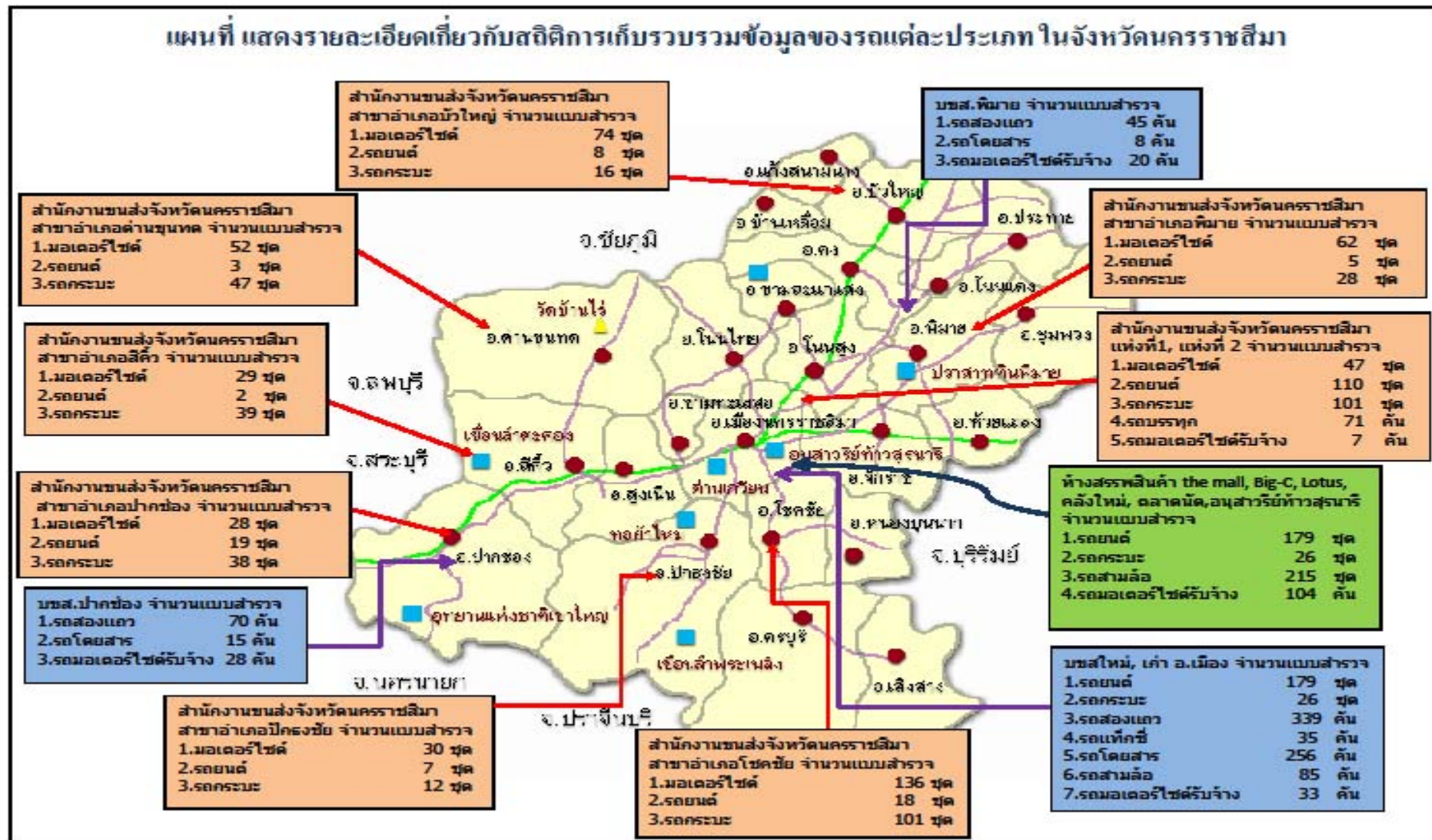


An Analysis of Vehicle Kilometers of Travel of Major Cities in Thailand

Proposed for ATRANS Research Grant

3 June 2010

Map collection data

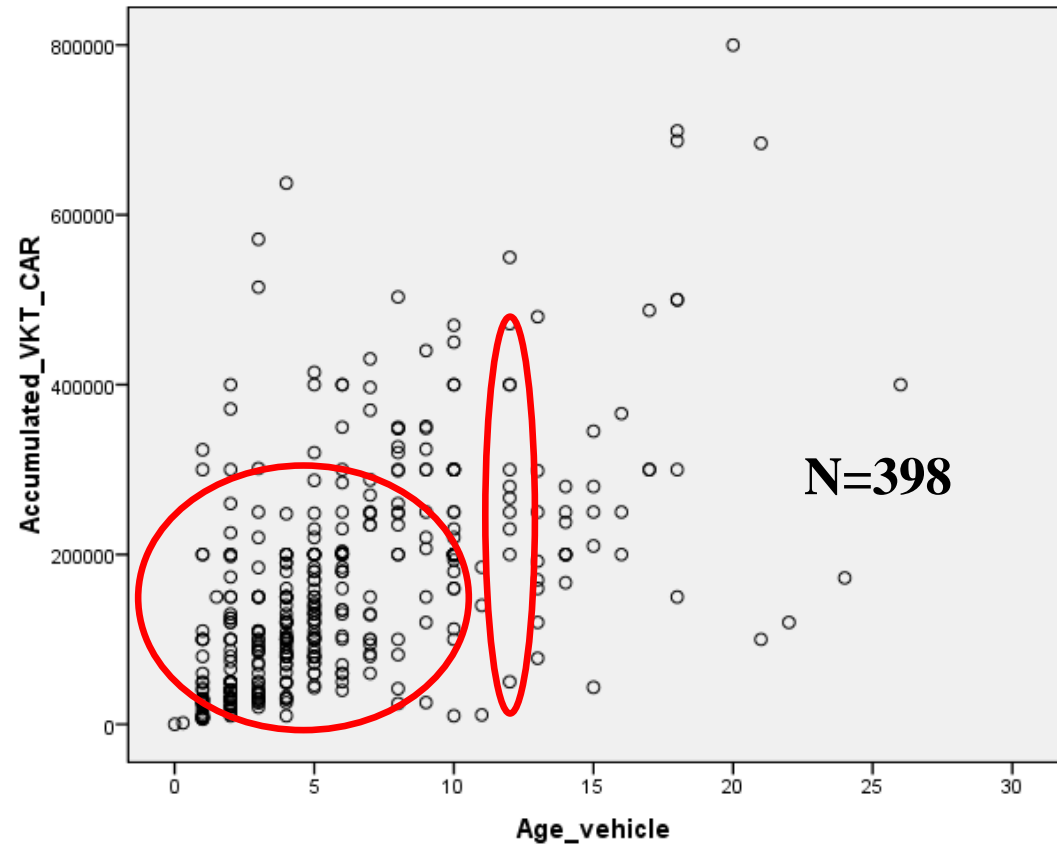


Result Regression Analysis

Independent :year

1. Sedan Not more than 7 pass.

Age vehicle	Accumulate VKT of CAR	N
1	57,120	38
2	88,151	58
3	116,145	38
4	119,037	54
5	151,853	49
6	185,902	29
7	205,164	19
8	246,507	18
9	253,034	12
10	259,714	31
12	308,956	11
total		357



1. Sedan Not more than 7 pass. (Cont'd)

Model Summary and Parameter Estimates

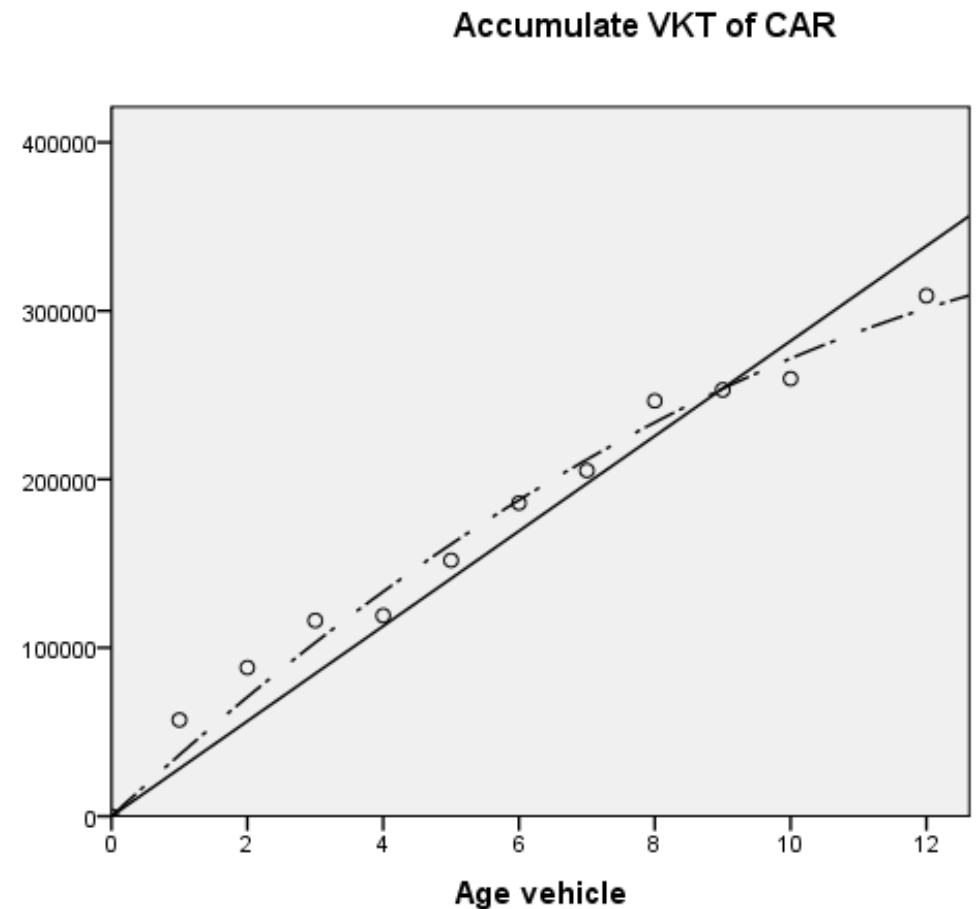
Dependent Variable: Accumulate VKT of CAR

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.988	901.458	1	11	.000	2.821E4	
Quadratic	.996	1.319E3	2	10	.000	3.741E4	-1.024E3

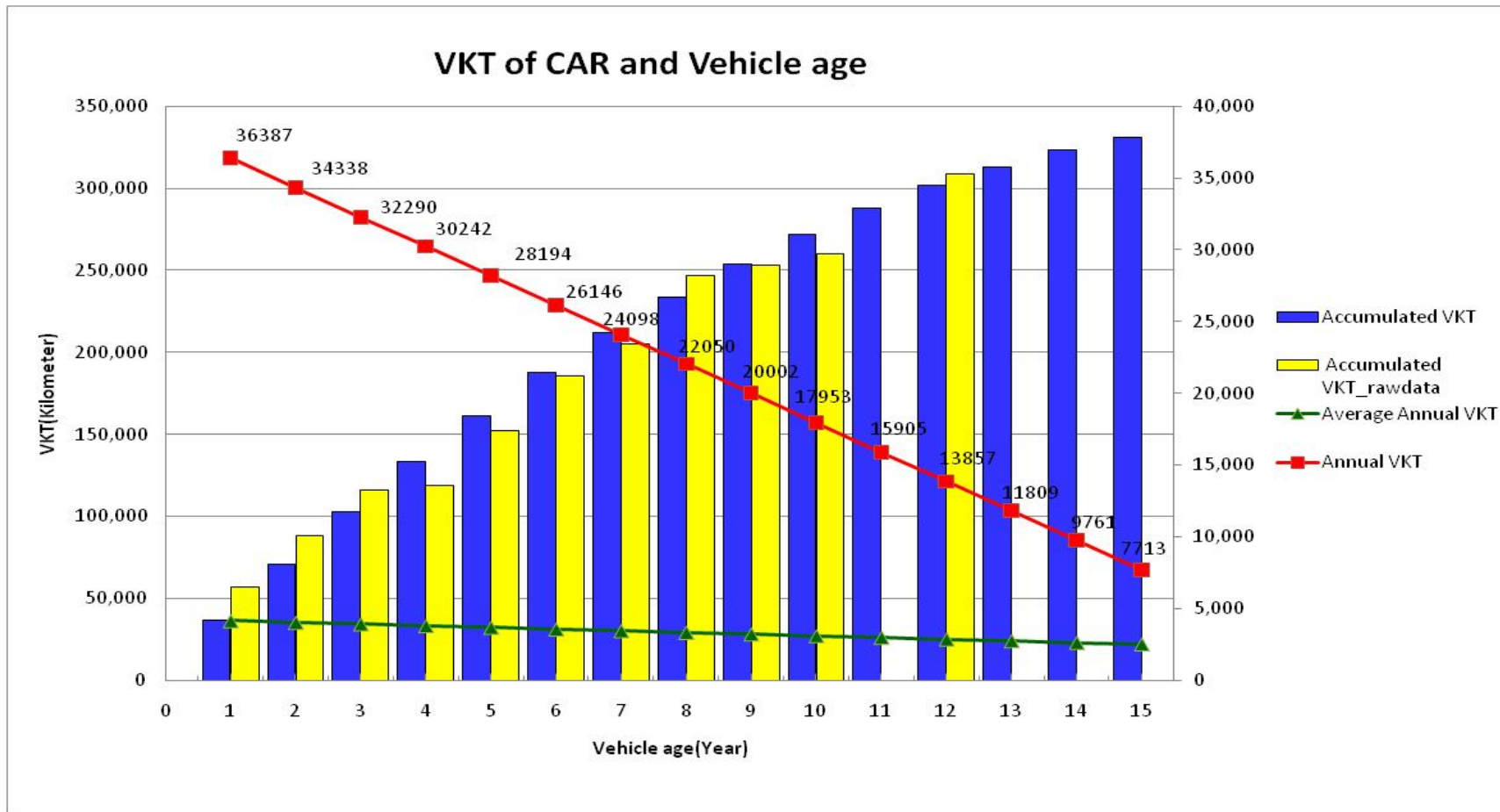
The independent variable is Age vehicle.

$$Y_{\text{Linear}} = 28,209.44x ; R^2 = 0.988$$

$$Y_{\text{Quadratic}} = 37410.57 x^2 - 1024.06 x ; R^2 = 0.996$$

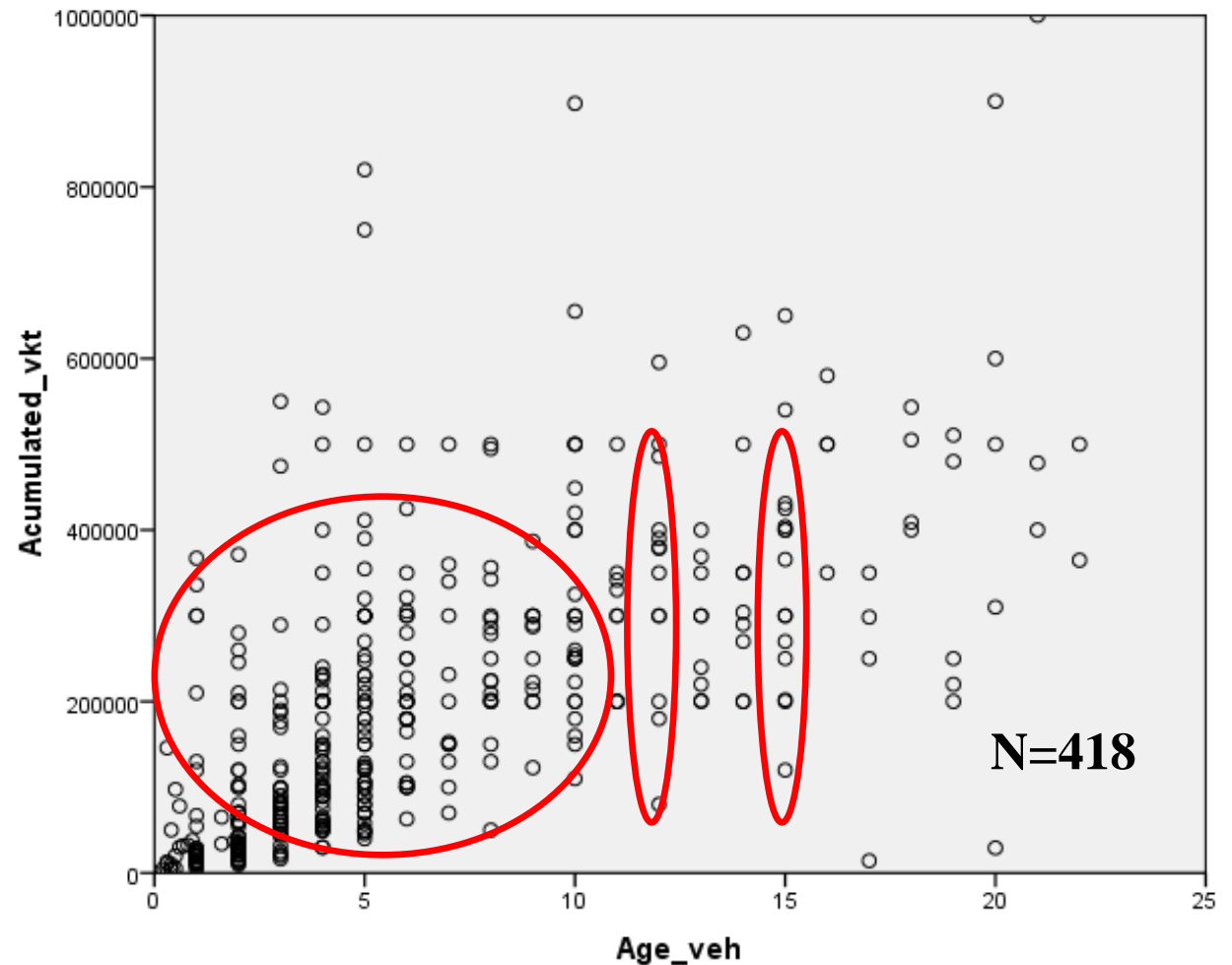


1. Sedan Not more than 7 pass. (Cont'd)



2. Van & Pick up (Cont'd)

Age vehicle	Accumulate VKT	N
1	63,436	44
2	79,378	51
3	111,626	41
4	145,504	51
5	201,247	51
6	218,041	28
7	223,683	12
8	241,405	20
9	256,083	12
10	335,500	26
12	349,209	13
15	350,501	15
Total		349



