

Comparative study on the threshold speed

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1. Purpose

A comparative study was conducted between the following additional threshold speed from Indian request.

✓ 35 / 70 / 80 / ~

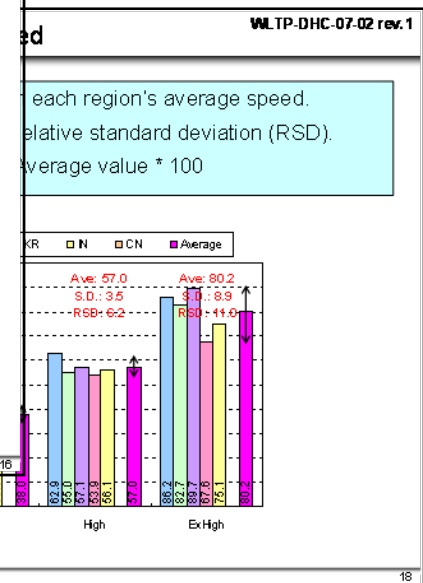
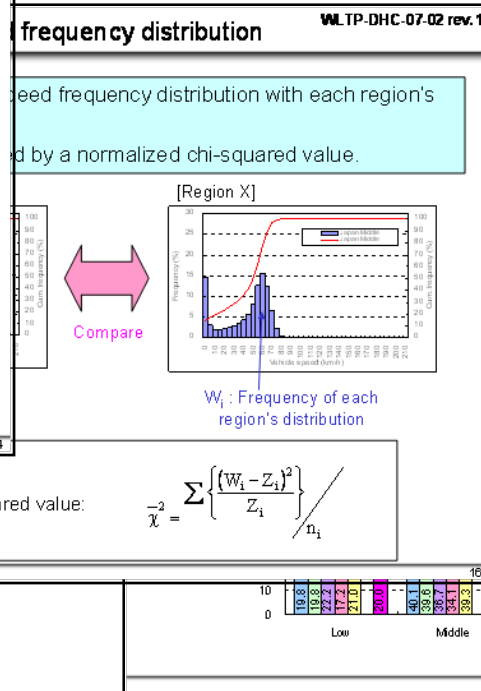
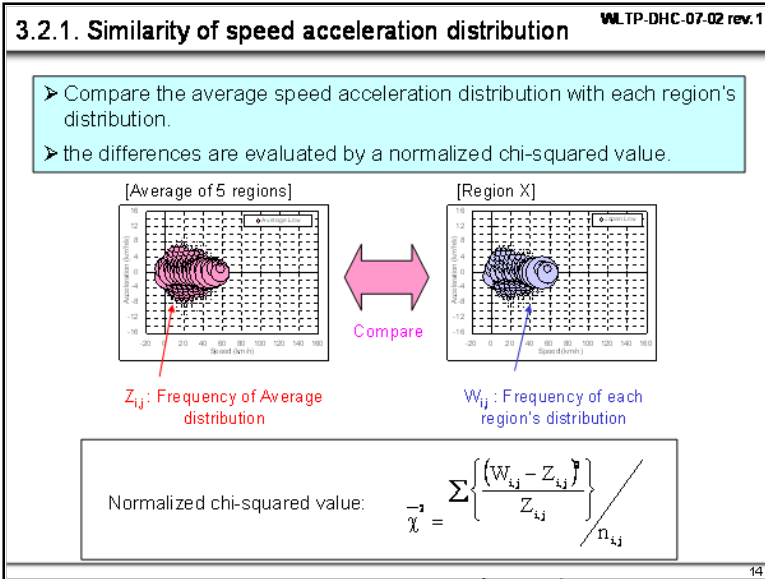
✓ 35 / 70 / 90 / ~

✓ 40 / 60 / 80 / ~

✓ 40 / 60 / 90 / ~

2.1. Review the threshold speed

- The threshold speed was reviewed based on 3 methods.
 - based on similarity of speed-acceleration distribution
 - based on similarity of speed frequency distribution
 - based on similarity of speed



2.2. Result of comparative study

If the value in column is small,
the criteria have similarity
between regions.

