation Using Accrued Benefit Cost

Year	Ft
2011	Rp 9.444.007,79
2012	Rp 19.853.235,67
2013	Rp 31.302.138,94
2014	Rp 53.331.342,65
⋮	⋮
2048	Rp 1.623.632.122,92
2049	Rp 1.773.875.475,52
2050	Rp 1.935.522.393,92

The Unfunded Actuarial Liability (UAL) for each year is the amount by which the actuarial liability exceeds the value of the pension fund's assets. In other words, it is the shortfall between the present value of promised pension benefits and the assets available to cover them. The Unfunded Actuarial Liability (UAL) for each year is calculated using the following formula:

$$\begin{aligned} UAL_{2011} &= TAL_{2011} - F_{2011} \\ UAL_t &= 0 - 9.444.007,79 \\ UAL_t &= Rp - 9.444.007,79 \end{aligned}$$

The calculation results are shown in [Table 6](#).

Table 6. Amount of Unfunded Actuarial Liability Each Year Using Accrued Benefit Cost

Year	UAL
2011	-Rp9.444.007,79
2012	-Rp10.419.963,18
2013	-Rp11.481.865,13
2014	-Rp22.096.628,02
⋮	⋮
2048	Rp1.380.686.390,30
2049	Rp68.814.944,88
2050	Rp74.819.154,38

UAL represents the difference between a pension fund's actuarial liabilities and the value of its available assets. A positive UAL indicates a funding deficit, meaning the current assets are insufficient to meet the actuarial obligations. A zero UAL reflects a fully funded status, where assets are exactly equal to liabilities. Conversely, a negative UAL denotes an overfunded position, indicating that available assets

exceed the actuarial liabilities.

(b) Implementing the Attained Age Normal Method

A worker's salary can be calculated by considering the salary increase and length of service. In this case, there was a salary increase of 3.46% per year. To calculate the final salary, the following formula is used:

$$Up_r = Up_a(1 + s)^{r-1-x}$$

The final wages for the participants can be seen in [Table 7](#).

Table 7. Final Wage Amount at Retirement Using Attained Age Normal

Initial Name	Up_r
AH	Rp14.794.233,52
CIS	Rp13.872.164,38
CS	Rp12.872.845,04
DF	Rp22.468.965,89
DS	Rp16.646.597,26
DY	Rp8.746.350,86
E	Rp11.570.856,36
L	Rp21.717.539,04
RS	Rp12.067.415,37
S	Rp9.198.886,70

Pension benefits are given based on the last salary received multiplied by the length of service, where the salary is given every month so that the calculation already includes a monthly annuity, multiplied by the discount factor and the interest rate to be received. To calculate the present value of pension benefits for a retirement age of 56 years with an annuity that has been set for a participant named AH, the following formula is used:

$$\begin{aligned}
 B_r &= 12Up_r\alpha(r - e)\ddot{a}_r^{(12)} \\
 B_{56} &= 12Up_{56}\alpha(r - e)\ddot{a}_{56}^{(12)} \\
 B_{56} &= 12Up_{56}(0,01)(56 - 28)(14,12)B_{56} \\
 &= Rp\ 701.931.824,39
 \end{aligned}$$

Next, pension benefits for other participants can be seen in [Table 8](#).

Table 8. Amount of Pension Benefits Using Attained Age Normal

Initial Name	Br
AH	Rp701.931.824,39
CIS	Rp843.319.668,15
CS	Rp736.535.366,33
DF	Rp1.256.439.139,81
DS	Rp959.066.721,37
DY	Rp414.982.094,58
E	Rp744.795.576,34
L	Rp1.203.764.108,54
RS	Rp715.692.948,57
S	Rp436.453.251,37

The normal contribution amount under the Attained Age Normal (AAN) method is calculated using the following formula:

$$NC_a = B_r \left(\frac{D_r^{(\tau)}}{N_a^{(\tau)} - N_r^{(\tau)}} \right)$$

The calculation for a participant named AH yields the following normal contribution amount:

$$\begin{aligned}
 NC_{33} &= B_{56} \left(\frac{D_{56}^{(\tau)}}{N_{33}^{(\tau)} - N_{56}^{(\tau)}} \right) \\
 NC_{33} &= Rp\ 701.931.824,39 \left(\frac{5913,47}{359373 - 86214} \right) NC_{33} = Rp\ 15.195.756,34
 \end{aligned}$$

Next, the normal contribution amount for other participants can be seen in [Table 9](#).

Table 9. Amount of Normal Contribution Using Attained Age Normal

Initial Name	NC_a
AH	Rp15.195.756,34
CIS	Rp10.876.240,20
CS	Rp13.195.157,46
DF	Rp21.968.797,07
DS	Rp12.052.994,76
DY	Rp8.353.291,94
E	Rp7.508.412,10
L	Rp21.565.640,54
RS	Rp9.588.238,53
S	Rp8.182.108,15

As in the previous method, the payment of actuarial liabilities in the Attained Age Normal (AAN) method is assumed to be made at the end of the year, resulting in an increase of one year in the participant's age at the time of payment. For example, AH, who was 33 years old when registering for the pension fund, is considered 34 years old at the end of the first year. The actuarial liabilities for participant AH under the AAN method are calculated using the following formula:

$$\begin{aligned}
 AL_x &= B_r \left(\frac{D_r^{(\tau)}}{D_x^{(\tau)}} \right) - NC_a \left(\frac{N_x^{(\tau)} - N_r^{(\tau)}}{D_x^{(\tau)}} \right) \\
 AL_{34} &= B_{56} \left(\frac{D_{56}^{(\tau)}}{D_{34}^{(\tau)}} \right) - NC_{33} \left(\frac{N_{34}^{(\tau)} - N_{56}^{(\tau)}}{D_{34}^{(\tau)}} \right) \\
 AL_{34} &= Rp701.931.824,39 \left(\frac{5913,47}{18665,5} \right) - Rp 15.195.756,34 \left(\frac{359373 - 86214}{18665,5} \right) \\
 AL_{34} &= Rp15.970.396,62
 \end{aligned}$$