2. Van & Pick up (Cont'd)

Model Summary and Parameter Estimates

Dependent Variable: Accumulated_VKT_of_Pickup

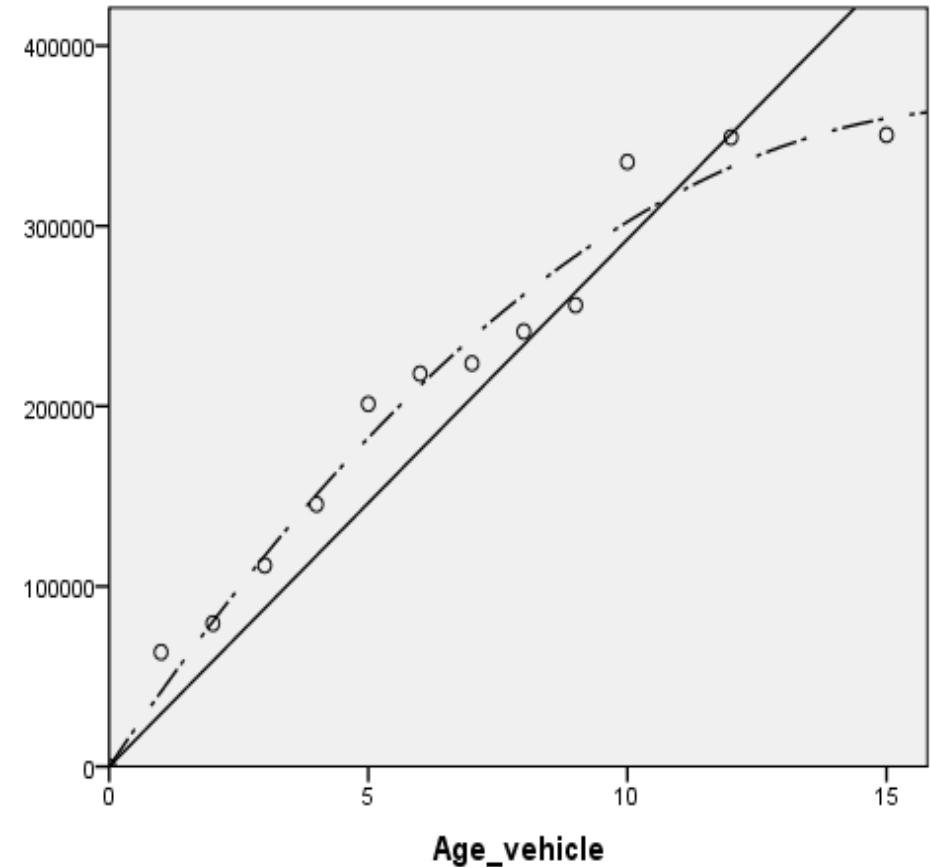
Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	B1	b2
Linear	.973	431.981	1	12	.000	2.926E4	
Quadratic	.994	965.117	2	11	.000	4.272E4	-1.249E3

The independent variable is Age_vehicle.

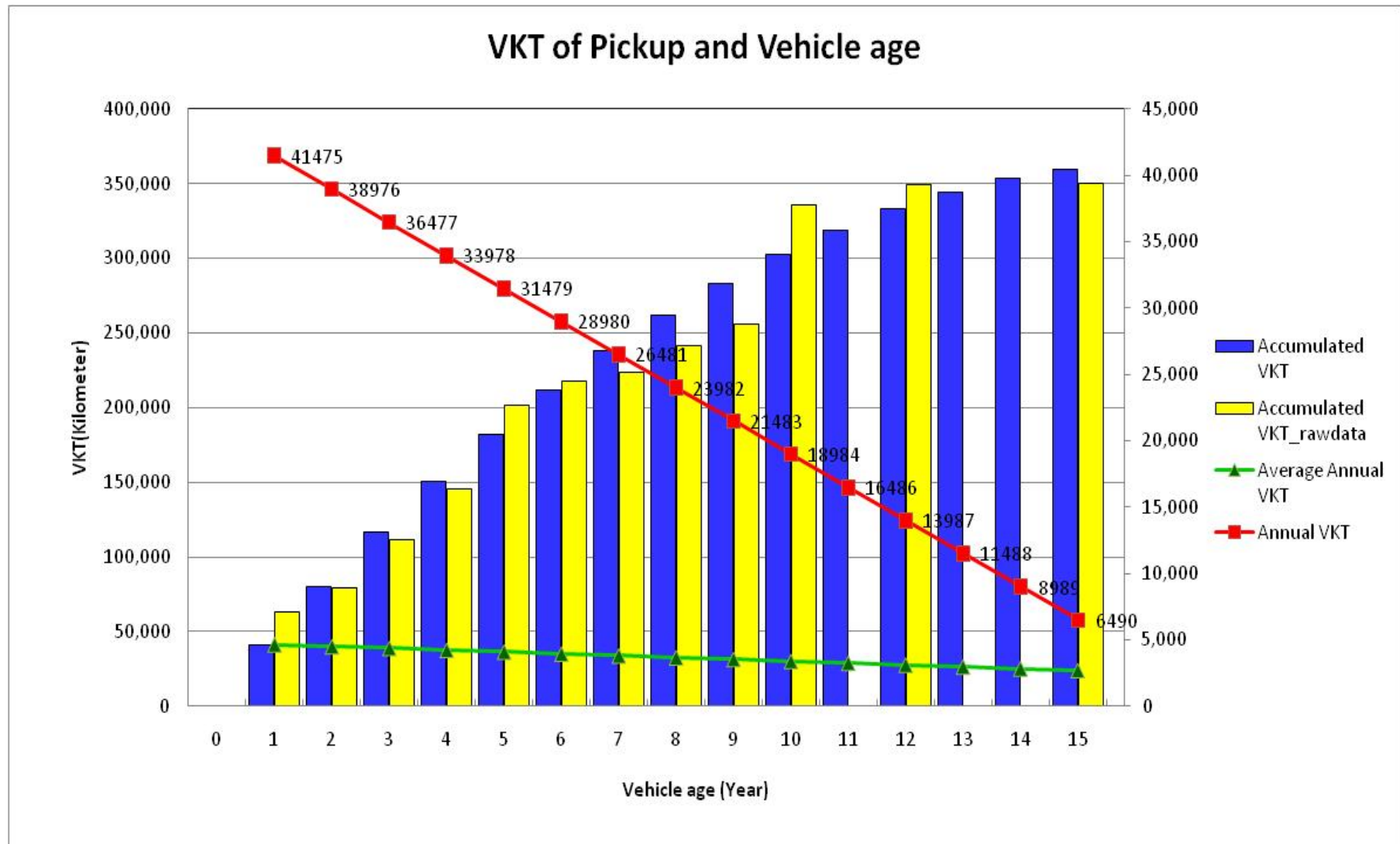
$$Y_{\text{Linear}} = 29255.10x ; R^2 = 0.973$$

$$Y_{\text{Quadratic}} = 42724.04x - 1249.45x^2 R^2 = 0.994$$

Accumulated_VKT_of_Pickup

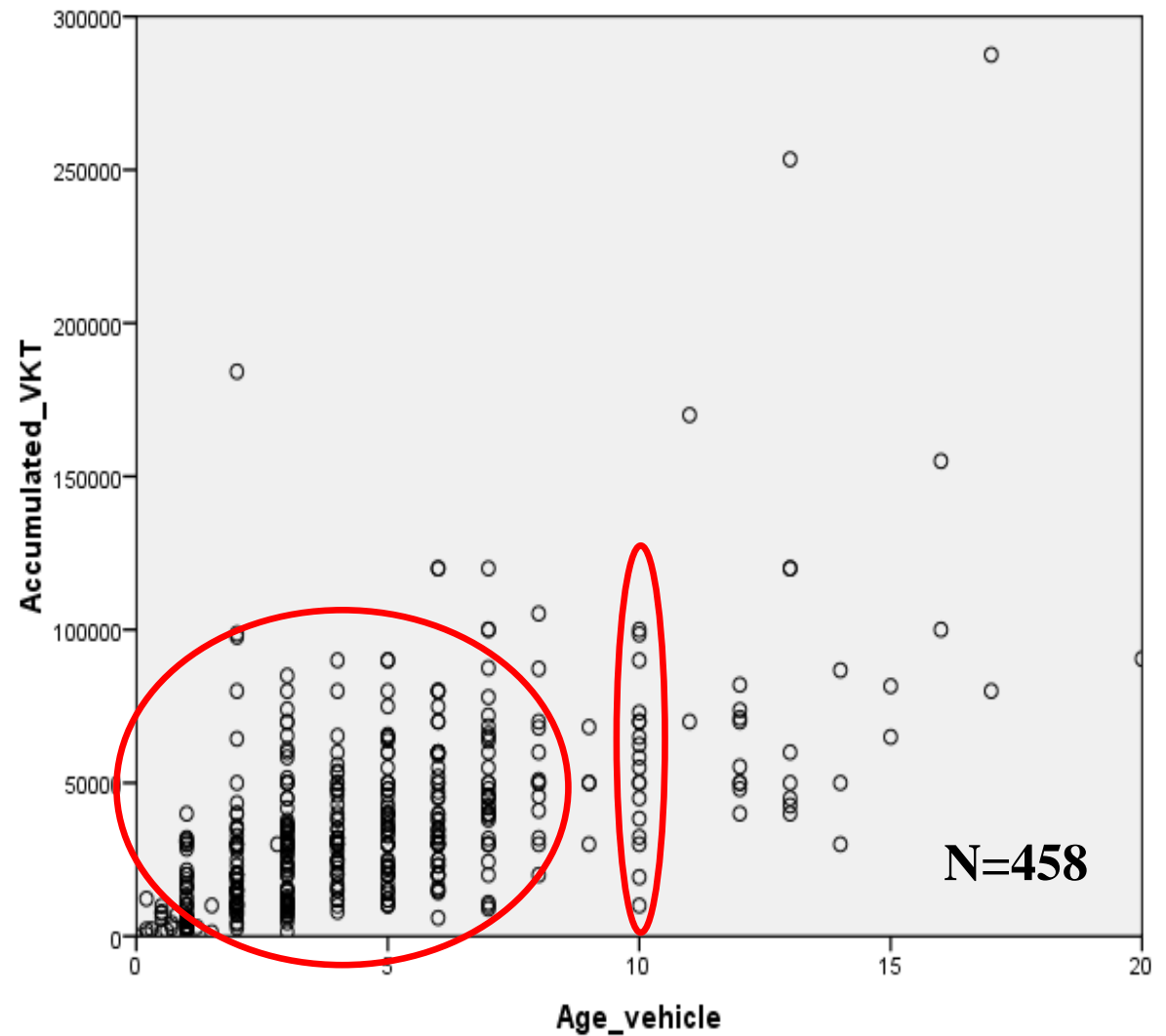


2. Van & Pick up (Cont'd)



3. Motorcycle

Age vehicle	Accumulate VKT	N
1	10,596	58
2	23,891	70
3	29,271	73
4	34,588	47
5	37,404	56
6	43,253	49
7	49,791	35
8	54,633	13
10	56,522	18
Total		419



3. Motorcycle (Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable: Accumulated_VKT_Mc

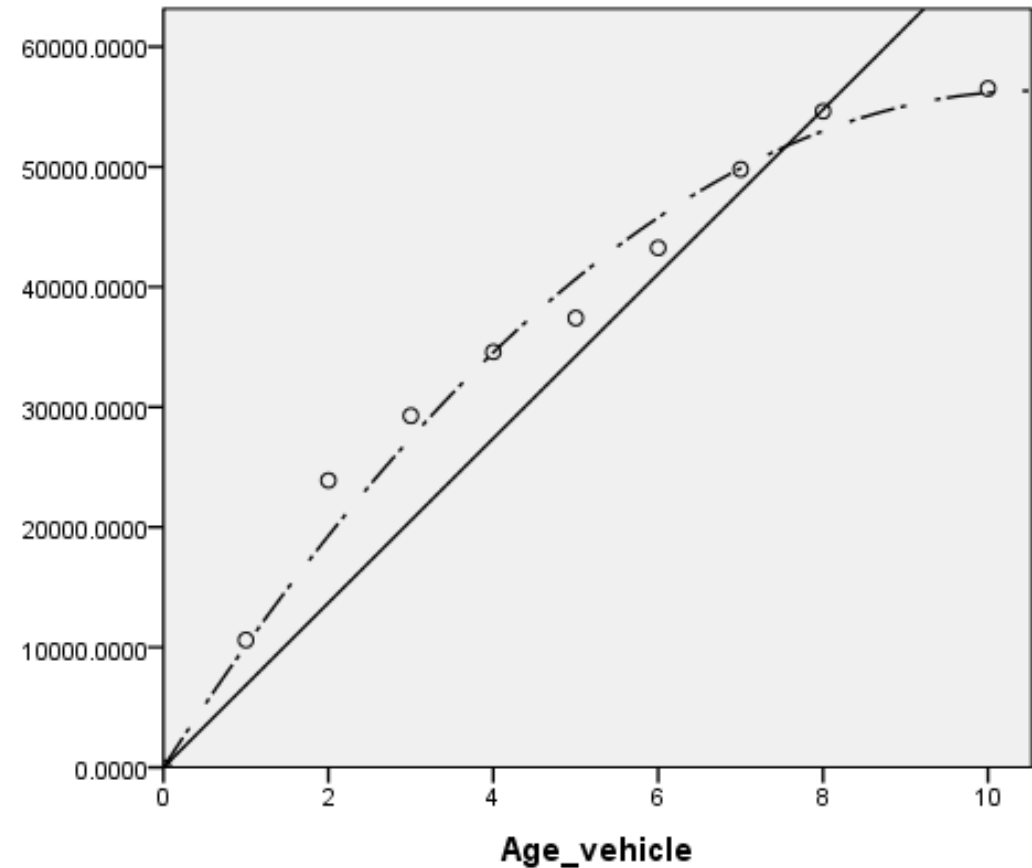
Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.972	315.205	1	9	.000	6.848E3	
Quadratic	.997	1.308E3	2	8	.000	1.065E4	-503.208

The independent variable is
Age_vehicle.

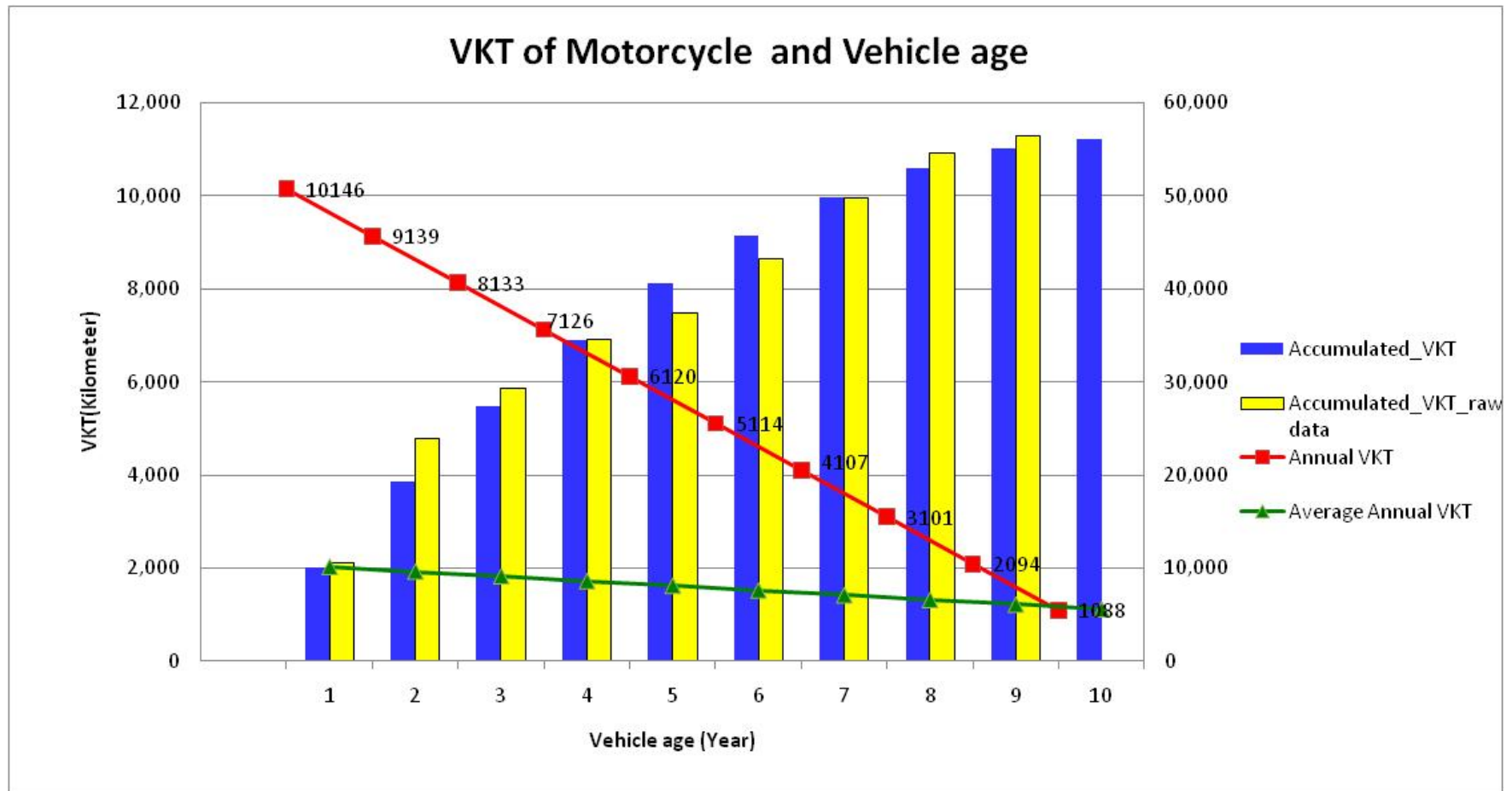
$$Y_{\text{Linear}} = 6848.34x ; R^2 = 0.972$$

$$Y_{\text{Quadratic}} = 10648.89x - 503.20x^2 ; R^2 = 0.997$$

Accumulated_VKT_Mc



3. Motorcycle (Cont'd)



4. Taxi(Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable:Accumulate_VKT_Taxi

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.981	156.281	1	3	.001	1.566E5	
Quadratic	.999	1.681E3	2	2	.001	4.747E4	6.168E4