[χ^2/n value on VA distribution]

Criteria	Low						Middle						High						ExHigh						Average
	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	
60/80/110/~	0.02	0.01	0.04	0.01	0.11	0.04	0.03	0.01	0.05	0.01	0.07	0.03	0.03	0.01	0.03	0.01	0.02	0.02	0.03	0.04	0.04	0.03	0.05	0.04	0.033
35/70/80/~	0.02	0.02	0.09	0.01	0.11	0.05	0.04	0.01	0.05	0.03	0.11	0.05	0.02	0.01	0.05	0.01	0.05	0.03	0.02	0.03	0.05	0.02	0.04	0.03	0.039
35/70/90/~	0.02	0.02	0.09	0.01	0.11	0.05	0.04	0.01	0.05	0.03	0.11	0.05	0.02	0.01	0.04	0.01	0.03	0.02	0.03	0.03	0.05	0.02	0.04	0.04	0.038
40/60/80/~	0.01	0.02	0.07	0.01	0.11	0.04	0.04	0.01	0.05	0.03	0.15	0.06	0.04	0.01	0.05	0.01	0.07	0.03	0.02	0.03	0.05	0.02	0.04	0.03	0.041
40/60/90/~	0.01	0.02	0.07	0.01	0.11	0.04	0.04	0.01	0.05	0.03	0.15	0.06	0.04	0.01	0.04	0.01	0.04	0.03	0.03	0.03	0.05	0.02	0.04	0.04	0.040

[χ^2/n value on Speed frequency]

Criteria	Low						Middle						High						ExHigh						Average
	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	
60/80/110/~	0.42	0.14	0.25	0.24	1.21	0.45	0.52	0.13	0.28	0.16	0.82	0.38	0.58	0.25	0.33	0.13	0.45	0.35	0.39	0.79	0.86	0.51	0.61	0.63	0.454
35/70/80/~	0.14	0.22	1.31	0.02	1.11	0.56	0.63	0.16	0.26	0.51	1.24	0.56	0.38	0.13	0.37	0.08	0.72	0.34	0.40	0.37	1.06	0.31	0.70	0.57	0.506
35/70/90/~	0.14	0.22	1.31	0.02	1.11	0.56	0.63	0.16	0.26	0.51	1.24	0.56	0.34	0.12	0.27	0.06	0.40	0.24	0.55	0.53	1.04	0.40	0.79	0.66	0.505
40/60/80/~	0.16	0.22	0.95	0.01	1.12	0.49	0.63	0.16	0.19	0.64	1.51	0.62	0.52	0.13	0.28	0.16	0.82	0.38	0.40	0.37	1.06	0.31	0.70	0.57	0.517
40/60/90/~	0.16	0.22	0.95	0.01	1.12	0.49	0.63	0.16	0.19	0.64	1.51	0.62	0.51	0.15	0.22	0.10	0.53	0.30	0.55	0.53	1.04	0.40	0.79	0.66	0.520

[RSD on Average speed]