The annual accumulation of funds is calculated using the following formula:

$$\begin{aligned}
 F_{2014} &= F_{2014-1} + TNC_{2014} + IR_{2014} - TAB_{2014} \\
 F_{2014} &= F_{2014-1} + TNC_{2014} + (TNC_{2014} * 5.17\%) \\
 &\quad + (F_{2014-1} * 5.17\%) - TAB_{2014} \\
 F_{2014} &= Rp 8.605.123,14
 \end{aligned}$$

In 2038, a participant retired and received compensation equivalent to the accrued pension benefits. The calculation of the fund accumulation for that year is as follows:

$$\begin{aligned}
 F_{2038} &= F_{2038-1} + TNC_{2038} + IR_{2038} - TAB_{2038} \\
 F_{2038} &= F_{2038-1} + TNC_{2038} + (TNC_{2038} * 5.17\%) \\
 &\quad + (F_{2038-1} * 5.17\%) - TAB_{2038} \\
 F_{2011} &= Rp3.720.046.446,76 + Rp124.579.707,26 \\
 &\quad + Rp198.767.172,16 - Rp436.453.251,37 \\
 F_{2038} &= Rp3.606.940.074,81
 \end{aligned}$$

The calculation results are presented in [Table 10](#).

Table 10. Amount of Fund Accumulation Each Year of Retirement Using Attained Age Normal

Year	Ft
2011	Rp8.605.123,14
2012	Rp17.655.131,16
2013	Rp27.173.024,58
2014	Rp51.060.340,20
⋮	⋮
2048	Rp2.183.903.991,44
2049	Rp2.338.907.051,68
2050	Rp2.501.923.770,13

The Unfunded Actuarial Liability (UAL) for each year is calculated using the following formula:

$$\begin{aligned}
 AL_{2014} &= TAL_{2014} - F_{2014} \\
 UAL_{2014} &= -Rp 8.605.123,14
 \end{aligned}$$

The calculation results are presented in [Table 11](#).

Table 11. The Amount of Unfunded Actuarial Liability Each Year Using Attained Age Normal

Year	UAL
2011	-Rp8.605.123,14
2012	-Rp9.056.953,07
2013	-Rp9.538.381,89
2014	-Rp23.927.518,29
⋮	⋮
2048	Rp46.361.357,60
2049	Rp55.773.731,54
2050	Rp67.315.689,24

Based on the definition of UAL described in the methods section above, the results in this study show that the UAL under the current method is smaller than that of the previous method. This indicates that the funding deficit in the previous method is greater, reflecting a less favorable funding position. A smaller UAL suggests that the method applied in this calculation is more effective in reducing the funding gap between actuarial liabilities and available assets.

(c) Comparison of Implementation of Accrued Benefit Cost Method and Attained Age Normal Method

To evaluate the differences between the two actuarial cost methods, a comparison of normal pension fund contributions over a five-year work period was conducted. The results are presented in [Table 12](#).

Table 12. Comparison of the implementation of the Accrued Benefit Cost method and the Attained Age Normal method

Initial Name	$B_r ABC$	$B_r AAN$	$NC_x ABC$	$NC_x AAN$
AH	832.065.094,21	701.931.824,39	8.523.954,13	15.195.756,34
CIS	769.110.544,75	843.319.668,15	4.969.355,10	10.876.240,20
CS	790.381.020,09	736.535.366,33	5.987.390,29	13.195.157,46
DF	1.352.673.141,39	1.356.439.139,81	9.180.140,93	21.968.797,07
DS	874.672.141,39	959.066.721,37	5.484.141,30	12.052.994,76
DY	576.989.673,04	414.982.094,58	4.870.830,93	8.353.291,94
E	599.328.724,78	744.795.576,34	3.314.831,28	7.508.412,10
L	1.333.437.216,47	1.203.764.108,54	10.953.781,61	21.565.640,54
RS	678.701.947,95	715.692.984,57	3.934.939,46	9.588.238,53
S	483.342.690,63	436.453.251,37	4.951.524,77	8.182.108,15

From the results, it can be seen that the higher an employee's basic salary and the longer the work period, the greater the normal contribution that must be paid. The results indicate that both an employee's basic salary and length of service have a positive correlation with the amount of normal contribution required. In comparing the two actuarial cost methods, the Attained Age Normal (AAN) method consistently produces higher normal contributions than the Accrued Benefit Cost (ABC) method. This difference arises because the AAN method allocates the present value of future benefits over the remaining years of service based on the participant's current age, resulting in larger annual contributions, especially for participants with shorter remaining service periods.

In the context of pension fund management, normal contributions serve as a key funding source to cover potential actuarial deficits. While both methods are applicable in pension benefit and contribution programs, the AAN method is generally preferable when the objective is to minimize the risk of underfunding, as its higher normal contributions enhance the sustainability and solvency of the pension fund.

4. Conclusion

Based on the analysis conducted under the assumptions of this study, the Attained Age Normal (AAN) method is found to be the most suitable for determining normal contributions, as it consistently

produces higher contribution values that help ensure the sustainability of the pension fund. These higher contributions also reduce the risk of underfunding and shortages in deficit payments. However, this conclusion applies within the context of the data, actuarial assumptions, and parameters used in this research.

For future research, it is recommended to provide a more detailed explanation of the actuarial assumptions applied and to explore alternative cost methods. Such an approach would enhance the reader's understanding of the range of available methodologies and their respective implications for pension fund management.

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