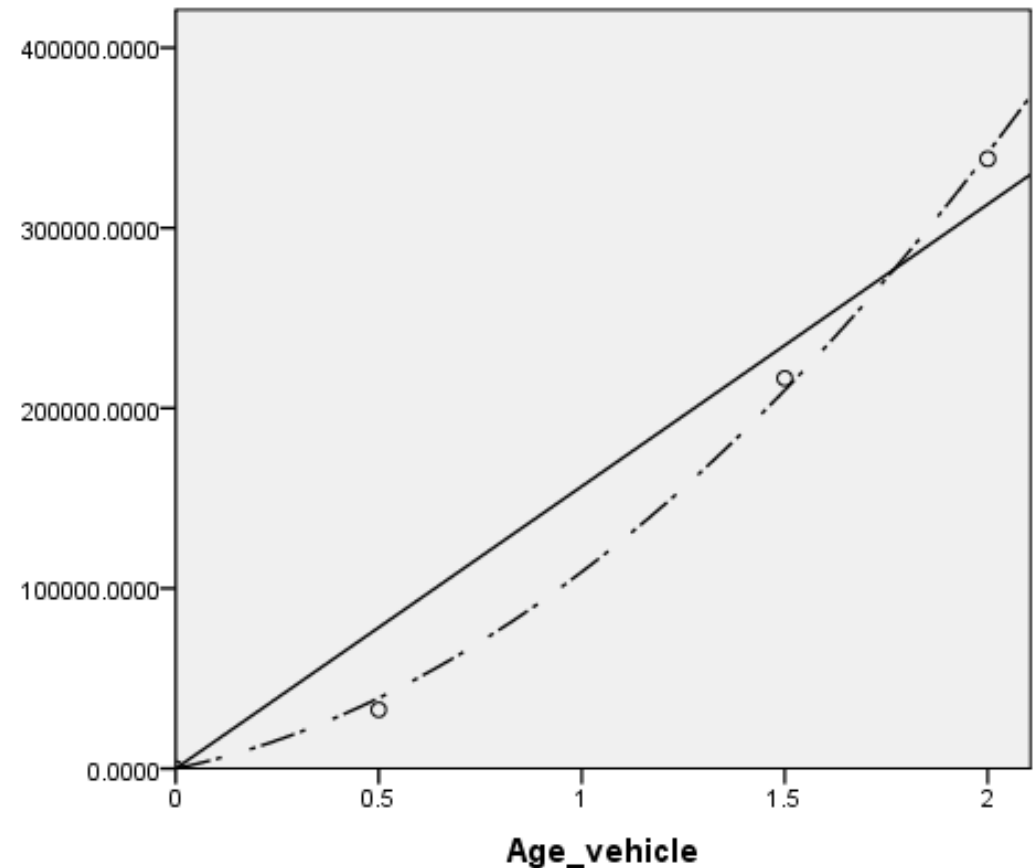
The independent variable is

Age_vehicle.

$$Y_{\text{Linear}} = 156596.64x ; R^2=0.981$$

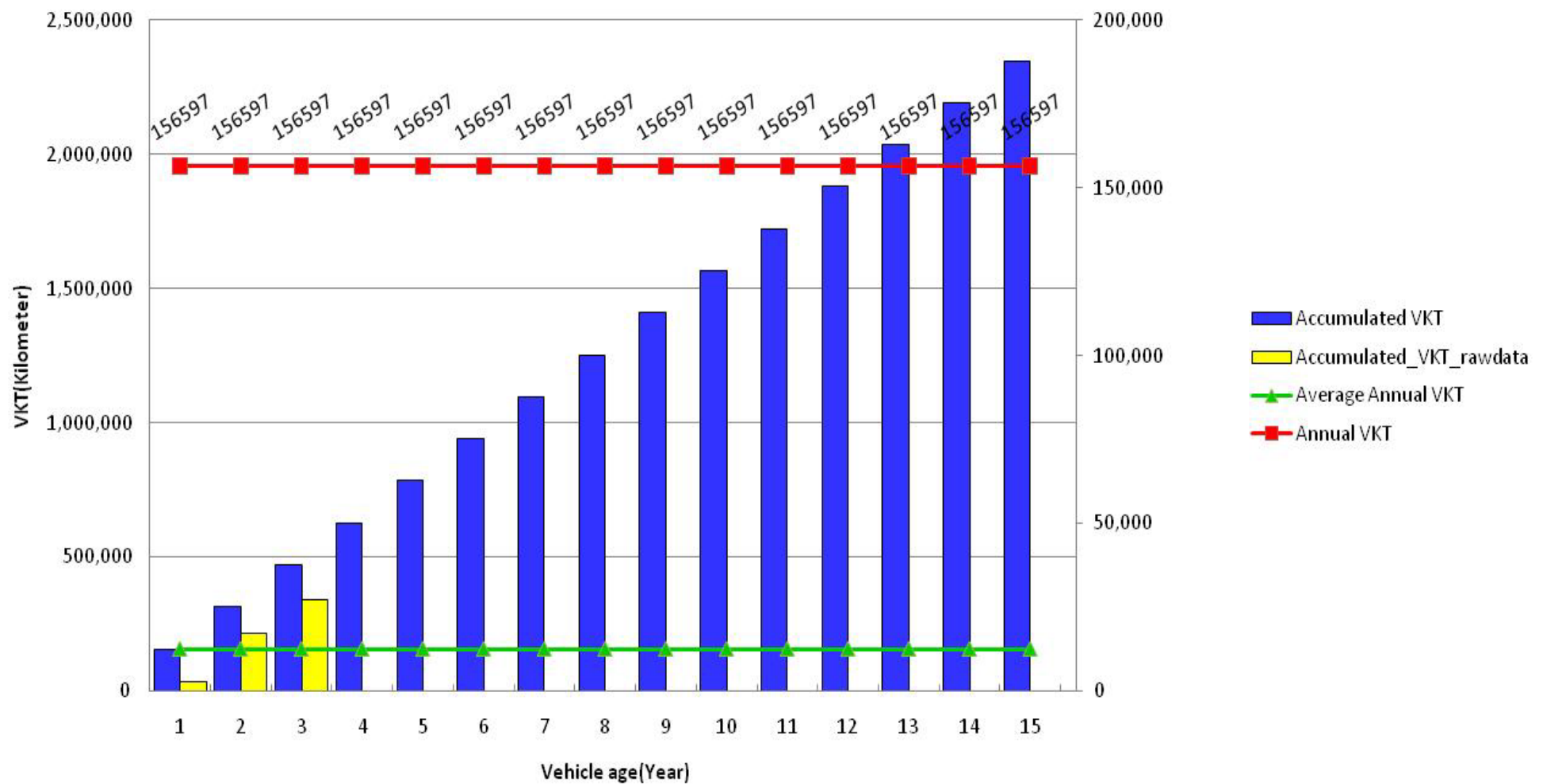
$$Y_{\text{Quadratic}} = 47467.68x + 61681.58x^2 ; R^2=0.999$$

Accumulate_VKT_Taxi



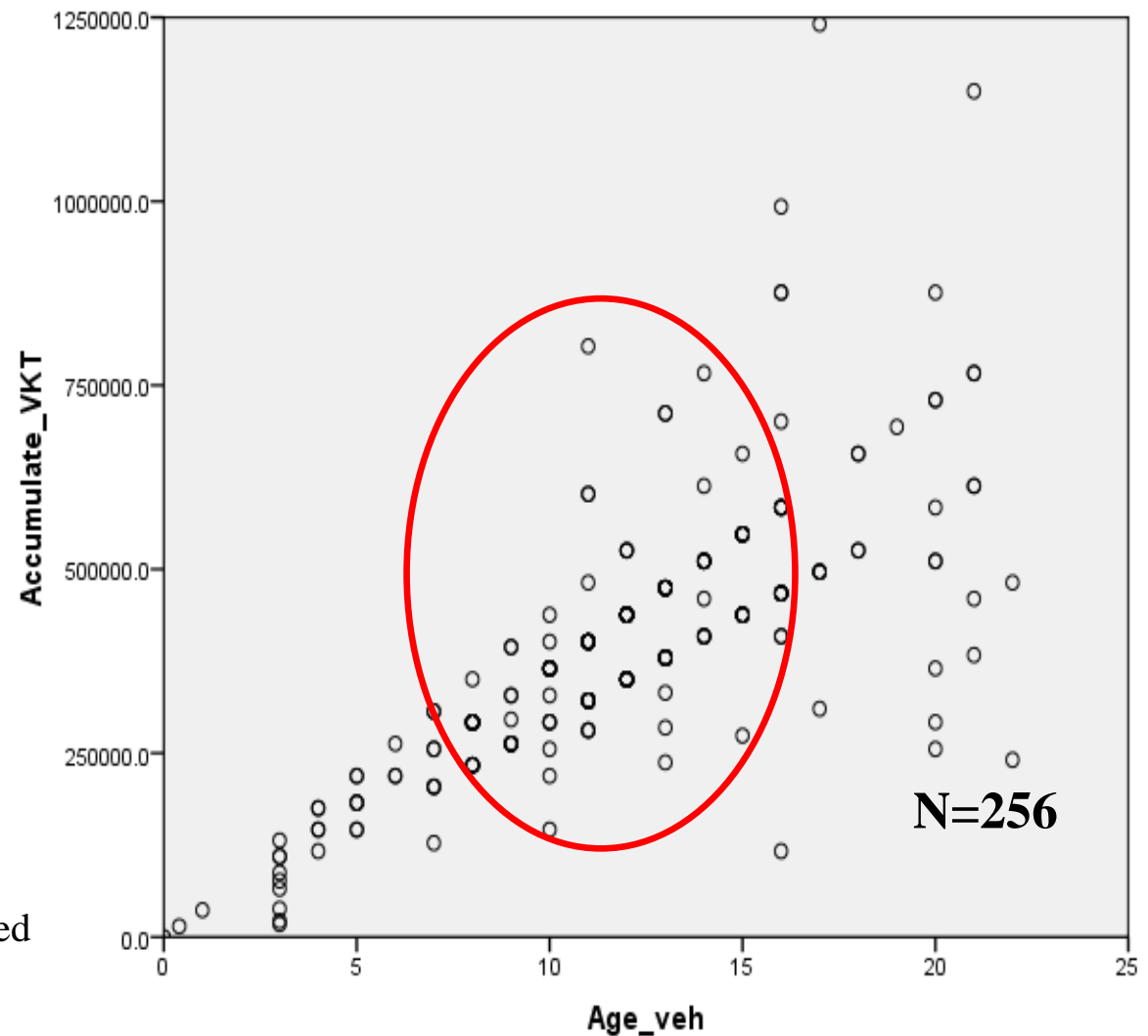
4. Taxi(Cont'd)

VKT of Taxi and Vehicle age



5. Motortricycle & Motortricycle taxi, tuk tuk

Age vehicle	Accumulated VKT	N
8	277,400.00	20
9	301,622.73	11
10	330,527.78	18
11	390,207.81	32
12	416,100.00	36
13	434,350.00	26
14	503,138.46	13
15	492,750.00	17
16	557,720.00	20
Total		173



หมายเหตุ วิธีการสำรวจลักษณะพิเศษ โดยระยะทางสะสม (Accumulated VKT)หาได้จากการประมาณการเดินทางต่อวัน

5. Motortricycle & Motortricycle taxi, tuk tuk (Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable: Accumulated_VKT_tuktuk

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.999	8.906E3	1	9	.000	3.431E4	
Quadratic	.999	3.981E3	2	8	.000	3.387E4	34.097

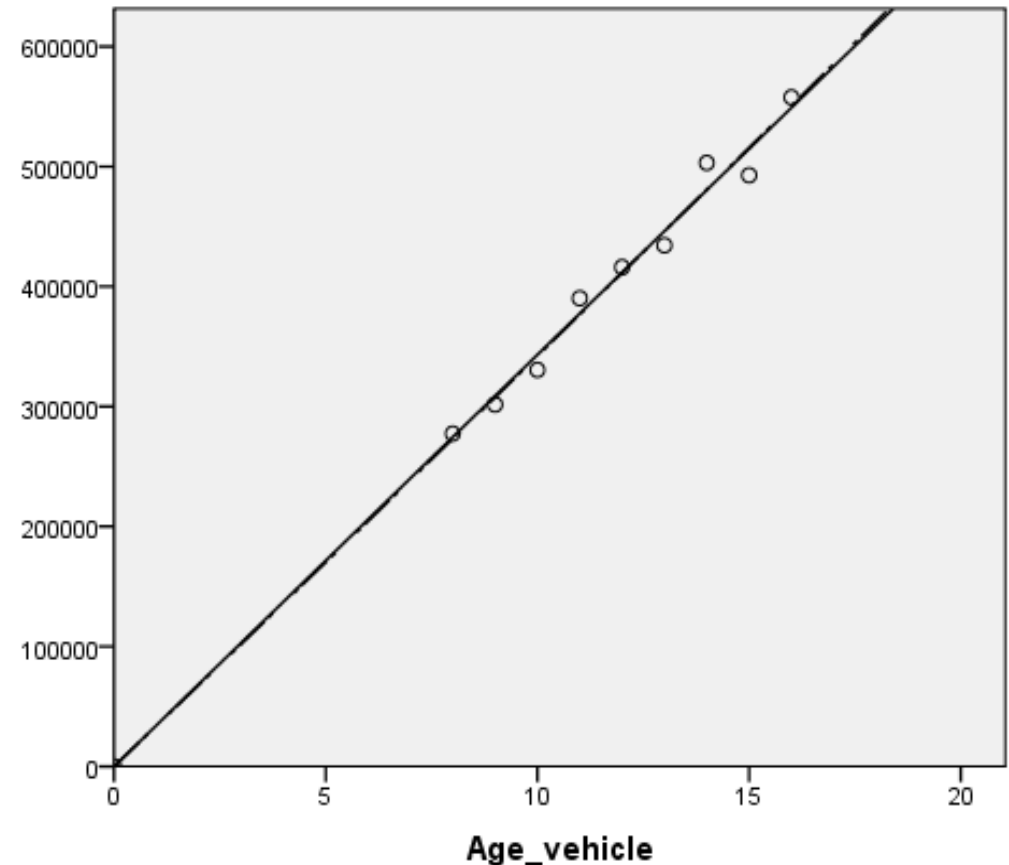
The independent variable is

Age_vehicle.

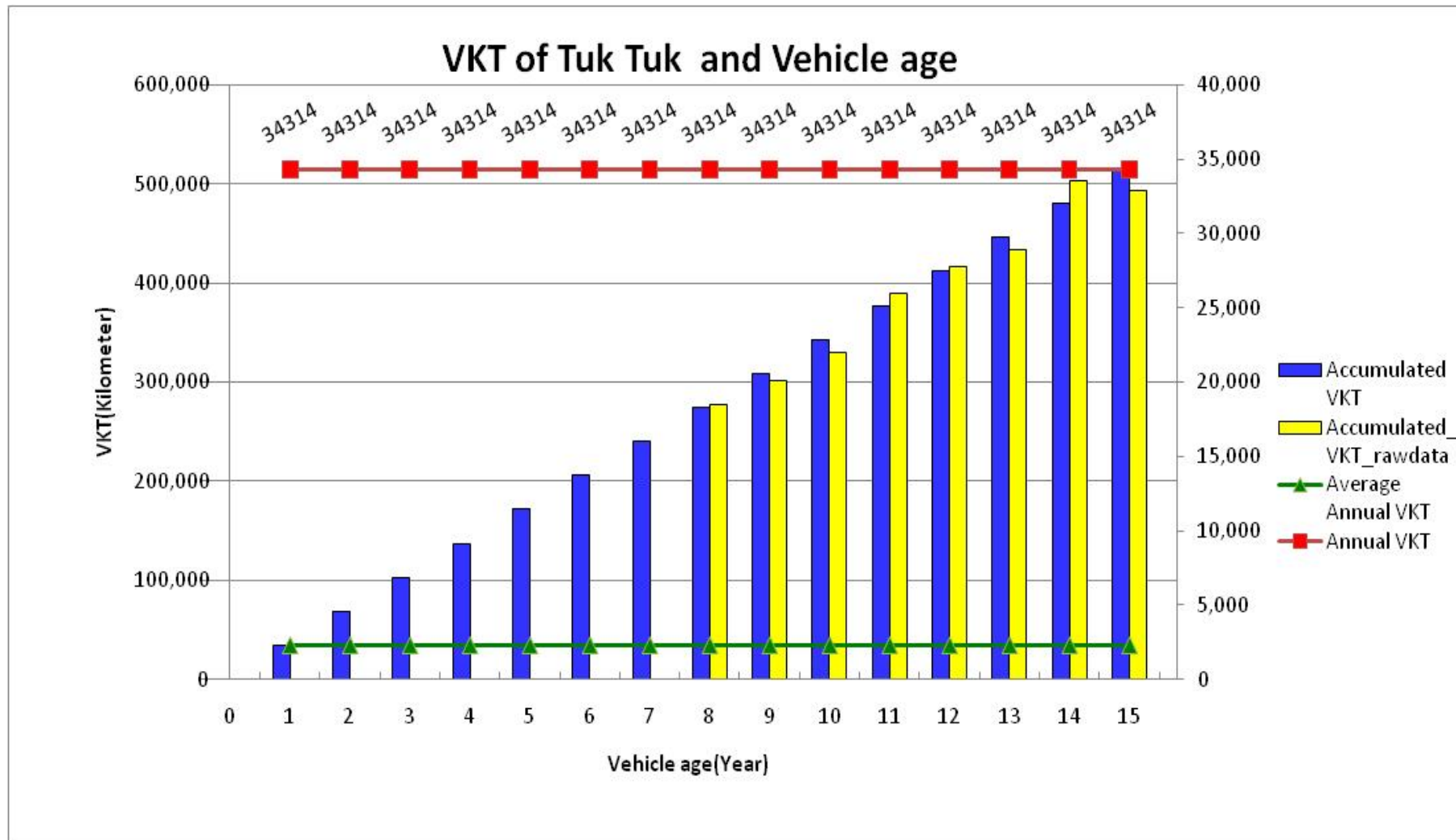
1. $Y_{\text{Linear}} = 34314.03x$; $R^2 = 0.999$