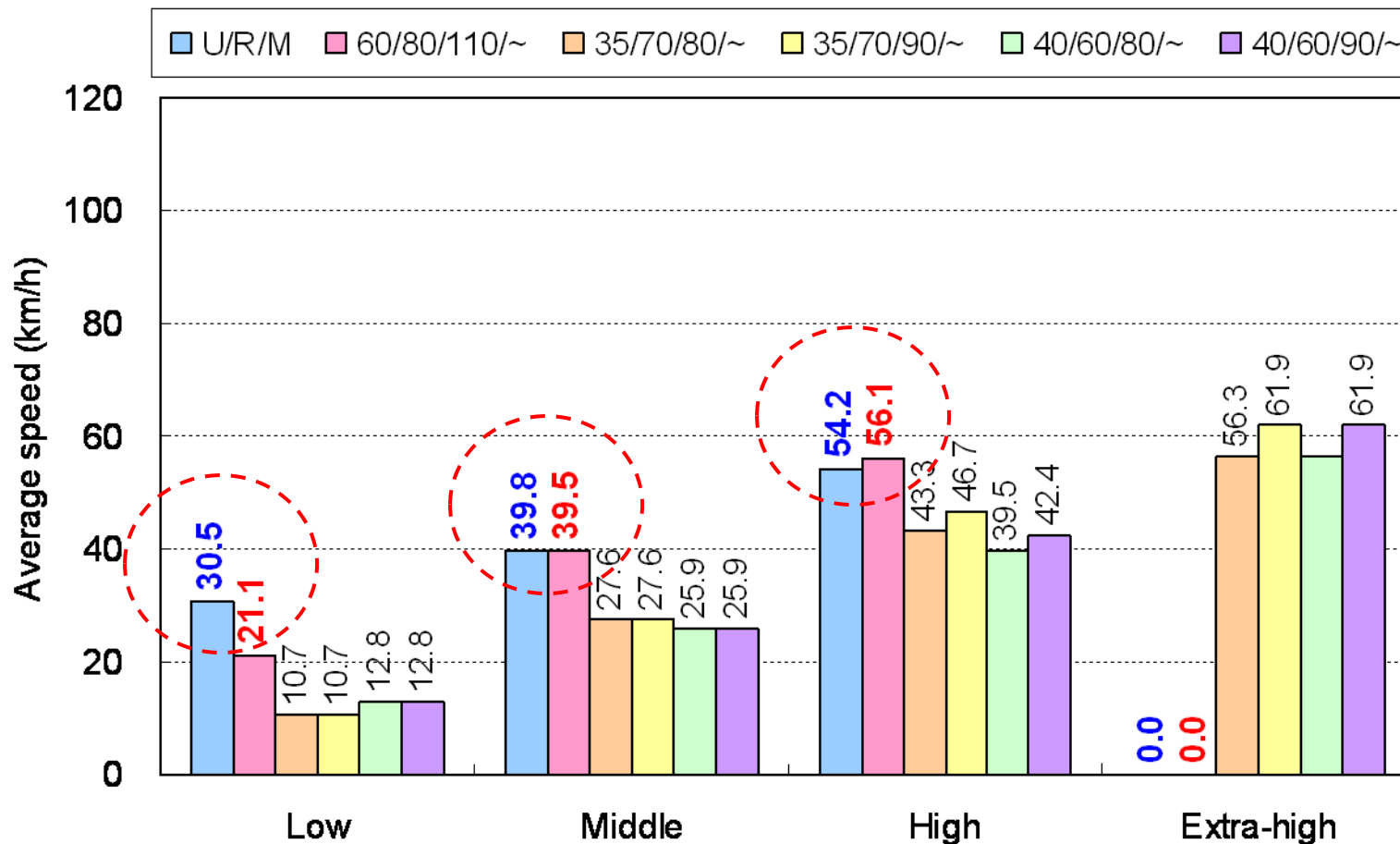
Criteria	Low						Middle						High						ExHigh						Average RSD
	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	
60/80/110/~	19.8	20.0	18.8	17.2	21.1	7.7	40.1	39.9	37.0	34.1	39.5	6.8	62.9	55.6	59.7	53.9	56.1	6.3	86.2	83.1	90.1	67.6	75.1	11.3	8.00
35/70/80/~	7.4	8.9	5.6	8.3	10.7	23.2	29.3	28.2	28.6	23.0	27.6	9.2	44.2	43.7	40.2	39.2	43.3	5.3	65.5	66.6	78.1	55.5	56.3	14.3	13.01
35/70/90/~	7.4	8.9	5.6	8.3	10.7	23.2	29.3	28.2	28.6	23.0	27.6	9.2	45.5	47.3	43.2	42.3	46.7	4.9	74.7	72.4	82.3	61.6	61.9	12.5	12.45
40/60/80/~	8.9	11.0	7.3	9.8	12.8	21.0	26.4	26.2	24.9	21.4	25.9	8.3	40.1	39.9	37.0	34.1	39.5	6.8	65.5	66.6	78.1	55.5	56.3	14.3	12.59
40/60/90/~	8.9	11.0	7.3	9.8	12.8	21.0	26.4	26.2	24.9	21.4	25.9	8.3	40.8	43.3	39.5	36.6	42.4	6.5	74.7	72.4	82.3	61.7	61.9	12.5	12.09

2.3. Conclusion < appropriate threshold >

- The threshold speed was considered based on 3 methods.
 - based on similarity of VA distribution
 - based on similarity of V distribution
 - based on similarity of parameters

