

Table of Integration Model for Motor Vehicle Sharia Insurance

Rini Cahyandari*¹, Asep Solih Awalluddin², Dara Selvi Mariani³, Sukono⁴ and
Puspa Liza Ghazali⁵

^{1,2,3}Department of Mathematics, UIN Sunan Gunung Djati Bandung, Indonesia

⁴Department of Mathematics, Universitas Padjadjaran, Indonesia

⁵Department of Finance, Universiti Sultan Zainal Abidin, Malaysia

E-mail: {*rini_cahyandari, aasolih}@uinsgd.ac.id, daraselvi26@gmail.com,
sukono@unpad.ac.id, puspaliza@unisza.edu.my

Abstract

Motor vehicle insurance is one of the general insurance types that provide coverage for loss, damages, and disappearance of a motor vehicle due to risks experienced by the covered object. The product illustration of motor vehicle insurance is generally presented in a condensed form, containing few pages and limited information. Based on a product illustration of motor vehicle sharia insurance issued by PT. Asuransi Tri Pakarta (TRIPA) treated as a case study, an alternative version of product illustration in form of a table of integration model was designed to not only provided general information but also vehicle prices, values of premiums, *tabarru*, *ujrah*, investment, insurance costs, and surplus (if any). The partitions also performed on the additional protection offered by TRIPA so that the benefits that would be received by the insured would be greater. The generated table of integration model presents richer information regarding the insurance products, better scheme, and transparency in the management of total premiums.

Keywords: general insurance; product illustration; management of total premiums; integration model; benefits.

Abstrak

Asuransi kendaraan bermotor merupakan salah satu jenis asuransi umum yang memberikan jaminan terhadap kerugian, kerusakan dan kehilangan kendaraan bermotor akibat terjadinya risiko yang menimpa obyek pertanggungan. Umumnya ilustrasi produk asuransi kendaraan bermotor disajikan dalam bentuk ringkasan yang beragam dalam beberapa halaman dan hanya menjelaskan informasi secara umum saja. Mengambil studi kasus berupa ilustrasi produk asuransi syariah kendaraan bermotor dari PT. Asuransi Tri Pakarta (TRIPA), dirancang bentuk alternatif penyajian berupa tabel model integrasi yang memberikan informasi tidak hanya harga kendaraan dan besaran premi, tetapi juga informasi tentang *tabarru*, *ujrah*, investasi, biaya asuransi, surplus (jika ada). Selanjutnya, dilakukan partisi terhadap perlindungan tambahan sehingga manfaat yang diperoleh tertanggung lebih luas. Melalui tabel model integrasi ini, informasi yang tertulis tentang produk asuransi lebih lengkap dan skema pengelolaan premi total asuransi syariah kendaraan bermotor juga lebih jelas.

Kata Kunci: asuransi umum; ilustrasi produk; pengelolaan premi total; model integrase; manfaat.

1. INTRODUCTION

Motor vehicle insurance is one of the general insurance types that provide coverage for loss, damages, and disappearance of a motor vehicle due to accident experienced by the covered object [1] [2]. Generally, there are two types of coverage offered by insurance companies: Total Loss Only (TLO) and Comprehensive. In TLO coverage, compensation shall be provided when a motor vehicle is missing or its value of damage/loss reaches 75% off or more than its market value. While in Comprehensive coverage, compensation shall be provided if partial (or total) damage or loss happens to the insured vehicle. Besides the two, insurance companies also offer additional protection for the insured, one of them being personal accident protection. This kind of protection provides a guarantee on the safety of vehicle driver and passenger, in the form of compensation for death when a driver or passenger of the vehicle is dead.

The offers regarding coverage and protection mentioned above are usually summed up in a product illustration of motor vehicle insurance which may be presented in various forms and have several pages. For instance, a product illustration of motor vehicle sharia insurance issued by PT Asuransi Tri Pakarta (TRIPA) consists of seven pages presenting the prices of the vehicle to be covered object and the premiums to be paid annually by the insured. The product, however, is not exhaustive; new information may be added in it so that the insured would receive more detailed information regarding the scheme of premiums management. Supported by the results of interviews with a respondent from TRIPA in Bandung, which were treated as data, an alternative product illustration of TRIPA motor vehicle sharia insurance in form of a table of integration model was designed in this paper. The table provides more detailed information, consisting of vehicle prices, total premium, *tabarru*, *ujrah*, investment, insurance costs, and surplus (if any) [3] [4] [5] [6] [7] [8] [9].