2. $Y_{\text{Quadratic}} = 33868.66x + 34.09x^2$; $R^2 = 0.999$

Accumulated_VKT_tuktuk

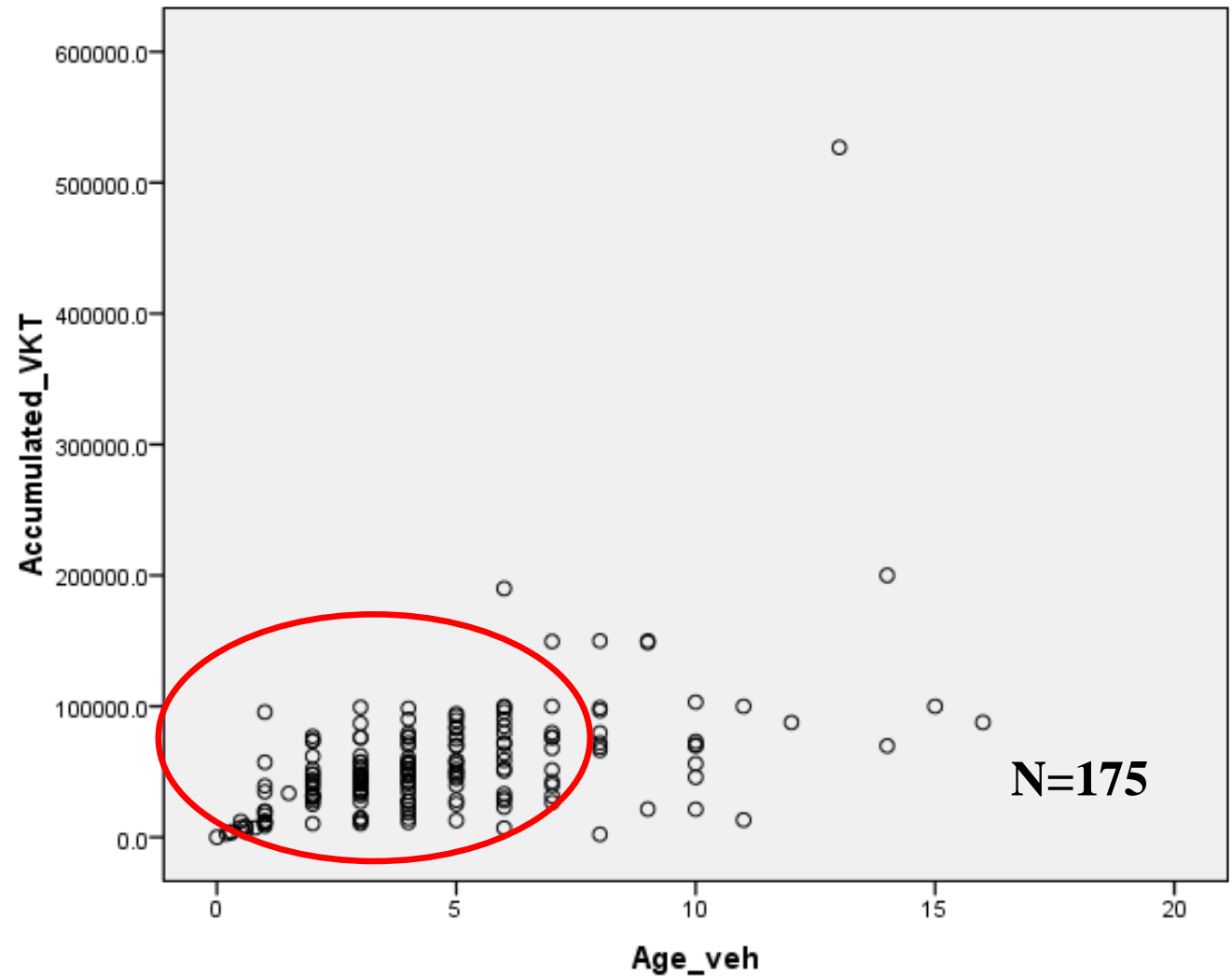


5. Motortricycle & Motortricycle taxi, tuk tuk (Cont'd)



6. Motorcycle Taxi

Age vehicle	Accumulated VKT	N
1	21941	18
2	42625	20
3	45448	31
4	49031	30
5	59831	21
6	68348	18
7	67406	11
Total		149



6. Motorcycle Taxi(Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable:Accumulated_VKT_Mctaxi

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.959	164.240	1	7	.000	1.158E4	
Quadratic	.992	390.194	2	6	.000	2.003E4	-1.509E3

The independent variable is

Age_vehicle.

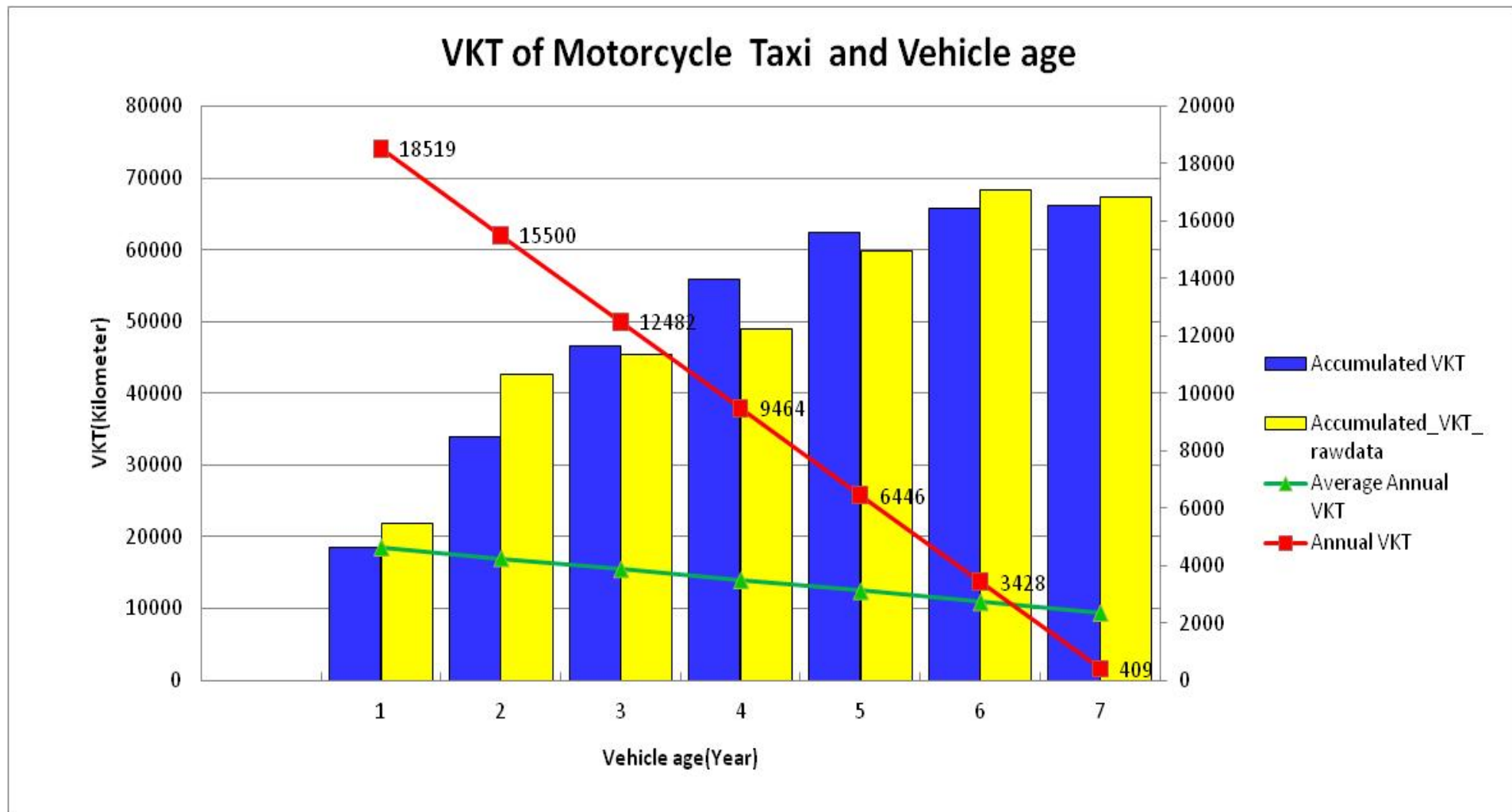
$$Y_{\text{Linear}} = 11576.73x ; R^2 = 0.959$$

$$Y_{\text{Quadratic}} = 20027.74x - 1509.10x^2 ; R^2 = 0.992$$

Accumulated_VKT_Mctaxi

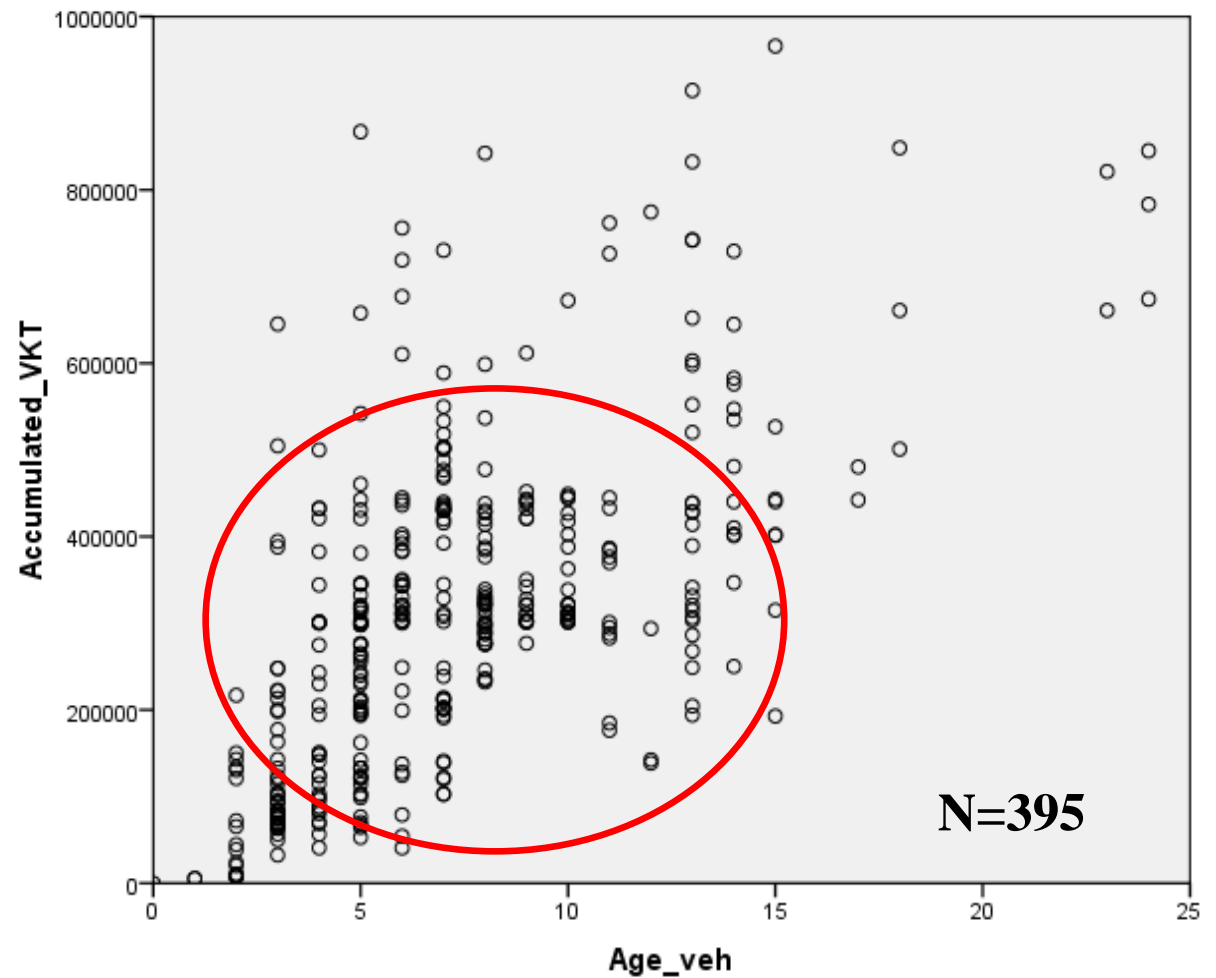


6. Motorcycle Taxi(Cont'd)



7. Microbus & Passenger Pick Up

Age vehicle	Accumulate VKT	N
2	70,740.18	17
3	149,834.76	42
4	206,303.75	32
5	256,125.41	63
6	336,186.16	37
7	349,650.49	45
8	352,434.50	40
9	368,226.38	21
10	366,953.41	22
11	386,543.14	14
13	454,436.38	26
14	488,248.85	13
Total		372



7. Microbus & Passenger Pick Up (Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable: Accumulated_VKT_Microbus

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.975	506.783	1	13	.000	3.902E4	
Quadratic	.993	810.329	2	12	.000	5.758E4	-1.744E3

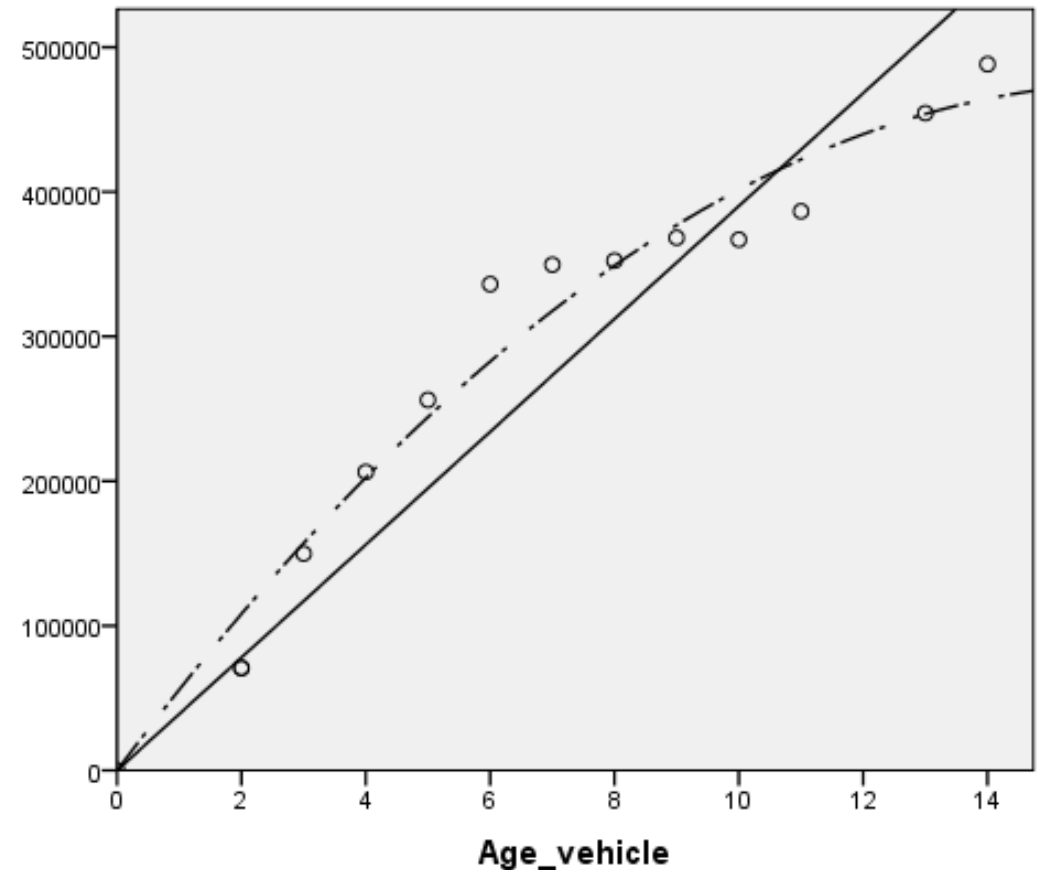
The independent variable is

Age_vehicle.

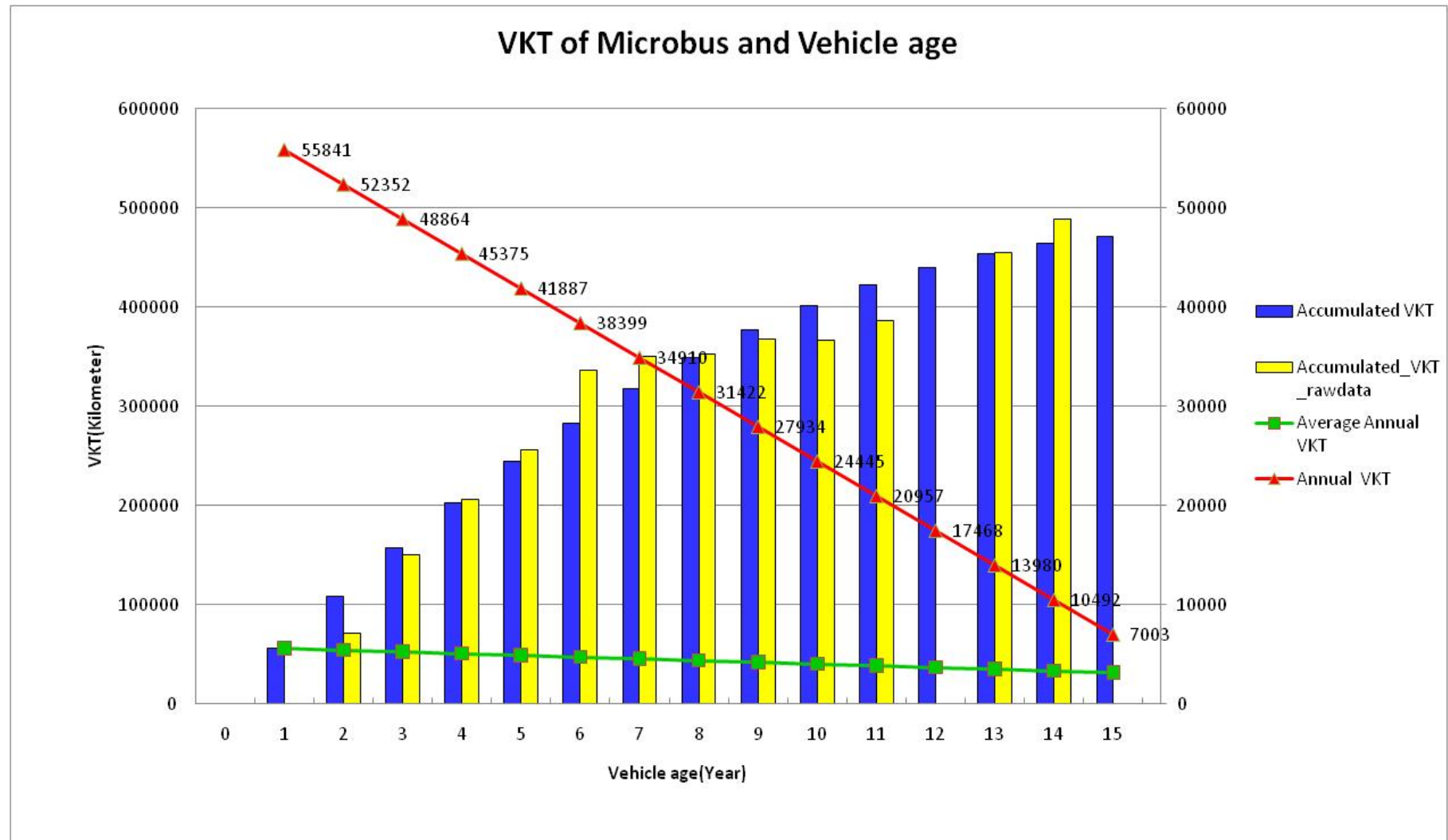
$$Y_{\text{Linear}} = 39017.34x ; R^2 = 0.975$$

