



Gambar 1 : Kerangka Konseptual

Tabel 1 Indikator Variabel

NO	Variabel	Indikator	Sumber
1	<i>Black litterman</i> (X1)	<i>Expected return</i> Black Litterman: $\mu_{BL} = \pi + (\tau \Sigma) P' (\Omega + P \tau \Sigma P')^{-1} (Q - P \pi)$	[27]
2	APT (<i>Arbitrage Pricing Theory</i>) (X1)	<i>Return aktual</i> : $R_i = E(R_i) + b_{i1} + f_1 + b_{i2} + f_2 + \dots + b_{ik} + f_k + e_i$	[28]
3	Portofolio Optimal (Y)	Nilai optimal	[10]

Tabel 1 Tingkat *Actual Return* Saham.

No	Kode	Nama Perusahaan	Σrit
1	AA	Alcoa Corporation	1.992424
2	MO	Altria Group Inc	0.098594
3	AXP	American Express Company	0.631319
4	AIG	American International Group Inc	0.616001
5	BA	The Boeing Company	-0.17221
6	CAT	Caterpillar	0.691727
7	C	Citigroup Inc	0.202176
8	COKE	Coca Cola Consolidated Inc	1.604429
9	DD	Dupont de Nemours Inc	0.391045
10	XOM	Exxon Mobil	0.414254
11	GE	Ge Electric Company	0.548458
12	GM	General Motor Company	0.617068
13	HON	Honeywell International Inc	0.501671
14	HPQ	Hp Inc	0.704214
15	IBM	Ibm	0.217772
16	INTC	Intel	0.28804
17	JNJ	Johnson	0.404365
18	MCD	Mcdonald's CORPORATION	0.520256
19	PG	P&G	0.641248
20	PFE	Pfizer Inc	0.493538
21	DIS	The Walt Disney Company And Subsidiaries	0.567362
22	VZ	Verizon	-0.02069
23	WMT	Walmart	0.505492

Tabel 2 Tingkat Keuntungan yang Diharapkan dari Actual Return.

No	Kode	Nama Perusahaan	$\sum rit$	E(ri)
1	AA	Alcoa Corporation	1.992424	0.045582
2	MO	Altria Group Inc	0.098594	0.001414
3	AXP	American Express Company	0.631319	0.018737
4	AIG	American International Group Inc	0.616001	0.016708
5	BA	The Boeing Company	-0.17221	-0.00542
6	CAT	Caterpillar	0.691727	0.016143
7	C	Citigroup Inc	0.202176	0.004638
8	COKE	Coca Cola Consolidated Inc	1.604429	0.043273
9	DD	Dupont de Nemours Inc	0.391045	0.006368
10	XOM	Exxon Mobil	0.414254	0.006731
11	GE	Ge Electric Company	0.548458	0.011734
12	GM	General Motor Company	0.617068	0.014737
13	HON	Honeywell International Inc	0.501671	0.012163
14	HPQ	HP Inc	0.704214	0.018871
15	IBM	IBM	0.217772	0.003425
16	INTC	INTEL	0.28804	0.004347
17	JNJ	JOHNSON	0.404365	0.008547
18	MCD	McDONALD'S CORPORATION	0.520256	0.011881
19	PG	P&G	0.641248	0.015274
20	PFE	PFIZER INC	0.493538	0.010863
21	DIS	THE WALT DISNEY COMPANY AND SUBSIDIARIES	0.567362	0.011611
22	VZ	Verizon	-0.02069	-0.00146
23	WMT	WALMART	0.505492	0.013025

Tabel 3 Tabel Harga saham indeks pasar dan suku bunga

Harga Saham Indeks Pasar	4.12
Risk Free Rate	0.3971

Sumber : Data sekunder, 2023

Tabel 4 Beta Saham Individu

No	Kode	Nama Perusahaan	Nilai Beta
			β_i
1	AA	Alcoa Corporation	2.46
2	MO	Altria Group Inc	0.692
3	AXP	American Express Company	1.21
4	AIG	American International Group Inc	1.21
5	CAT	Caterpillar	1.08
6	C	Citigroup Inc	1.55
7	COKE	Coca Cola Consolidated Inc	1.35
8	DD	Dupont de Nemours Inc	1.19
9	XOM	Exxon Mobil	1.06