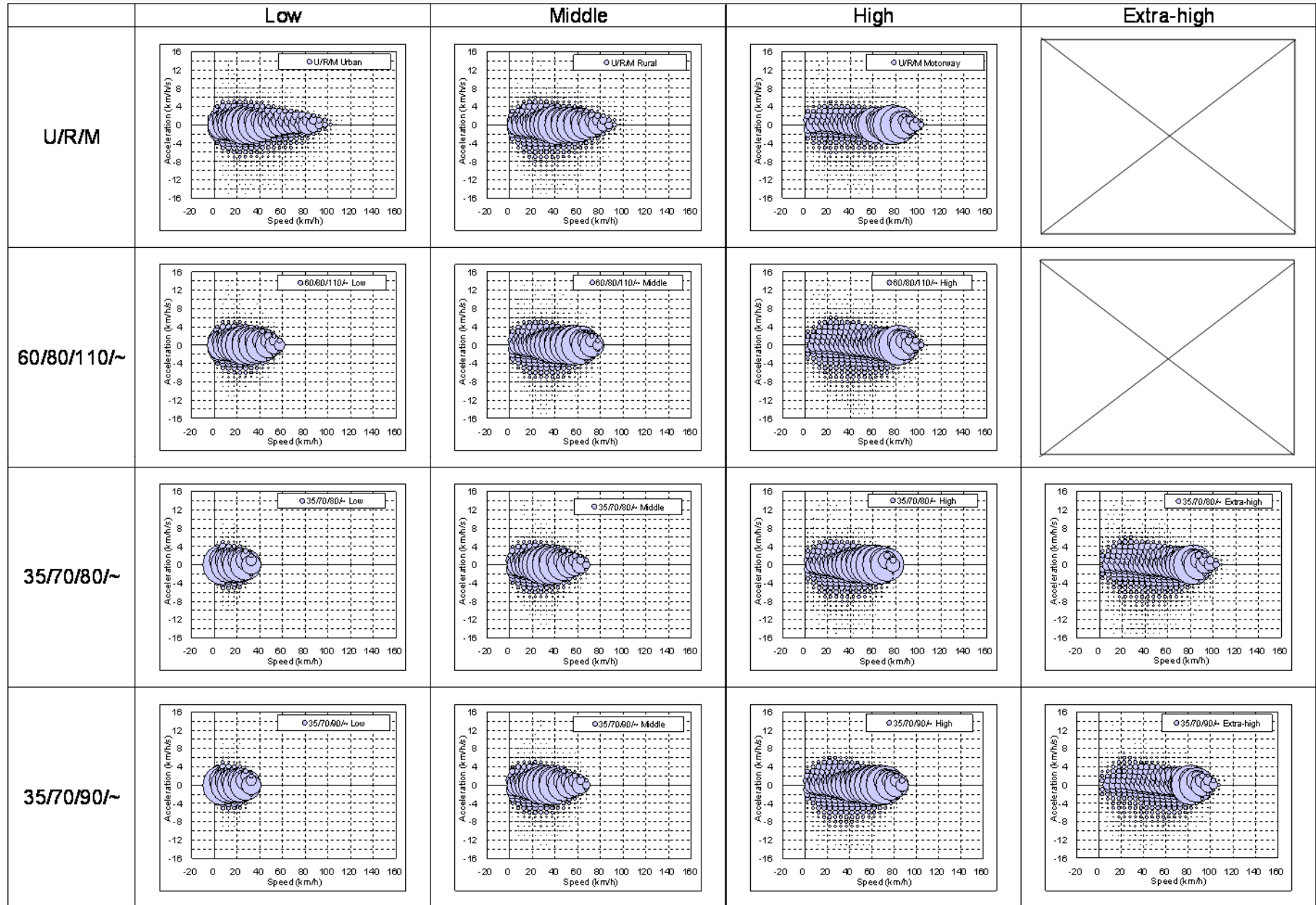
- Threshold speed of [60/80/110/~] are best choice for less difference for all countries.