$$Y_{\text{Quadratic}} = 57584.85x - 1744.19x^2 ; R^2 = 0.993$$

Accumulated_VKT_Microbus

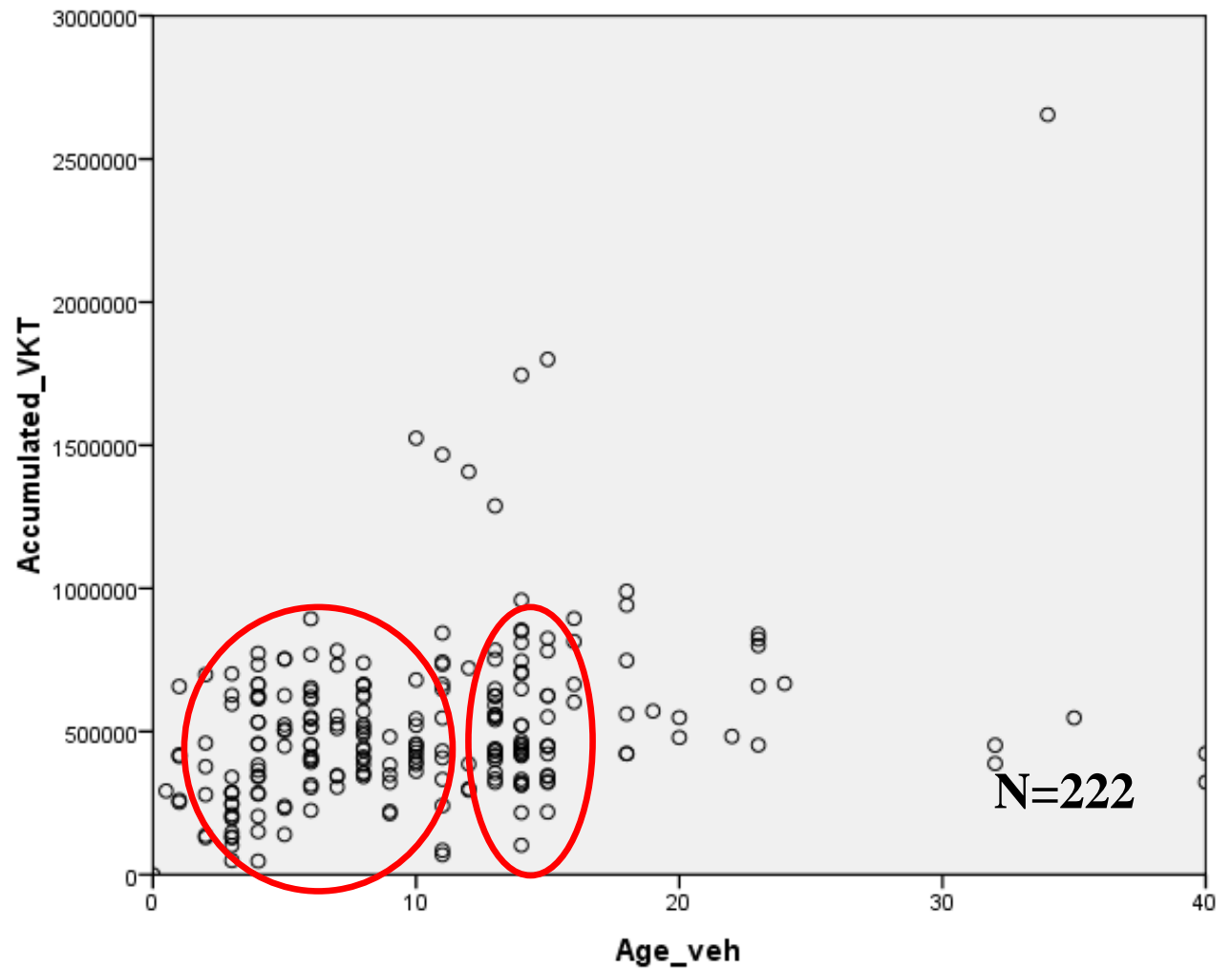


7. Microbus & Passenger Pick Up (Cont'd)



8. Bus

Age vehicle	Accumulate VKT	N
3	281,449	17
4	453,615	20
5	472,473	10
6	509,224	19
8	510,783	19
10	531,579	16
11	592,507	13
13	624,527	17
14	650,352	20
15	683,284	13
Total		164



8. Bus(Cont'd)

Model Summary and Parameter Estimates

Dependent Variable: Accumulated_VKT_Bus

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	b1	b2	b3
Linear	.903	93.576	1	10	.000	4.933E4		
Quadratic	.992	530.267	2	9	.000	1.108E5	-5.093E3	
Cubic	.998	1.072E3	3	8	.000	1.489E5	-1.339E4	400.584

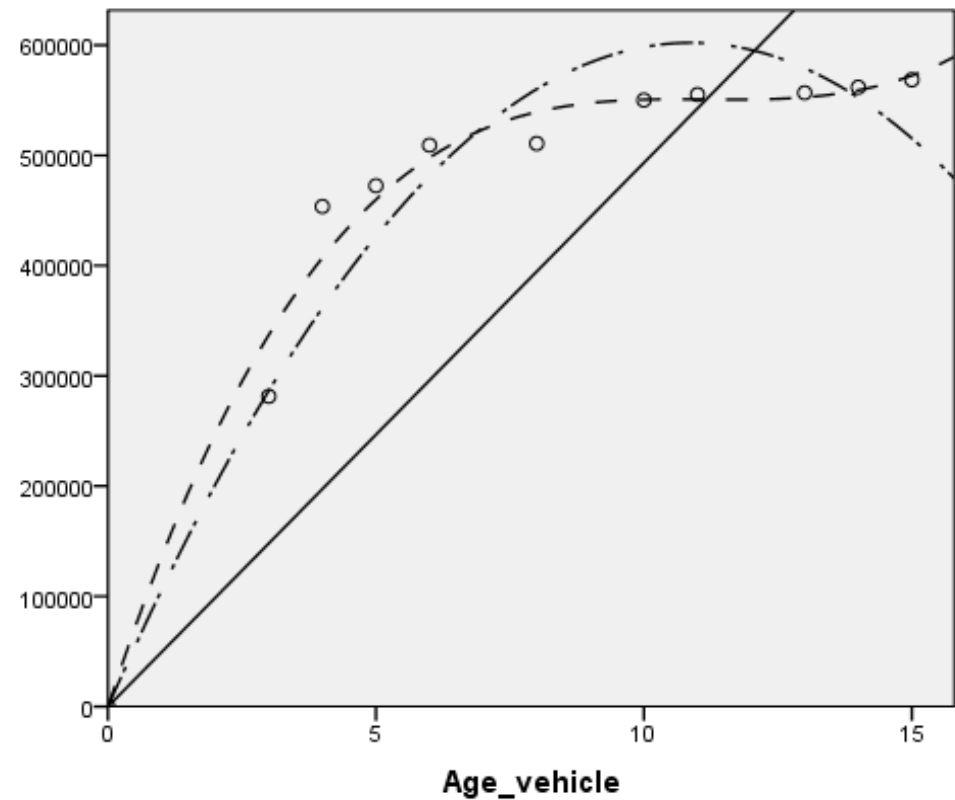
The independent variable is Age_vehicle.

$$Y_{\text{linear}} = 49329.06x ; R^2=0.903$$

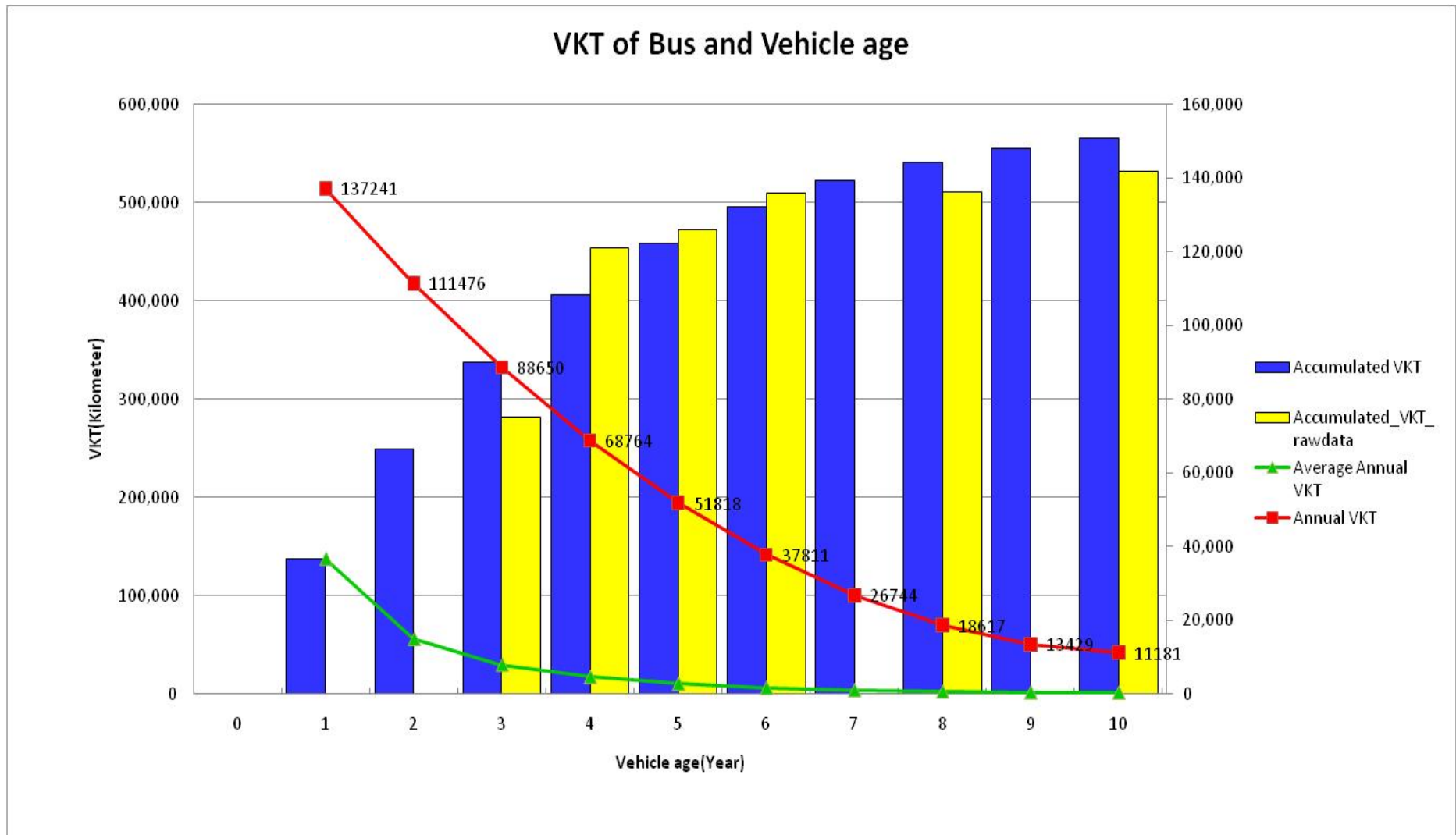
$$Y_{\text{quadratic}} = 110761.67x - 5093.32x^2 ; R^2=0.992$$

$$Y_{\text{cubic}} = 148927.47x - 13393.12x^2 + 400.58x^3 ; R^2=0.998$$

Accumulated_VKT_Bus

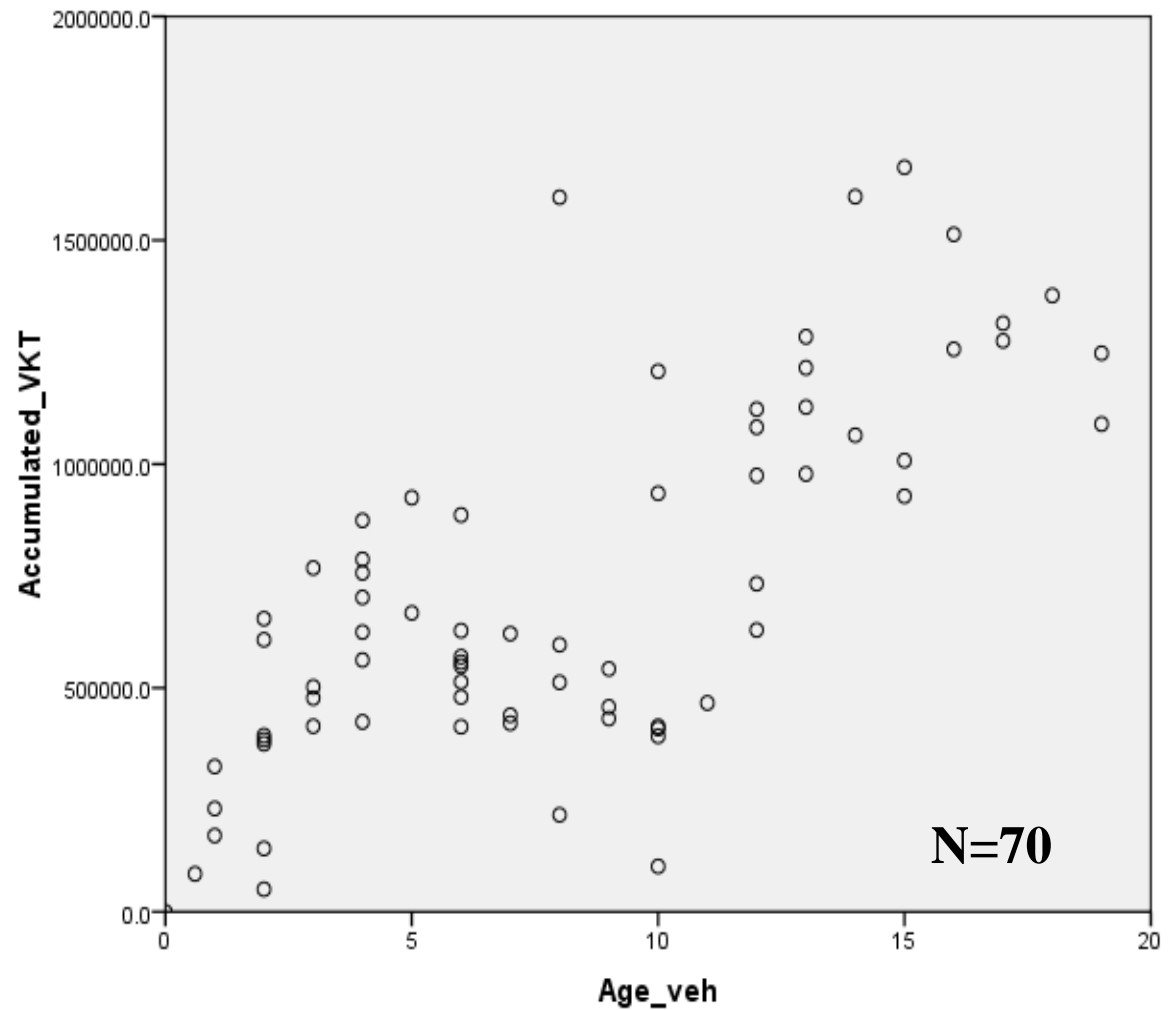


8. Bus (Cont'd)



9.Truck

Age vehicle	Accumulated VKT	N
1	202,475	4
2	372,494	7
3	540,497	4
4	675,975	7
5	796,334	2
6	574,637	8
7	493,867	3
8	730,313	4
9	477,291	3
10	576,431	6
11	466,482	1
12	908,380	5
13	1,151,281	4
14	1,331,091	2
15	1,199,774	3
16	1,385,015	2
17	1,294,968	2
18	1,376,821	1
19	1,168,597	2
Total		70



9.Truck(Cont'd)

Model Summary and Parameter Estimates

Dependent

Variable:Accumulate_VKT_TRUCK

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	b1	b2
Linear	.941	304.710	1	19	.000	7.727E4	
Quadratic	.947	160.063	2	18	.000	1.001E5	-1.562E3

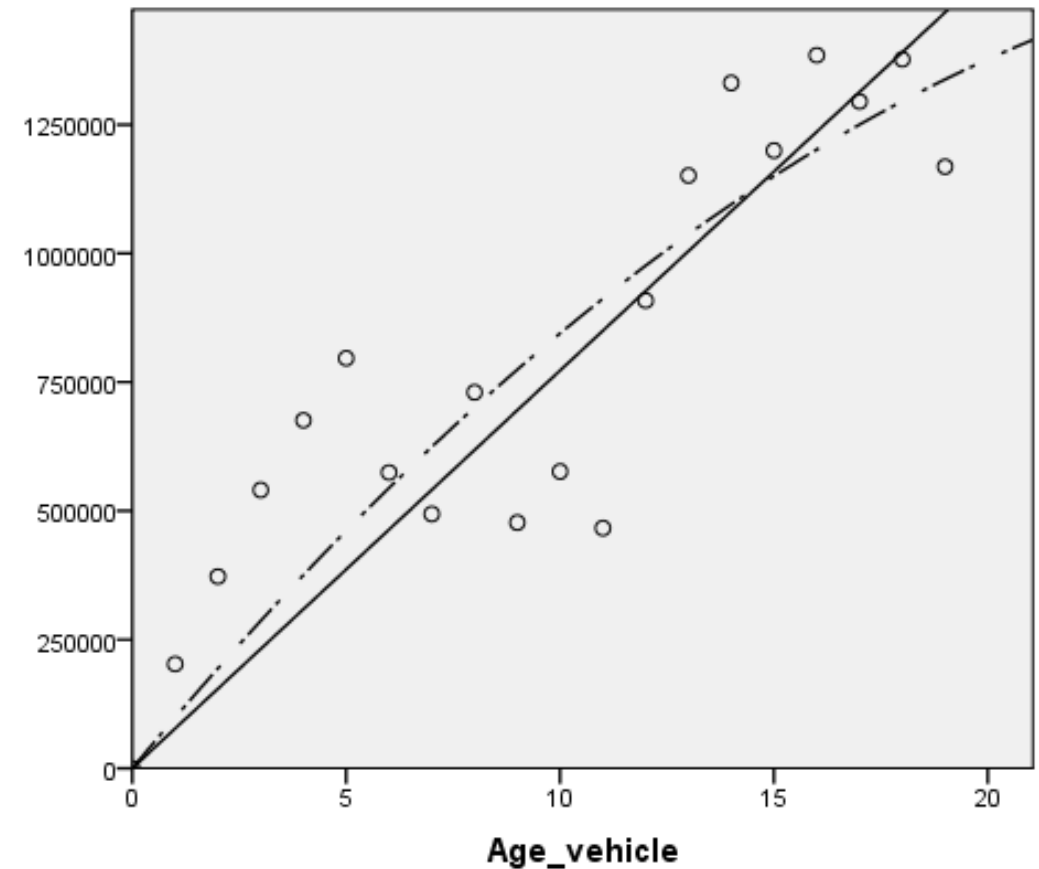
The independent variable is

Age_vehicle.