10	GE	Ge Electric Company	1.2
11	GM	General Motor Company	1.49
12	HON	Honeywell International Inc	1.05
13	HPQ	HP Inc	1.05
14	IBM	Ibm	0.762
15	INTC	Intel	0.893
16	JNJ	Johnson	0.572
17	MCD	Mcdonald's CORPORATION	1.22
18	PG	P&G	0.89
19	PFE	Pfizer Inc	0.579
20	DIS	The Walt Disney Company And Subsidiaries	0.543
21	WMT	Walmart	1.02

Sumber : Data sekunder, 2023

Tabel 5 Analisis Tingkat *Expected Return*

No	Kode	Nama Perusahaan	μ <i>CAPM</i>
1	AA	Alcoa Corporation	0.055345
2	MO	Altria Group Inc	0.002739
3	AXP	American Express Company	0.017537
4	AIG	American International Group Inc	0.017111
5	CAT	Caterpillar	-0.00478
6	C	Citigroup Inc	0.019215
7	COKE	Coca Cola Consolidated Inc	0.005616
8	DD	Dupont de Nemours Inc	0.044567
9	XOM	Exxon Mobil	0.010862
10	GE	Ge Electric Company	0.011507
11	GM	General Motor Company	0.015235
12	HON	Honeywell International Inc	0.017141
13	HPQ	HP Inc	0.013935
14	IBM	Ibm	0.019562
15	INTC	Intel	0.006049
16	JNJ	Johnson	0.008001
17	MCD	Mcdonald's CORPORATION	0.011232
18	PG	P&G	0.014452
19	PFE	Pfizer Inc	0.017812
20	DIS	The Walt Disney Company And Subsidiaries	0.013709
21	WMT	Walmart	0.01576

Sumber : Data sekunder, 2023

Tabel 6 Investor Views

NO	Kode	Nama Perusahaan	Σ rit November 2021	Σ rit Desember 2021	Selisih
1	AA	Alcoa Corporation	0.073717634	0.267841801	0.194124
2	MO	Altria Group Inc	-0.002350381	0.144723525	0.147074
3	AXP	American Express Company	-0.160911309	0.197800224	0.358712
4	AIG	American International Group Inc	-0.146579286	0.104821488	0.251401
5	CAT	Caterpillar	0.014356427	0.061879939	0.047524
6	C	Citigroup Inc	-0.114970474	0.121504991	0.236475
7	COKE	Coca Cola Consolidated Inc	-0.061955375	0.014248098	0.076203
8	DD	Dupont de Nemours Inc	0.40313342	-0.336236893	0.73937
9	XOM	Exxon Mobil	0.029568328	-0.143957488	0.17353
10	GE	Ge Electric Company	0.094376509	0.21881915	0.124443
11	GM	General Motor Company	0.088901364	0.005394471	0.08351
12	HON	Honeywell International Inc	-.050067557	-0.11376396	0.0637
13	HPQ	HP Inc	0.105927296	-0.050330379	0.15626
14	IBM	IBM	-0.095460984	-0.092697308	0.002764
15	INTC	INTEL	0.162320602	-0.142090942	0.30441
16	JNJ	JOHNSON	0.042666335	-0.098786802	0.14145
17	MCD	McDONALD'S CORPORATION	0.139315381	-0.089102071	0.22842
18	PG	P&G	0.099821441	-0.128108356	0.22793
19	PFE	PFIZER INC	0.120295475	-0.150549502	-0.27084
20	DIS	THE WALT DISNEY COMPANY AND SUBSIDIARIES	0.129381475	-0.206718921	0.07734
21	WMT	WALMART	0.211902637	-0.14590194	0.3578

Sumber : Data sekunder, 2023

Tabel 6 Daftar *Expected Return Black Litterman* Periode 2019-2021:

NO	Kode	Nama Perusahaan	μ BL	Z
1	AA	Alcoa Corporation	0.0553	0.229427
2	MO	Altria Group Inc	0.0027	0.009988
3	AXP	American Express Company	0.0175	0.033099
4	AIG	American International Group Inc	0.0171	0.044494
5	CAT	Caterpillar	-0.0048	-0.00218
6	C	Citigroup Inc	0.0192	0.020678
7	COKE	Coca Cola Consolidated Inc	0.0056	0.001701
8	DD	Dupont de Nemours Inc	0.0446	0.096043
9	XOM	Exxon Mobil	0.0109	-0.00043
10	GE	Ge Electric Company	0.0115	0.058238
11	GM	General Motor Company	0.0152	0.015225
12	HON	Honeywell International Inc	0.0171	0.005936