3.1. Data analysis on India ~ Average speed

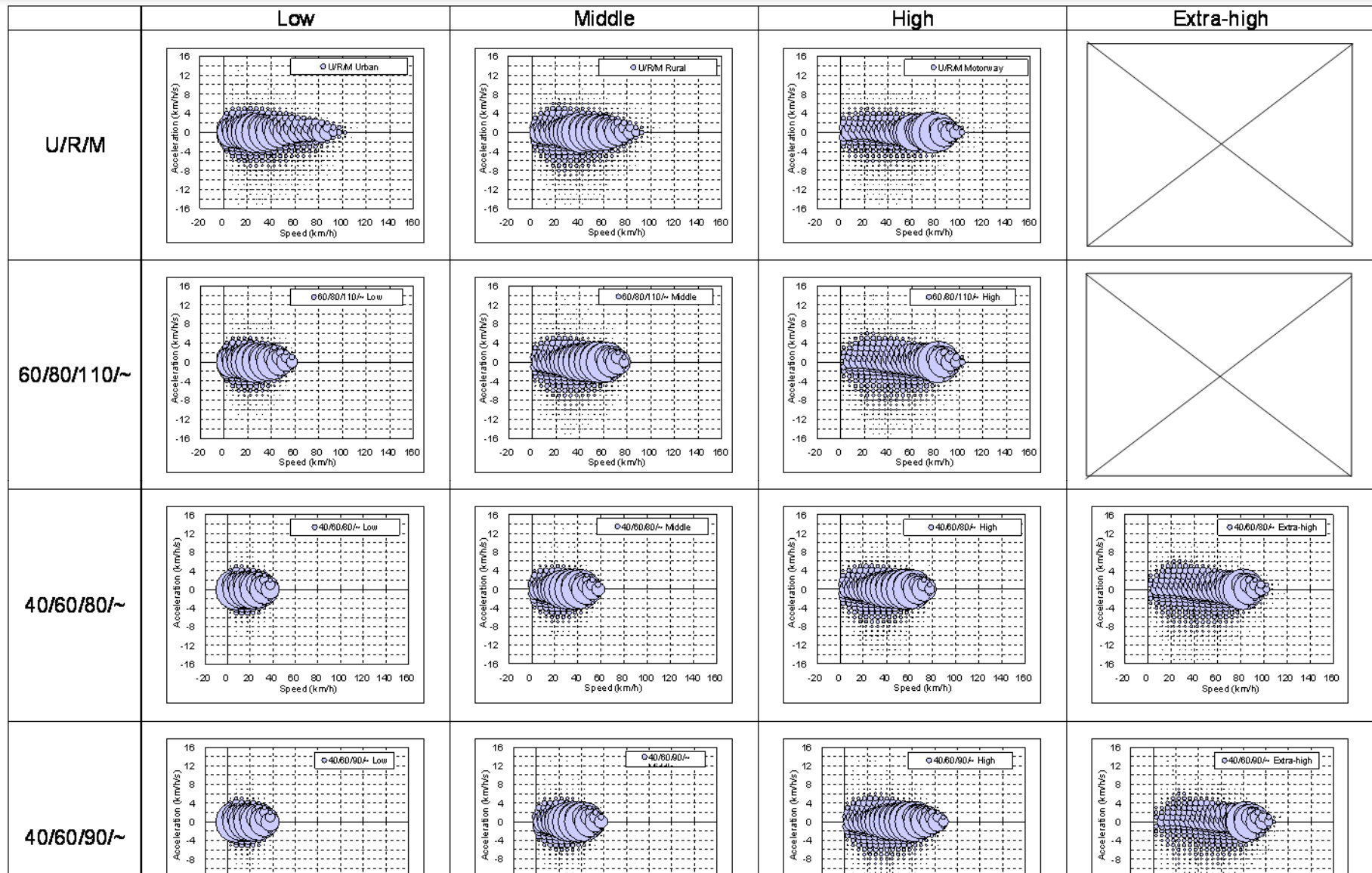


In each average speed of the threshold speed of 60/80/110/~ are similar to that of Urban/Rural/Motorway category.

3.2.1. Data analysis on India ~ Average speed



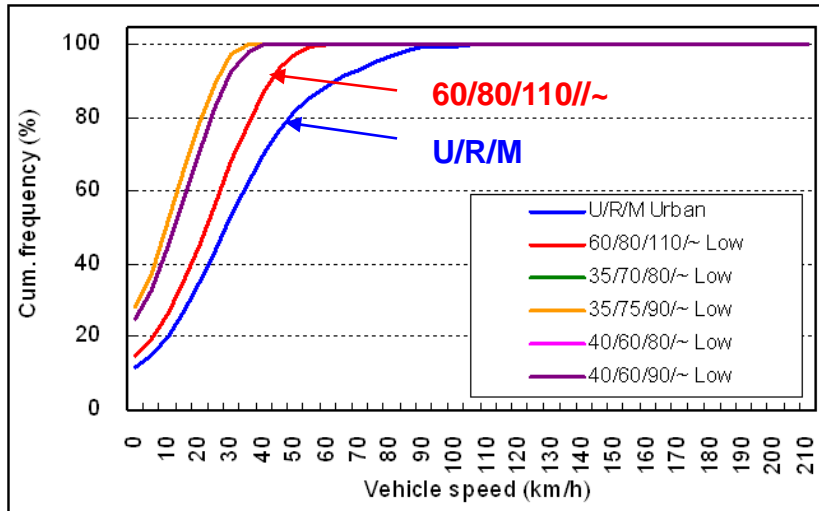
3.2.2. Data analysis on India ~ Average speed