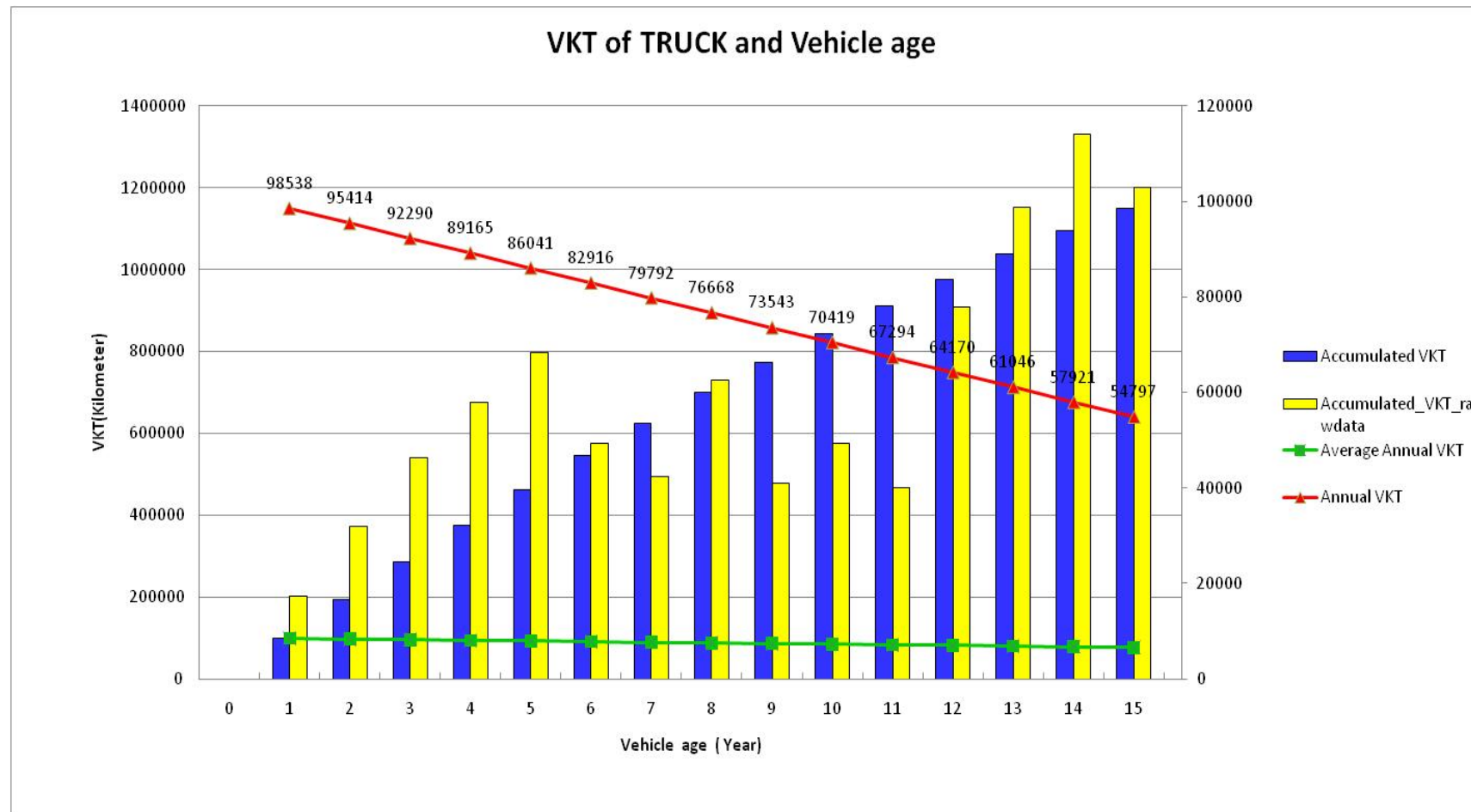
$$Y_{\text{Linear}} = 77268.446x ; R^2 = 0.941$$

$$Y_{\text{Quadratic}} = 100100.65x - 1562.20x^2 ; R^2 = 0.947$$

Accumulate_VKT_TRUCK



9.Truck(Cont'd)



Summary

Type of vehicle	Motorcycle	Motorcycle Taxi	TUK TUK	PICK UP	TAXI	CAR	BUS	TRUCK	MICROBUS
Year/Equation	$10648.89x - 503.20x^2$	$20027.74x - 1509.10x^2$	$33868.66x + 34.09x^2$	$42724.04x - 1249.45x^2$	$47467.68x + 61681.58x^2$	$37410.57x^2 - 1024.06x$	$148927.47x - 13393.12x^2 + 400.58x^3$	$100100.65x - 1562.20x^2$	$57584.85x - 1744.19x^2$
R²	0.997	0.992	0.999	0.994	0.999	0.996	0.998	0.947	0.993
1	10146	18519	34314	41475	156597	36387	137241	98538	55841
2	19285	34019	68628	80450	313193	70725	248717	193952	108193
3	27418	46501	102942	116927	469790	103015	337367	286242	157057
4	34544	55965	137256	150905	626387	133257	406131	375407	202432
5	40664	62411	171570	182384	782983	161451	457949	461448	244319
6	45778	65839	205884	211364	939580	187597	495760	544365	282718
7	49885	66248	240198	237845	1096177	211695	522504	624157	317628
8	52986		274512	261828	1252773	233745	541120	700824	349050
9	55081		308826	283311	1409370	253746	554549	774367	376984
10	56169		343140	302295	1565966	271700	565730	844786	401429
11			377454	318781	1722563	287605	577602	912080	422386
12			411768	332768	1879160	301462	593105	976250	439854
13			446082	344255	2035756	313271	615178	1037296	453834
14			480396	353244	2192353	323032	646762	1095217	464325
15			514710	359734	2348950	330745	690796	1150014	471329
N	458	175	256	418	35	398	222	70	395

Total VKT In Nakhon Ratchasima

Type of vehicle	Motorcycle	Motorcycle Taxi	TUK TUK	PICK UP	TAXI	CAR	BUS	TRUCK	MICROBUS
Vehicle Age	Total VKT	Total VKT	Total VKT	Total VKT	Total VKT	Total VKT	Total VKT	Total VKT	Total VKT
1 ปี	518191117	425929	0	295136100	2035756	227561234	10704787	25127304	9939638
2 ปี	439508456	465013	34314	366491328	3914916	216228842	10478714	23185612	11726908
3 ปี	473513122	1273185	0	343540386	0	198003936	12233715	33501137	8795497
4 ปี	450771872	2735092	0	328091568	0	189467070	13340248	17565549	11026241
5 ปี	368759903	2036863	0	321211716	0	185714076	10933565	30372408	7330240
6 ปี	257208380	966570	0	273832020	0	147881267	7713473	44360279	7756535
7 ปี	149669648	101924	0	184890342	0	98367179	4626723	17394656	6283853
8 ปี	69140544	69996	0	116216772	0	75453971	4486601	10656795	6284380
9 ปี	37355229	39705	0	101700522	0	48003720	1611452	11693366	4190026
10 ปี	12326972	19648	0	85314096	0	33949936	983888	4365964	2713407
11-15 ปี	86110355	123210	68628	513008128	0	197388605	21611454	32842507	23807819
16-20 ปี	31591605	33156	480396	171478780	0	85897788	23866320	18850077	16128232
> 20 ปี	11135513	21285	26902201	77127160	0	60190925	27873395	17808939	13179910
Total VKT	2,905,282,714	8,311,576	27,485,539	3,178,038,918	5,950,673	1,618,019,834	98,724,620	251,065,578	129,162,689

VKT In Nakhon Ratchasim

Total VKT In Nakhon Ratchasima = 8,222,042,141

Population** = 2,571,292

VKT/Person (Nakhon Ratchasima) = 8,222,042,141 / 2,571,292
= 3197.63 Km/ person

หมายเหตุ :

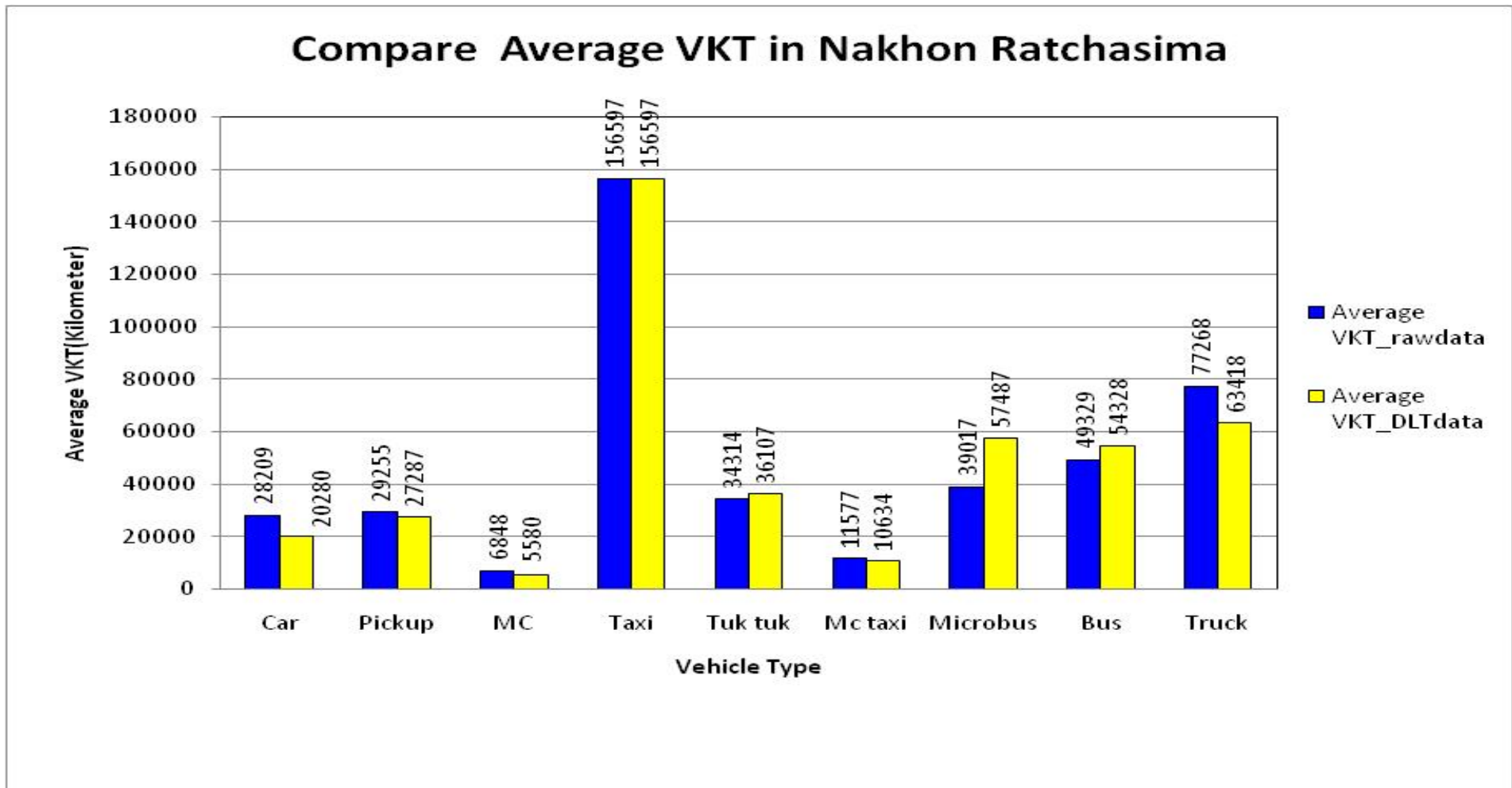
Number of car* สถิติจำนวนรถจำแนกตามอายุรถ สำนักงานขนส่งจังหวัดนครราชสีมา

Population** รายงานสถิติจำนวนประชากร รายจังหวัดนครราชสีมา ณ เดือน ธันวาคม พ.ศ. 2552

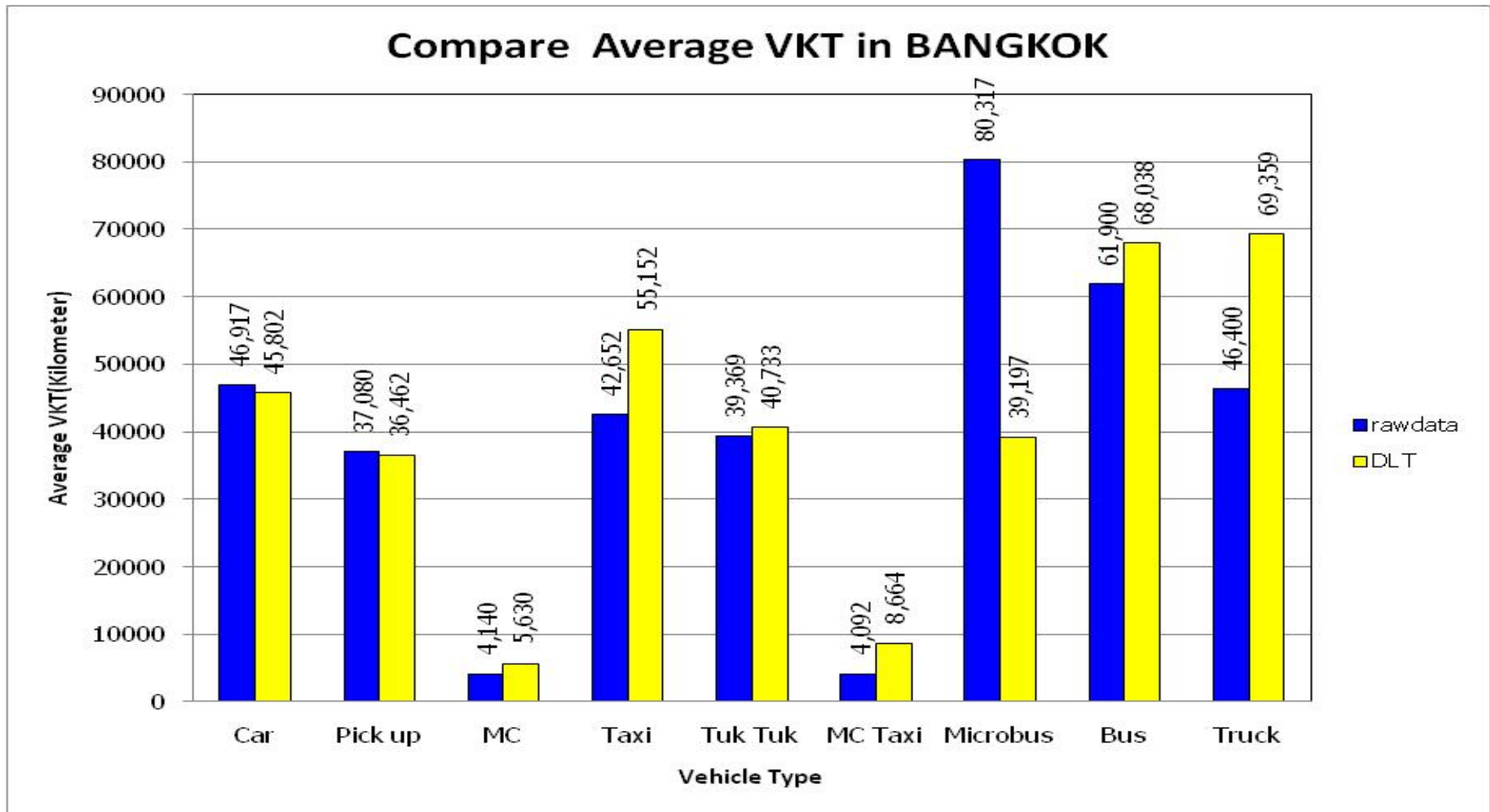
Compare VKT with other cities

Country	VKT per capita (kilometres)
USA (2002)	15,900
New Zealand(2002)	11,200
Canada (2002)	10,100
Australia (2002)	9,800
Finland (2002)	9,400
Norway(2002)	7,300
Korea (2002)	2,300
Turkey (2002)	800
Mexico (2002)	700
Nakhon Ratchasima(2009)	3,198