13	HPQ	HP Inc	0.0139	0.005249
14	IBM	Ibm	0.0196	0.029446
15	INTC	Intel	0.0060	0.013481
16	JNJ	Johnson	0.0080	-0.00517
17	MCD	Mcdonald's CORPORATION	0.0112	0.006571
18	PG	P&G	0.0145	0.017046
19	PFE	Pfizer Inc	0.0178	0.011375
20	DIS	The Walt Disney Company And Subsidiaries	0.0137	0.019338
21	WMT	Walmart	0.0158	-0.01125

Sumber : Data sekunder, 2023

Tabel 7 Hasil Bentuk *Expected Return Black Litterman*:

NO	Kode	Nama Perusahaan	μ BL	Z
1	AA	Alcoa Corporation	0.0553	0.229427
2	MO	Altria Group Inc	0.0027	0.009988
3	AXP	American Express Company	0.0175	0.033099
4	AIG	American International Group Inc	0.0171	0.044494
5	C	Citigroup Inc	0.0192	0.020678
6	COKE	Coca Cola Consolidated Inc	0.0056	0.001701
7	DD	Dupont de Nemours Inc	0.0446	0.096043
8	GE	Ge Electric Company	0.0115	0.058238
9	GM	General Motor Company	0.0152	0.015225
10	HON	Honeywell International Inc	0.0171	0.005936
11	HPQ	HP Inc	0.0139	0.005249
12	IBM	Ibm	0.0196	0.029446
13	INTC	Intel	0.0060	0.013481
14	MCD	Mcdonald's CORPORATION	0.0112	0.006571
15	PG	P&G	0.0145	0.017046
16	PFE	Pfizer Inc	0.0178	0.011375
17	DIS	The Walt Disney Company And Subsidiaries	0.0137	0.019338

Sumber : Data sekunder, 2023

Tabel 8 Perbandingan nilai return saham optimal Black Litterman

NO	Kode	Nama Perusahaan	Return Pengembalian E(rp)	Risiko Portofolio	Penilaian
1	AA	Alcoa Corporation	1.9894323	3.93	Tidak Optimal
2	MO	Altria Group Inc	0.5505708	0.31	Optimal
3	AXP	American Express Company	0.9756173	0.94	Optimal
4	AIG	American International Group Inc	0.9740062	0.94	Optimal
5	C	Citigroup Inc	1.2435176	1.54	Optimal

6	COKE	Coca Cola Consolidated Inc	1.0755824	1.17	Tidak Optimal
7	DD	Dupont de Nemours Inc	0.9792185	0.91	Optimal
8	GE	Ge Electric Company	0.9581447	0.92	Optimal
9	GM	General Motor Company	1.1923766	1.42	Tidak Optimal
10	HON	Honeywell International Inc	0.8454008	0.71	Optimal
11	HPQ	HP Inc	0.8433577	0.71	Optimal
12	IBM	Ibm	0.6200115	0.37	Optimal
13	INTC	Intel	0.7117617	0.51	Optimal
14	MCD	McDonald's CORPORATION	0.9754666	0.95	Optimal
15	PG	P&G	0.7160936	0.51	Optimal
16	PFE	Pfizer Inc	0.4718533	0.21	Optimal
17	DIS	The Walt Disney Company And Subsidiaries	0.4397674	0.19	Optimal

Sumber : Data sekunder, 2023

Tabel 9 Penilaian Rata-Rata Tertimbang

NO	Kode	Nama Perusahaan	Wb	μ BL	Penilaian
1	MO	Altria Group Inc	0.1%	0.002738731	Optimal
2	AXP	American Express Company	0.7%	0.017536645	Optimal
3	AIG	American International Group Inc	0.7%	0.017111143	Optimal
4	C	Citigroup Inc	0.8%	0.019214629	Optimal
5	DD	Dupont de Nemours Inc	1.8%	0.044567463	Optimal
6	GE	Ge Electric Company	39.0%	0.9581447	Optimal
7	HON	Honeywell International Inc	0.7%	0.017140766	Optimal
8	HPQ	HP Inc	34.3%	0.8433577	Optimal
9	IBM	IBM	0.8%	0.0195615	Optimal
10	INTC	INTEL	0.2%	0.006049228	Optimal
11	MCD	McDONALD'S CORPORATION	0.5%	0.011232351	Optimal
12	PG	P&G	0.6%	0.014451546	Optimal
13	PFE	PFIZER INC	19.2%	0.4718533	Optimal
14	DIS	THE WALT DISNEY COMPANY AND SUBSIDIARIES	0.6%	0.0137094	Optimal