2. METHOD

The product illustration of TRIPA insurance for a case study in this paper was the product illustration of motor vehicle sharia insurance for Serena branded personal vehicle type: New Serena 2.0 Highway Star A/T 2017. The illustration describes in Table 1. Table 1 shows that the initial value of the covered object (Serena branded personal vehicle: type New Serena 2.0 Highway Star A/T 2017) is IDR434,400,000 and insured for 4 years. In the first year, the net premium which must be paid by the insured is IDR5,212,800 plus administration cost of IDR31,000. If the insured also takes the personal accident protection, then the additional premium of IDR35,000 will be added, resulting in a total premium of IDR5,278,800 which must be paid. The benefits of comprehensive coverage and personal accident protection are claimed when the insured is dead. The prices of the covered object from year to year decrease while net premium to be paid will increase in the second year, higher than the one in the first year, and then it will decrease in the third and fourth years. The value of personal accident premium stays the same until the final year of the insurance policy period while the administration costs are omitted in the second, third, and fourth years. Therefore, the total premium to be paid in the second year will be IDR7,815,192, the third year IDR6,359,864, and the fourth year IDR5,908,099. The value of personal accident protection which will be claimed by the insured if he dies is IDR15,000,000. Based on the interview results with a respondent of TRIPA in Bandung, an illustration regarding the scheme of total premium management of motor vehicle sharia insurance product designed and presented in Figure 1.

Table of integration model for motor vehicle sharia insurance

Table 1. A Product Illustration of Motor Vehicle Sharia Insurance for Serena Branded Personal Vehicle: Serena Type New Serena 2.0 Highway Star A/T 2017.

Year	Details	Prices	Coverage and Protection
1	Vehicle Price	IDR434,400,000	
	Net Premium	IDR5,212,800	
	Administration Cost	IDR31,000	Comprehensive
	Personal Accident (PA) Premium	IDR35,000	PA : Death
	Total Premium	IDR5,278,800	
2	Vehicle Price	IDR369,240,000	
	Net Premium	IDR7,680,192	
	Administration Cost	–	Comprehensive
	Personal Accident (PA) Premium	IDR35,000	PA : Death
	Total Premium	IDR7,815,192	
3	Vehicle Price	IDR304,080,000	
	Net Premium	IDR6,324,864	
	Administration Cost	–	Comprehensive
	Personal Accident (PA) Premium	IDR35,000	PA : Death
	Total Premium	IDR6,359,864	
4	Vehicle Price	IDR282,360,000	
	Net Premium	IDR5,873,088	
	Administration Cost	–	Comprehensive
	Personal Accident (PA) Premium	IDR35,000	PA : Death
	Total Premium	IDR5,908,099	

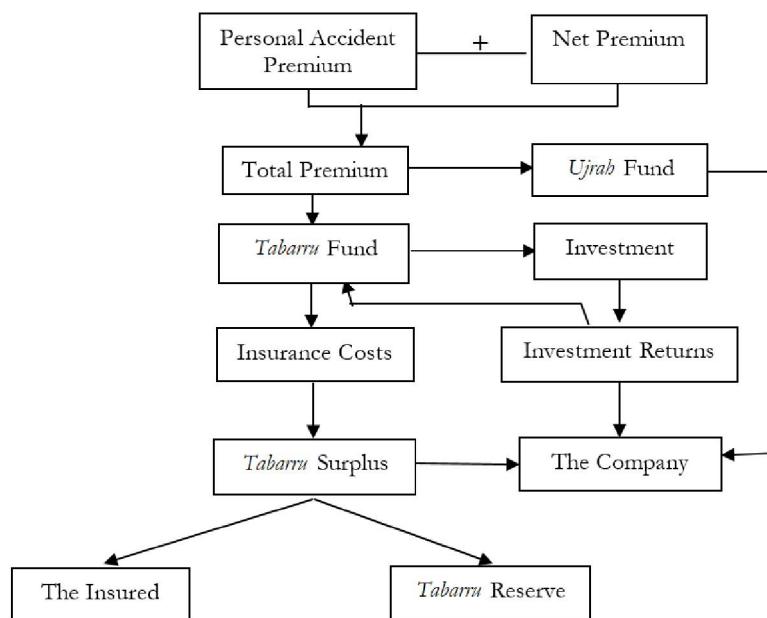


Figure 1. The Scheme of Total Premium Management of TRIPA Motor Vehicle Sharia Insurance Product.