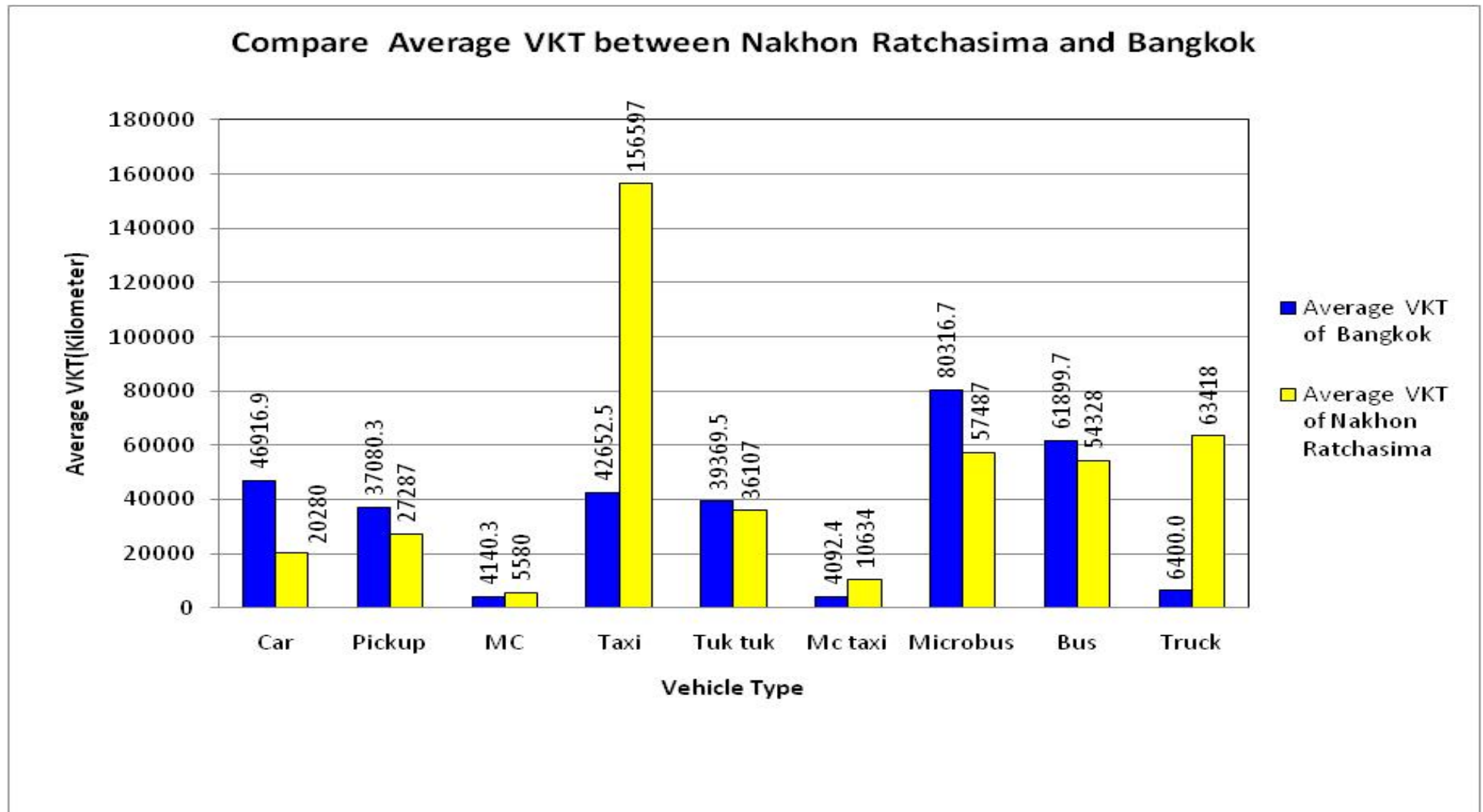
Compare Average VKT in Nakhon Ratchasima