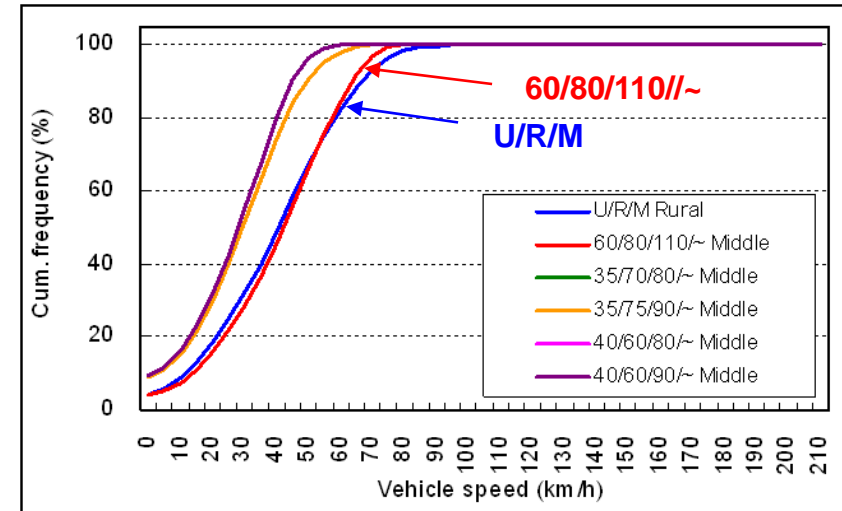
It seems that the threshold speed of 35 or 40 km/h for Low phase is low

3.3. Data analysis on India ~ Speed cum. frequency distribution

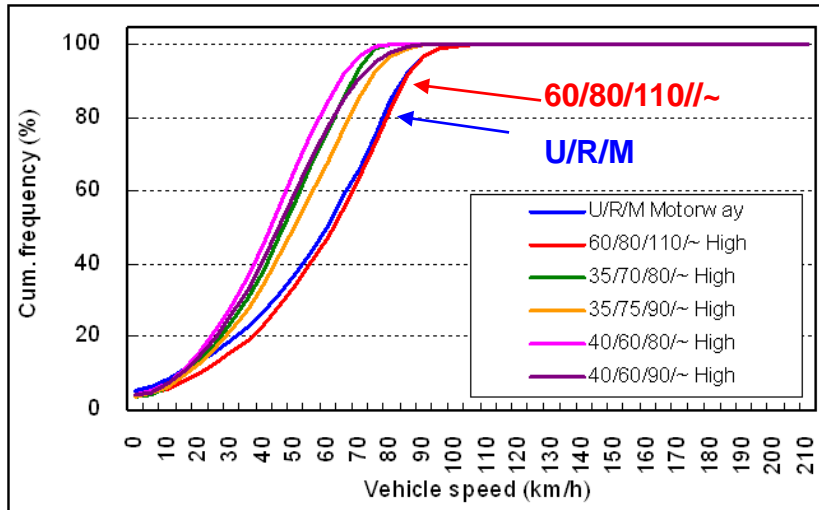
[LOW / Urban phase]



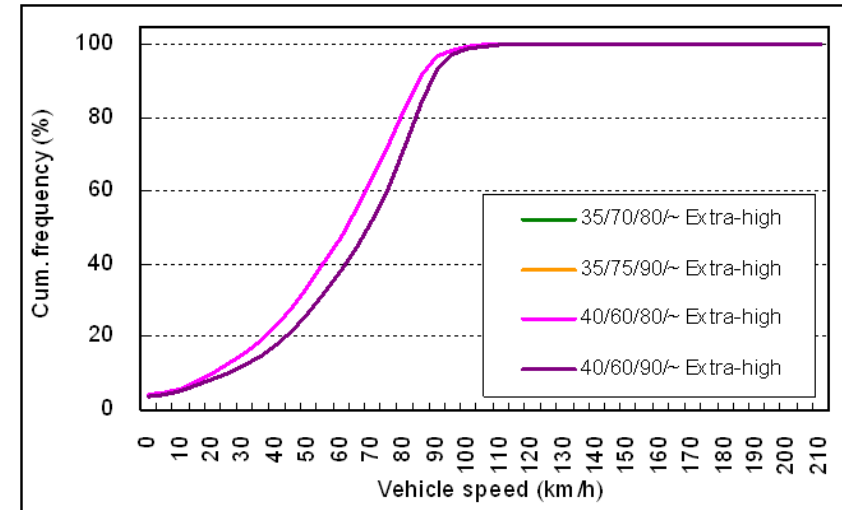
[MIDDLE / Rural phase]