Figure 1 explains that the total premium to be paid is the addition result of comprehensive coverage premium (the net premium) and personal accident premium. Next, the total premium divided into two accounts, namely *the tabarru* fund account, which will be used to pay insurance costs, and *the ujab* fund account, which will be used to pay the company's operational expenses. *Tabarru* fund then invested in sharia shares. Some of the investment income will be directed to the company (company returns) and others will be returned to *the tabarru* fund account (*tabarru* fund returns). The total amount of *the tabarru* fund after being reduced by the insurance costs is called the *tabarru* surplus, which later will be divided for the company, the insured and the *tabarru* reserve.

Here are the mathematical notations and calculations for the terms presented in the scheme of total premium management of TRIPA motor vehicle sharia insurance product that was developed based on the interview results:

1. Year = n
2. Total premium of nth year = P_n .
3. *Ujab* fund of nth year: $U_n = 0.4 \times P_n$. (1)
4. *Tabarru* fund of nth year: $T_n = 0.6 \times P_n$. (2)
5. Investment of nth year: $I_n = 0.6 \times P_n$. (3)
6. Investment returns of nth year: $HI_n = 0.1 \times I_n$. (4)
7. Return (for the company) of nth year: $KP_n = 0.7 \times HI_n$. (5)
8. Return (for *the tabarru* fund) of nth year: $KT_n = 0.3 \times HI_n$. (6)
9. Total of *the tabarru* in the nth year: $TL_n = (0.6 \times P_n) + 0.3(0.1 \times I_n)$. (7)
10. Insurance costs of nth year: $BK_n = 0.7 \times TL_n$. (8)
11. *Tabarru* surplus of nth year: $ST_n = TL_n - BK_n$. (9)
12. *The tabarru* surplus in the nth year (for the insured): $ST_t = 0.3 \times ST_n$. (10)
13. *The tabarru* surplus in the nth year (for the company): $ST_p = 0.675 \times ST_n$. (11)
14. *The tabarru* surplus in the nth year (for the *tabarru* reserve): $ST_c = 0.025 \times ST_n$. (12)

Next, to design a more complete table of integration model, a partition of the personal accident protection were performed for expanding protection that could be provided to the insured. The personal accident protection divided into three types of protection: medication cost, physical disability, and death [5] [9].

Table 2. Partitioning The Personal Accident Protection.

Types of Protection	Medication Cost (2x)	Physical Disability (9x)	Death (9x)
The Ratio of Vehicle User (20x)	2x = 5 people	9x = 5 people	9x = 5 people
Personal Accident Premium IDR35,000	10 (1750) = IDR3,500	45 (1750) = IDR15,750	45 (1750) = IDR15,750

Table 2 describes that the protection is expanded to include five people who use same personal vehicle, one (1) driver and four (4) passengers. Personal accident premium of IDR35,000 is partitioned into three: IDR3,500 for medication cost, IDR15,750 for physical disability and IDR15,750 for death. Next, the amount of personal accident protection which is IDR15,000,000 is partitioned into

1. Medication cost = $2x = 2$ (IDR750,000) = IDR1,500,000
2. Physical disability = $9x = 9$ (IDR750,000) = IDR6,750,000
3. Death = $9x = 9$ (IDR750,000) = IDR6,750,000

where x value = IDR750,000 (per unit).

3. RESULTS AND DISCUSSION

The total premiums of the first year until the fourth year on Table 1 are entered into the mathematical calculation in equation (1) – (12) resulting a table of integration model for TRIPA motor vehicle sharia insurance.

Table 3. Table of Integration Model for TRIPA Motor Vehicle Sharia Insurance.