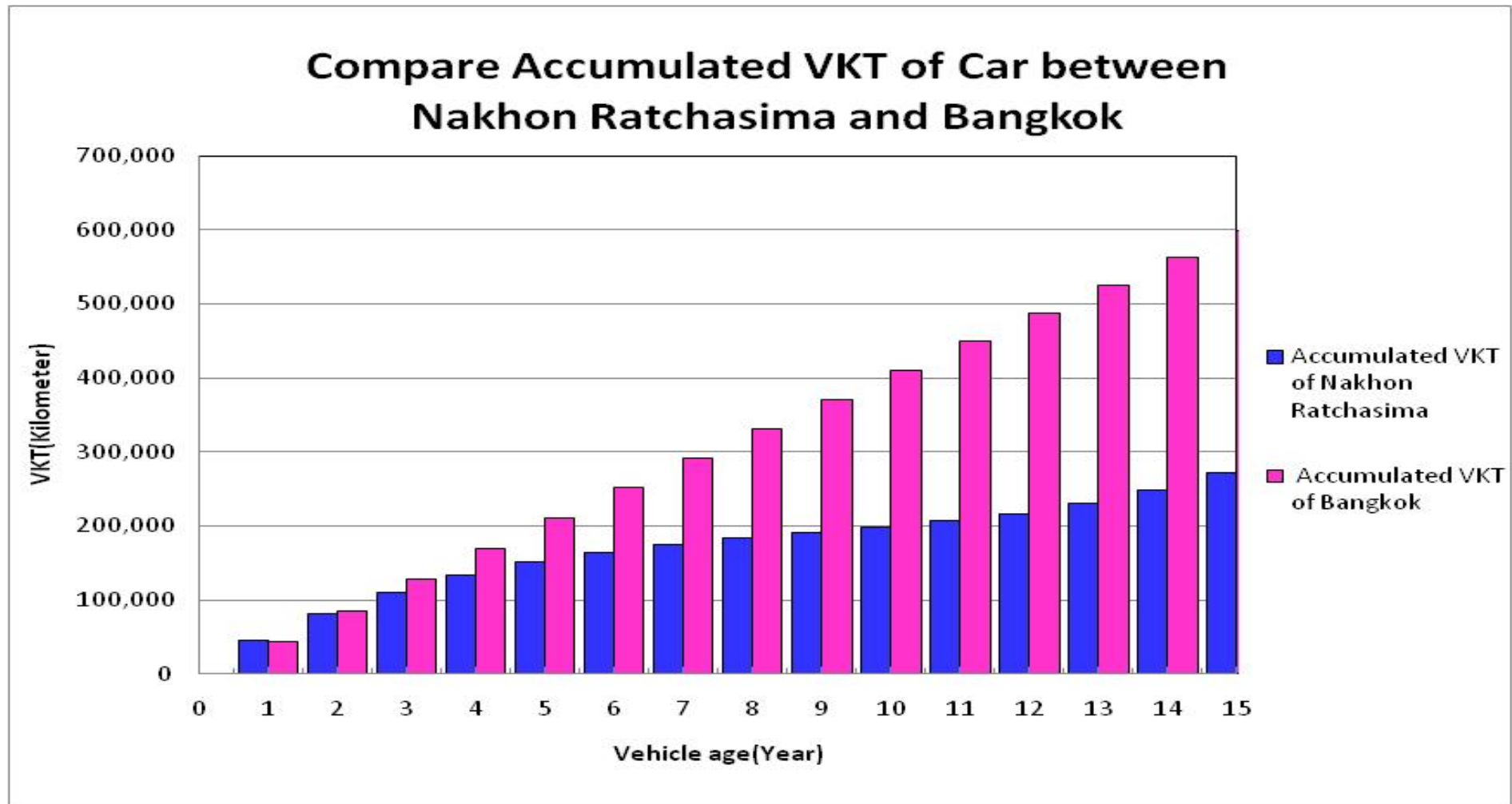
Compare Average VKT in Bangkok



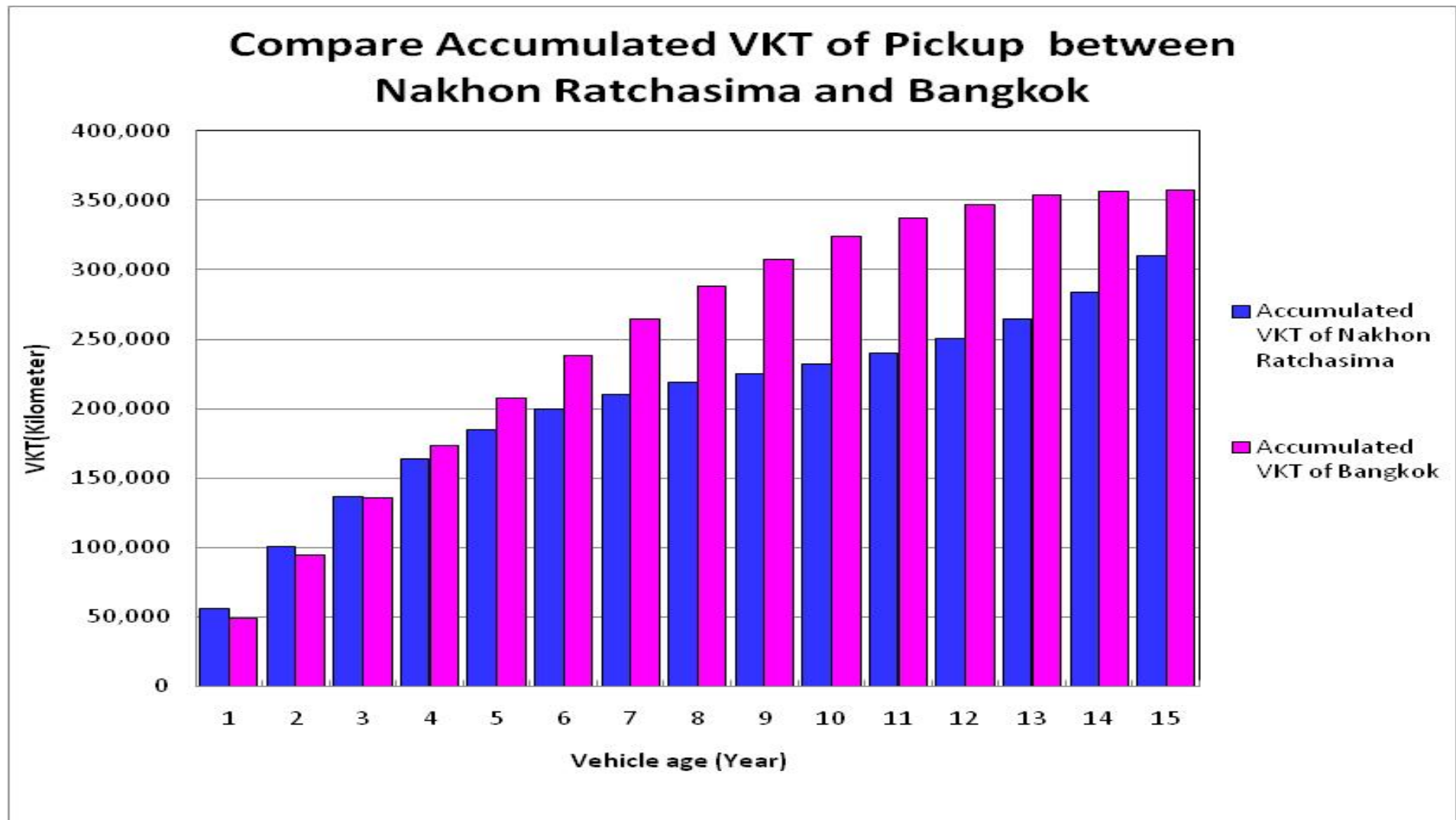
Compare Average VKT



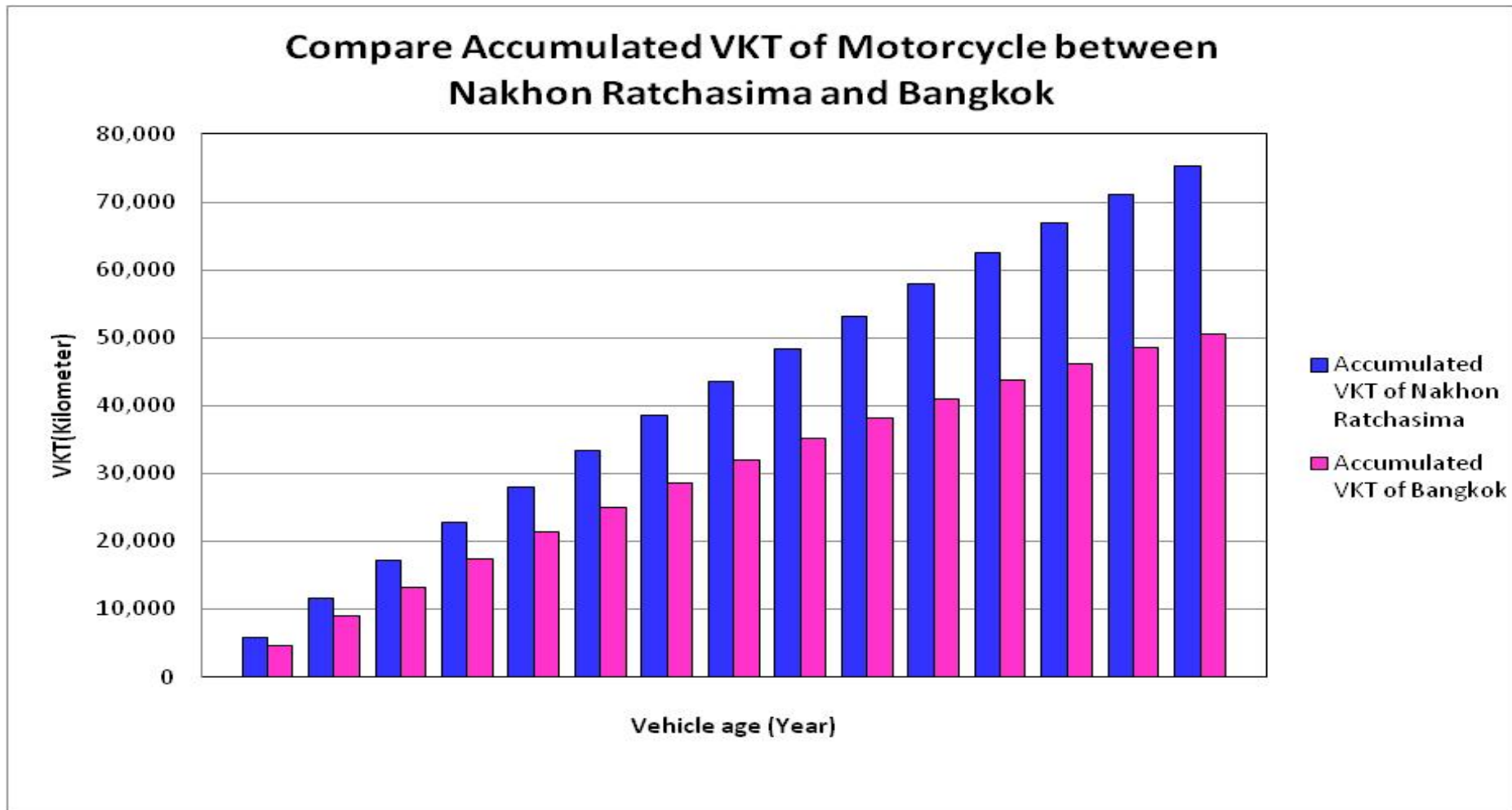
Compare Accumulated VKT of Car



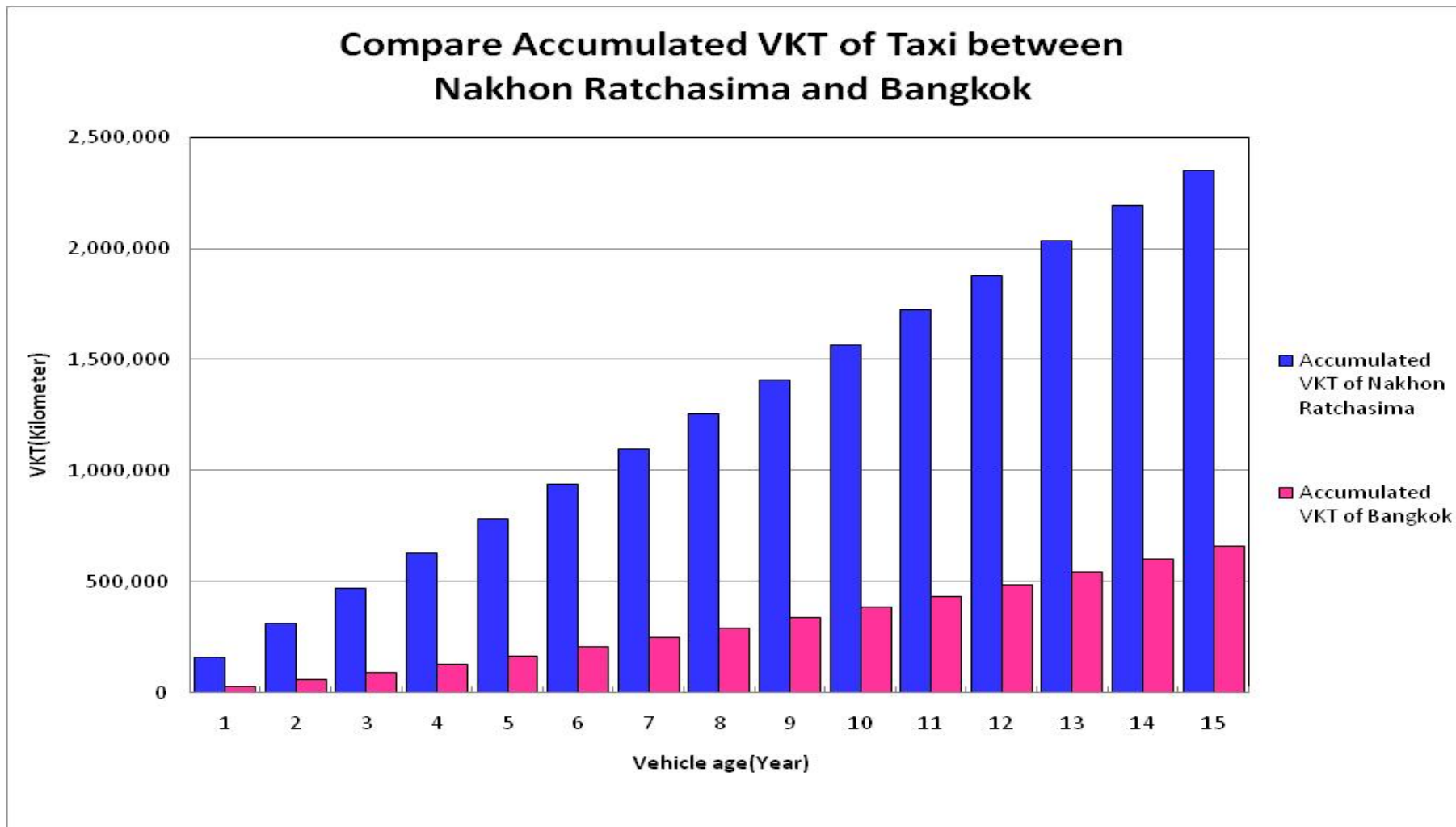
Compare Accumulated VKT of Pickup



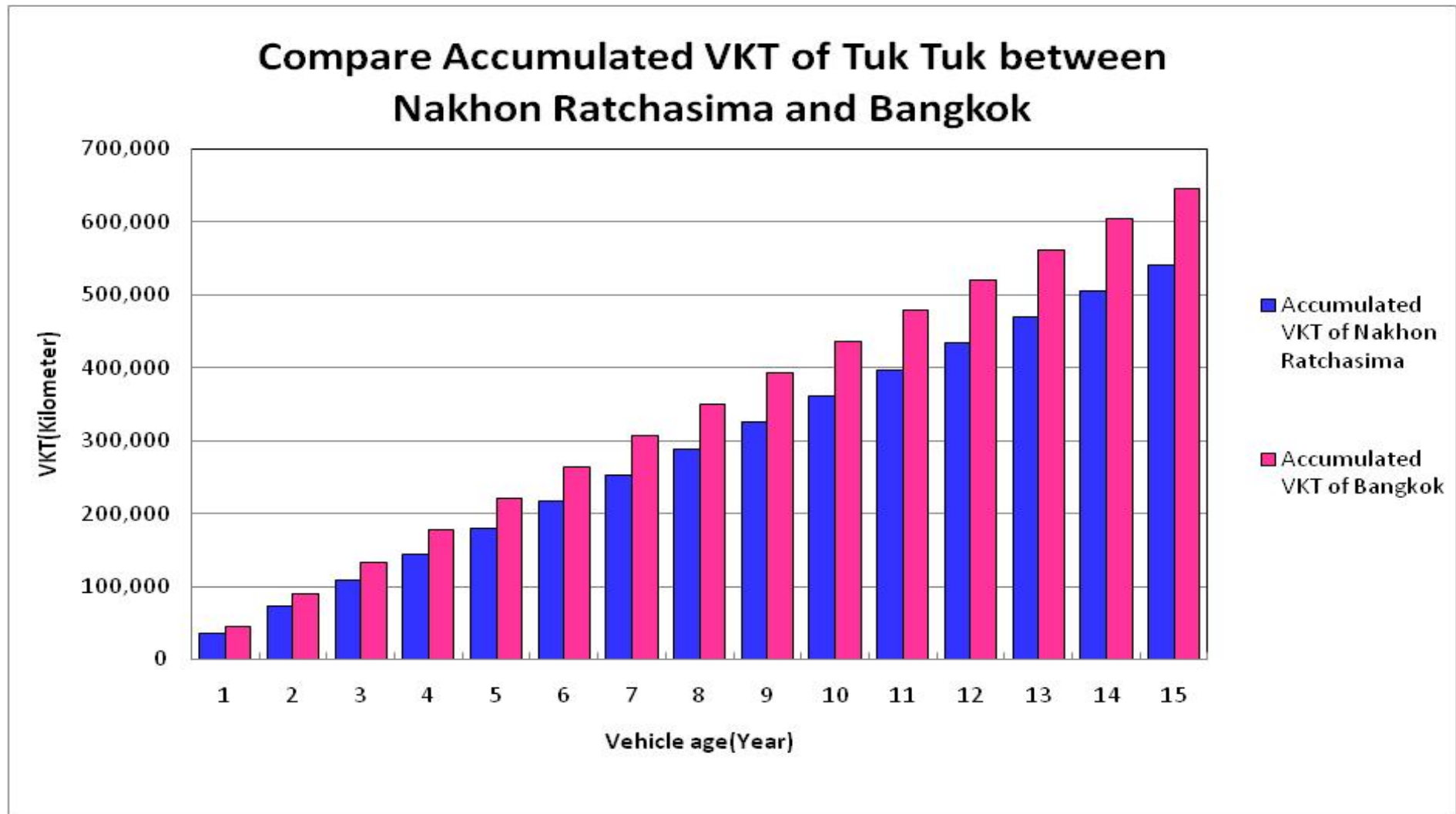
Compare Accumulated VKT of Motorcycle



Compare Accumulated VKT of Taxi

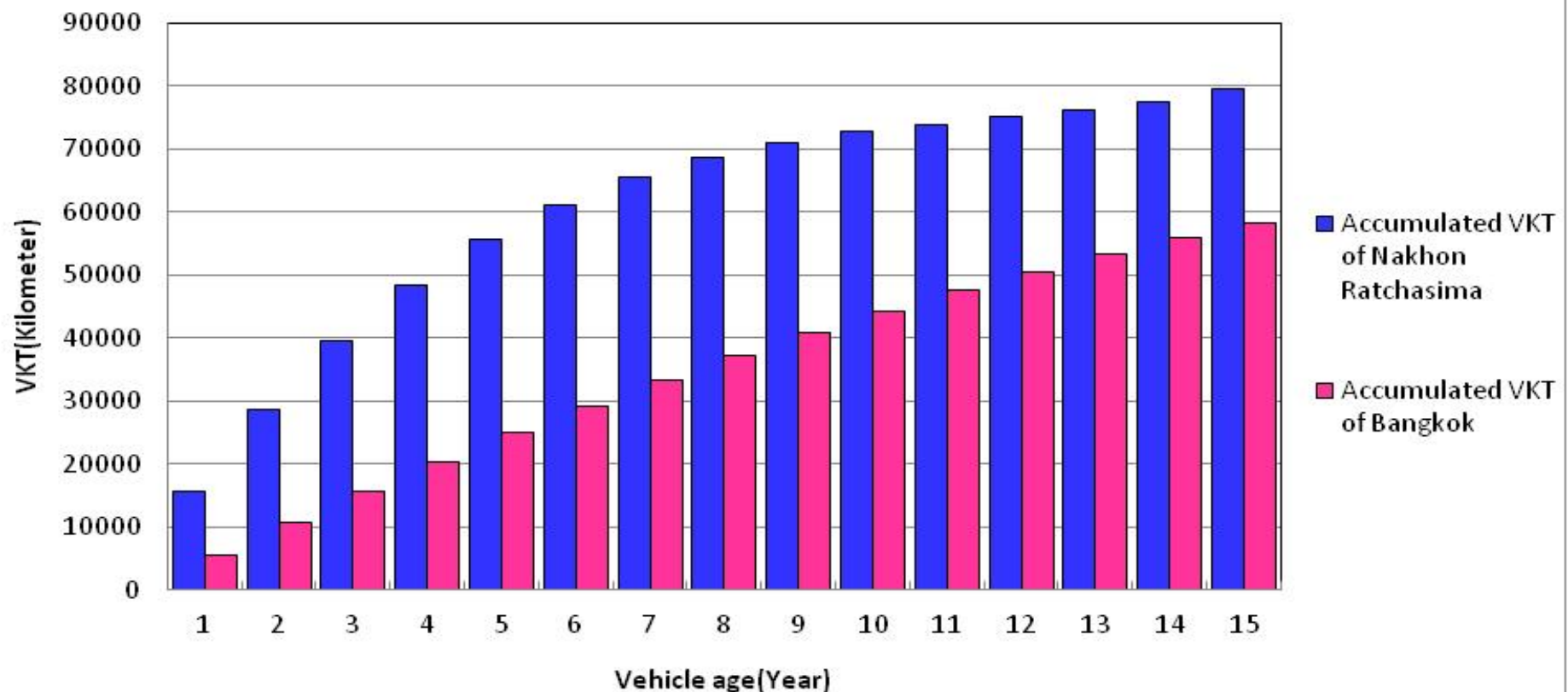


Compare Accumulated VKT of Tuk Tuk

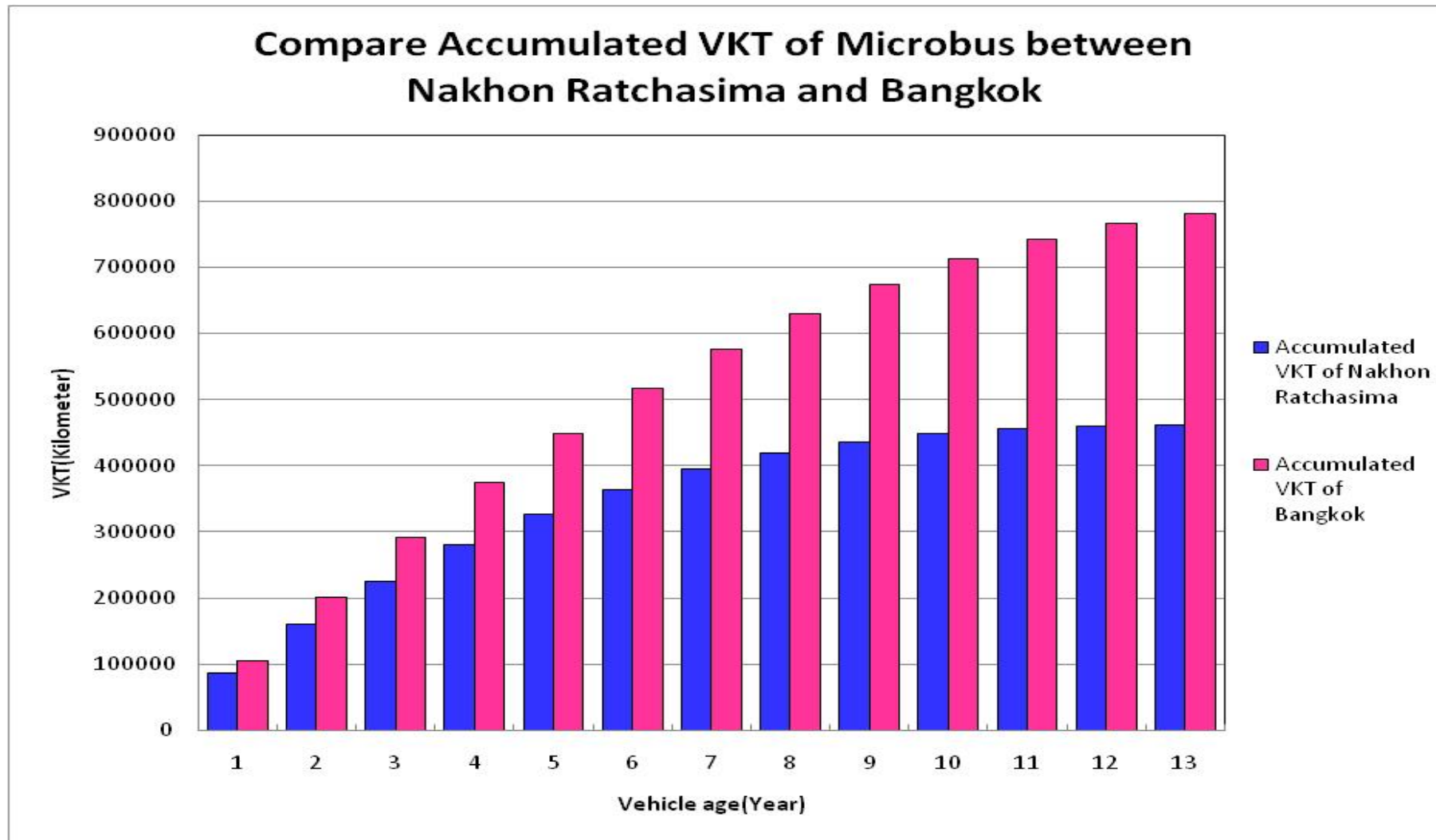


Compare Accumulated VKT of Motorcycle taxi

Compare Accumulated VKT of Motorcycle Taxi between Nakhon Ratchasima and Bangkok

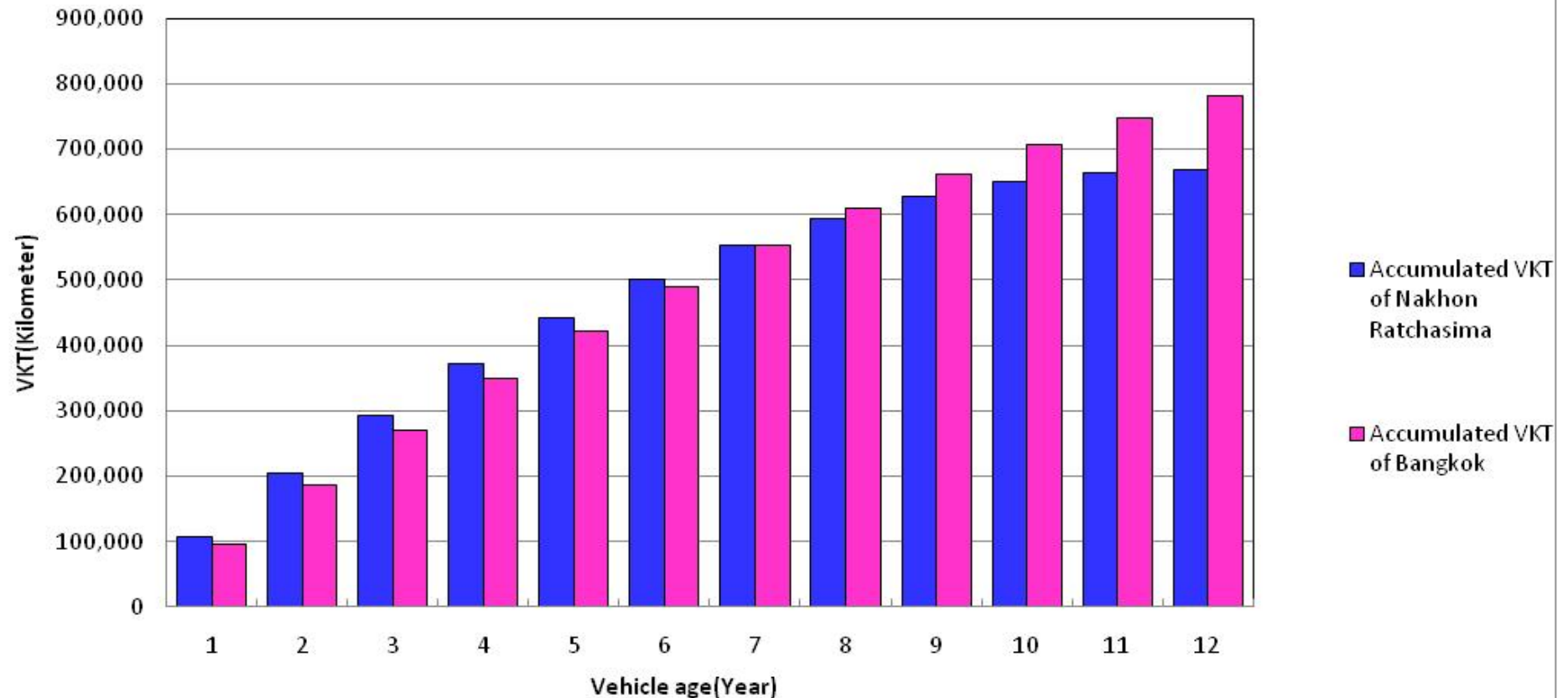


Compare Accumulated VKT of Microbus

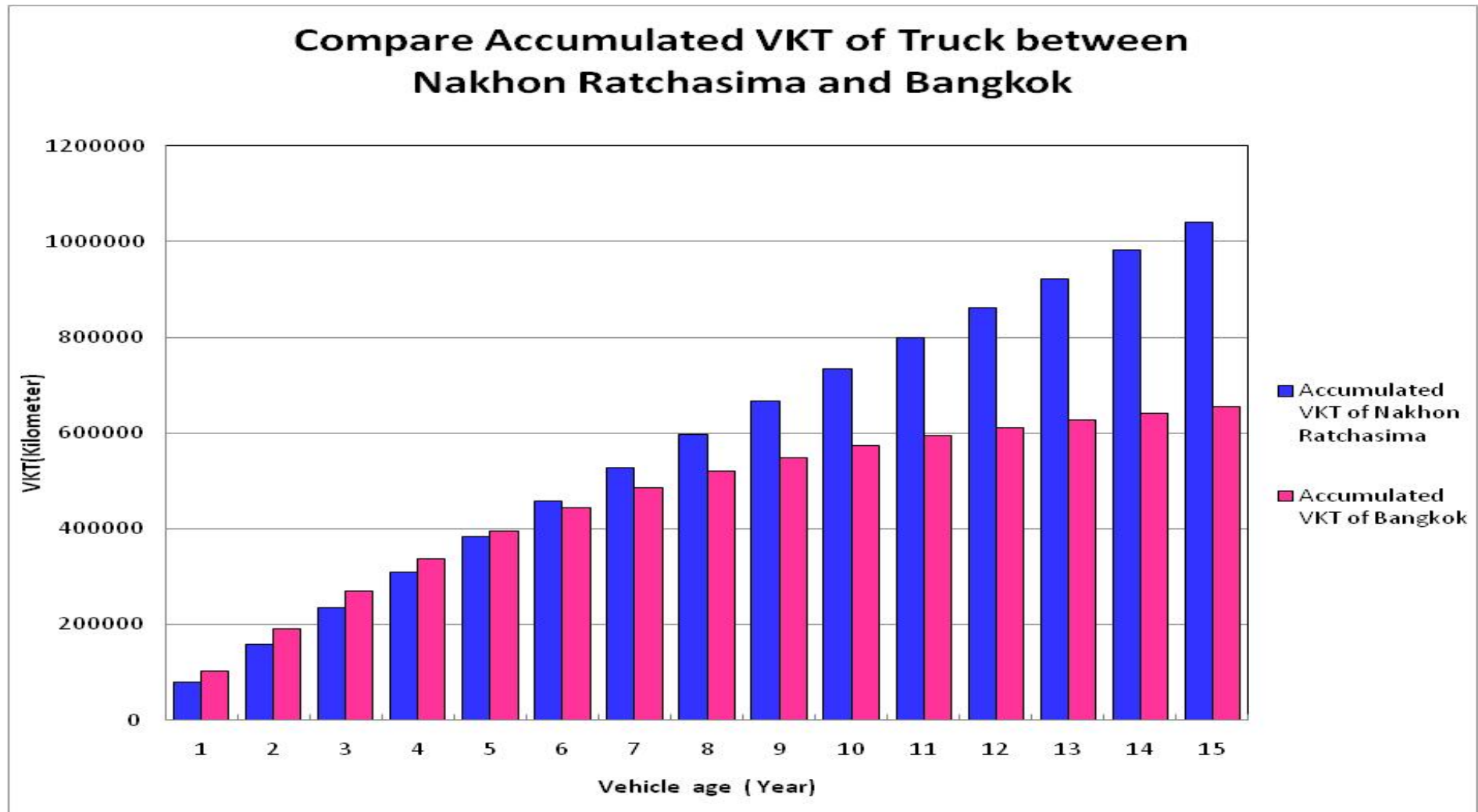


Compare Accumulated VKT of Bus

Compare Accumulated VKT of Bus between Nakhon Ratchasima and Bangkok



Compare Accumulated VKT of Truck



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Thank you
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