[HIGH / Motorway phase]



[Ex-HIGH phase]



The cumulative frequency distributions of vehicle speed are similar as 60/80/110/~ and U/R/M

3.4. Data analysis on India ~ Parameter list

Region	Phase	Threshold speed	Driving duration	Driving distance	Average speed	Maximum speed	Relative positive acceleration	Average short trip duration	Average idling duration	Acceleration ratio	Deceleration ratio	Cruise ratio	Idling ratio
	-	-	hr	km	km/h	km/h	m/s ²	s	s	%	%	%	%
India	Low (Urban)	U/R/M	533	15001	30.5	115.2	0.146	208.7	24.5	29.6	25.2	33.4	11.8
		60/80/110/~	540	12081	21.1	60.0	0.134	148.1	23.1	27.1	23.8	34.1	15.0
		35/70/80/~	134	1392	10.7	35.0	0.132	59.8	19.5	23.9	22.3	25.7	28.1
		35/70/90/~	134	1392	10.7	35.0	0.132	59.8	19.5	23.9	22.3	25.7	28.1
		40/60/80/~	186	2343	12.8	40.0	0.136	72.8	20.7	25.2	23.0	26.9	25.0
		40/60/90/~	186	2343	12.8	40.0	0.136	72.8	20.7	25.2	23.0	26.9	25.0
	Middle (Rural)	U/R/M	392	15545	39.8	110.0	0.137	586.2	23.9	30.4	24.2	40.9	4.5
		60/80/110/~	399	16865	39.5	80.0	0.142	642.3	24.6	30.9	25.4	39.7	4.1
		35/70/80/~	604	18571	27.6	70.0	0.135	298.2	26.6	28.8	24.6	37.6	9.0
		35/70/90/~	604	18571	27.6	70.0	0.135	298.2	26.6	28.8	24.6	37.6	9.0
		40/60/80/~	353	9738	25.9	60.0	0.133	282.8	27.4	28.1	24.2	38.0	9.7
		40/60/90/~	353	9738	25.9	60.0	0.133	282.8	27.4	28.1	24.2	38.0	9.7
	High (Motorway)	U/R/M	464	25232	54.2	146.0	0.112	668.0	29.9	27.0	21.9	45.7	5.4
		60/80/110/~	443	26399	56.1	109.9	0.162	1156.6	46.2	34.6	26.7	34.7	4.0
		35/70/80/~	201	8983	43.3	80.0	0.147	777.8	26.8	31.3	25.4	39.7	3.7
		35/70/90/~	434	22133	46.7	90.0	0.152	837.8	30.9	32.4	26.0	37.7	3.9
		40/60/80/~	399	16865	39.5	80.0	0.142	642.3	24.6	30.9	25.4	39.7	4.1
		40/60/90/~	632	30015	42.4	90.0	0.147	699.4	27.1	31.7	25.8	38.4	4.1
	Extra-high	U/R/M	-	-	-	-	-	-	-	-	-	-	-
		60/80/110/~	-	-	-	-	-	-	-	-	-	-	-
		35/70/80/~	450	26833	56.3	146.0	0.163	1161.1	46.2	34.7	26.7	34.6	4.0
35/70/90/~		218	13683	61.9	146.0	0.165	1536.1	60.1	35.3	26.4	34.4	3.9	
40/60/80/~		450	26833	56.3	146.0	0.163	1161.1	46.2	34.7	26.7	34.6	4.0	
40/60/90/~		218	13682	61.9	146.0	0.165	1536.1	60.1	35.3	26.4	34.4	3.9	

3.5. Conclusion

- From viewpoints of Indian driving behavior, the current threshold speed of [60/80/110/~] is the most appropriate criteria.