Sumber : Data sekunder, 2023

Tabel 10 Hasil Perhitungan APT (*Arbitrage Pricing Theory*).

NO	Kode	Nama Perusahaan	E(Ri)	fk	bik	Error	APT (<i>Arbitrage Pricing Theory</i>)
1	AA	Alcoa Corporation	0.112743	0.001440	1.937079	-3.79	-1.735317415
2	MO	Altria Group Inc	0.566918	0.000007	0.095856	-0.30	0.360887875
3	AXP	American Express Company	0.303605	0.000174	0.613783	-0.92	-0.005460513
4	AIG	American International Group Inc	0.302126	0.000208	0.59889	-0.92	-0.021797274
5	CAT	Caterpillar	0.373393	0.000004	-0.16743	-0.74	-0.529372456
6	C	Citigroup Inc	0.241333	0.000073	0.672512	-1.51	-0.600704634

7	COKE	Coca Cola Consolidated Inc	0.290288	0.000002	0.19656	-1.15	-0.662120263
8	DD	Dupont de Nemours Inc	0.271179	0.001183	1.559861	-0.89	0.939462704
9	XOM	Exxon Mobil	0.36875	-0.000001	0.380183	-0.71	0.04057409
10	GE	Ge Electric Company	0.308979	0.000111	0.402747	-0.91	-0.195990869
11	GM	General Motor Company	0.255214	0.000041	0.533223	-1.40	-0.611152606
12	HON	Honeywell International Inc	0.362269	0.000028	0.599927	-0.70	0.267168448
13	HPQ	HP Inc	0.364934	0.000021	0.487736	-0.70	0.157634149
14	IBM	Ibm	0.483521	0.000247	0.684653	-0.37	0.802361694
15	INTC	Intel	0.435749	0.000018	0.211723	-0.50	0.144749069
16	JNJ	Johnson	0.689679	-0.000013	0.280039	-0.21	0.763436116
17	MCD	Mcdonald's CORPORATION	0.316677	0.000016	0.393132	-0.94	-0.228516086
18	PG	P&G	0.42642	0.000077	0.505804	-0.50	0.432932481
19	PFE	Pfizer Inc	0.652906	0.000102	0.623436	-0.21	1.065094825
20	DIS	The Walt Disney Company And Subsidiaries	0.69937	0.000131	0.479829	-0.19	0.993446359
21	WMT	Walmart	0.381623	-0.000043	0.551602	-0.66	0.277275781

Sumber : Data sekunder, 2023

Tabel 10 Hasil Perhitungan Saham Optimal APT (*Arbritage Pricing Theory*).

NO	Kode	Nama Perusahaan	Wb	APT (<i>Arbritage Pricing Theory</i>)
1	MO	Altria Group Inc	6%	0.360887875
2	DD	Dupont de Nemours Inc	15%	0.939462704
3	XOM	Exxon Mobil	1%	0.04057409
4	HON	Honeywell International Inc	4%	0.267168448
5	HPQ	HP Inc	3%	0.157634149
6	IBM	IBM	13%	0.802361694
7	INTC	INTEL	2%	0.144749069
8	JNJ	JOHNSON	12%	0.763436116
9	PG	P&G	7%	0.432932481
10	PFE	PFIZER INC	17%	1.065094825
11	DIS	THE WALT DISNEY COMPANY AND SUBSIDIARIES	16%	0.993446359
12	WMT	WALMART	4%	0.277275781

Sumber : Data sekunder, 2023

Tabel 11 Hasil Uji Paired Sampel T test.

Paired Samples Test

Paired Differences				95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean					

					Lower	Upper			
Pair 1	BL - APT	0.80401	0.98975	0.21598	0.35348	1.25454	3.723	20	0.001