Year (n)	Vehicle Price	Total Premium (P _n)	Tabarru (T _n)	Ujroh (U _n)	Investment (I _n)	Investment Return (HI _n)	Investment Return	
							The Company (KP _n)	Tabarru (KT _n)
	1	2	3	4	5	6	7	8
1	434,400,000	5,278,800	3,167,280	2,111,520	3,167,280	316,728	221,710	95,018
2	369,240,000	7,815,192	4,689,115	3,126,077	4,689,115	468,912	328,238	140,674
3	304,080,000	6,359,864	3,815,918	2,543,946	3,815,918	381,592	267,114	114,478
4	282,360,000	5,908,088	3,544,853	2,363,235	3,544,853	354,485	248,120	106,346

Table 3. Continued.

Total Tabarru (TL _n)	Insurance Cost (BK _n)	Tabarru Surplus (ST _n)	Tabarru Surplus			Medication Cost	Physical Disability	Death
			The Insured (ST _i)	The Company (ST _p)	Tabarru Reserve (ST _r)			
9	10	11	12	13	14	15	16	17
3,262,298	2,283,609	978,689	293,607	660,615	24,467	1,500,000	6,750,000	6,750,000
4,829,789	3,380,852	1,448,937	434,681	938,032	36,223	1,500,000	6,750,000	6,750,000
3,651,199	2,555,839	1,095,360	328,608	739,368	27,384	1,500,000	6,750,000	6,750,000
2,555,839	1,789,087	766,752	230,026	517,558	19,169	1,500,000	6,750,000	6,750,000

The total premium of the first year, P_1 , is IDR5,278,800 is entered into the mathematical calculation equation (1) to (3), obtained *Tabarru* T_1 (column 3), *Ujroh* U_1 (column 4), and *Investment* I_1 (column 5) in Table 3, while the

results of column 6 to column 12 are obtained from columns 3, 4 and 5. In the same way, for the second, third, and fourth years.

Acknowledgment

We thank Mathematics Department and thankful for the people who have helped us directly or indirectly so that this paper could be well finished.

REFERENCES

- [1] M. S. Sula, Asuransi Syariah (Life and General) Konsep dan Sistem Operasional, Jakarta: Gema Insani, 2004.
- [2] P. L. Ghazali, W. Ahmad and M. Mamat, Comparison of Mathematical Formulation in Insurance and Takaful, Malaysia: Penerbit UNISZA, 2015.
- [3] P. L. Ghazali, I. Mohd, W. M. A. Ahmad and M. Mamat, "Integration model in premium life table of family takaful," *J. App. Sci.*, vol. 8, no. 8, pp. 3763-76, 2012.
- [4] N. N. Z. A. Azhar, P. L. Ghazali, M. Mamat, Y. Abdullah, S. Mahmud, S. Lambak, Z. Sulong, N. H. M. Foziah and A. Z. A. Latif, "Acceptance of integrated modification model of auto takaful insurance in Malaysia," *Far East J. Math. Sci.*, vol. 101, no. 8, pp. 1771-84, 2017.
- [5] R. Cahyandari, R. L. Ariany and Sukono, "Optimization of hybrid model on hajj Travel," in *IOP Conf. Ser.: Mat. Sci. Eng.* 332 012042, 2018.
- [6] R. Cahyandari, R. L. Ariany, Sukono and Y. S. Perkasa, "The hybrid model algorithm on sharia insurance," in *IOP Conf. Ser.: J. Phy.* 1090 012080, 2018.
- [7] P. L. Ghazali, I. Mohd, W. M. A. Ahmad and M. Mamat, "Implementation of integration model for all," *J. App. Sci. Res.*, vol. 8, no. 3, pp. 1802-12, 2012.
- [8] P. L. Ghazali, P. P. S. Abdul Ghani, M. Mamat, Z. Salleh and S. A. Ismail, "Integration model in auto takaful insurance," *Far East J. Math. Sci.*, vol. 98, no. 5, pp. 599-611, 2015.
- [9] P. L. Ghazali, N. M. Abu Bakar, I. M. Tahir, M. Haron, W. Z. Wan Ismail and M. Mamat, "Optimization of integration model in family takaful," *App. Math. Sci.*, vol. 9, no. 39, pp. 1899-1909, 2015.