EXPERIMENTAL VALIDATION OF ACCIDENT PREDICTION MODELS FOR ROUNDABOUTS

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ABSTRACT

Roundabouts are considered the more safer road intersections (advantages: reduction of conflict points, lower speed for circulation and approach). However, accidents may occur also on roundabouts. The more common accident types are: collision between entering vehicle and circulating vehicle (due to give way refusal of entering vehicles), single vehicle accident (the vehicle run off road running to collision with the central island), run off road of entering vehicle. These three types of accidents constitute more than 70% of the total. Other types of accidents take pace with a frequency of 30%.

The study of the safety characteristics of the road system elements (road and intersection) can be based also on the accident prediction models.

There is a vast literature on this subject. Specifically for roundabouts, the models of Maycock and Hall (experimental model) and of Arndt and Troutbeck (theoretical model) can be employed. Both models allow to estimate the number of accidents (for each type of accident) in a time interval (usually a year).

In this paper, we will estimate the reliability of these models, through the comparison between the data obtained from the same models and the survey data about accidents occurred on roundabouts located in Oriental Sicily. Such comparison will be carried out comparing the real number of accidents occurred and the number obtained from prediction model. A detailed analysis will be carried out also about single accident type.

The result of experimental research will underline as the model of Arndt and Troutbeck is similar to the real accidents data.

Keywords: roundabout, accident, model

1. RESEARCH OBJECTIVES

Roundabouts are considered the more safer road intersections. However accidents may occur also on roundabouts. The study of the safety characteristics of roundabouts can be based also on accident prediction models. Research objectives are to estimate the reliability of 2 roundabout prevision accident models (Maycock-Hall and Arndt-Troutbeck). To that end, the survey's issues of 5 roundabouts will be presented: 4 roundabouts have medium/low vehicular volumes, the other one is jammed and characterized by high vehicular delays.

2. ACCIDENT PREDICTION MODELS

2.1 Maycock-Hall models

In a major cross-sectional study of accidents at 4-arm roundabouts, Maycock and Hall (1984) developed accident predictive models using the technique of linear modelling (FHWA-RD-00-67, 2000). The accident predictive models, for each accident type are listed in the following equations (Kennedy-Peirce-Summersgill, 2005):

- Entering-Circulating – Vehicle Accidents:

$$A = 0.052 Q_e^{0.7} Q_c^{0.4} \exp\left(-40C_e + 0.14e - 0.007ev - \frac{1}{1+\exp(4R-7)} + 0.2P_m - 0.01\theta \right) \quad \text{(Eq. 1)}$$

where: A=injury crashes per year per roundabout approach, Q_e=entering flow (1,000s of vehicle/day), Q_c=circulating flow (1,000s of vehicle/day), C_e=entry curvature = $1/R_e$, R_e=entry path radius for the shortest vehicle path (m), e=entry width (m), v=approach width (m), R=ratio of inscribed circle diameter/central island diameter, P_m=proportion of motorcycles (%), θ= angle to next leg, measured centreline to centreline (degrees).

- Approaching –Vehicle Accidents:

$$A = 0.0057 Q_e^{1.7} \exp(20C_e - 0.1e) \quad \text{(Eq. 2)}$$

where: A=injury crashes per year per approach or leg, Q_e=entering flow (1,000s of vehicle/day), C_e=entry curvature = $1/R_e$, R_e=entry path radius for the shortest vehicle path (m), e=entry width (m).

- Single vehicle Accidents:

$$A = 0.0064 Q_e^{0.8} \exp(25C_e + 0.2v - 45C_a) \quad \text{(Eq. 3)}$$

where: A=injury crashes per year per approach or leg, Q_e=entering flow (1,000s of vehicle/day), C_e=entry curvature = $1/R_e$, R_e=entry path radius for the shortest vehicle path (m), v=approach width (m), C_a=approach curvature=$1/R_a$, R_a= approach radius (m), defined as the radius of a curve between 50 m and 500 m of the yield line.

- "Other" Accidents (Vehicle):

$$A = 0.0026 Q_{ec}^{0.8} \exp(0.2P_m) \quad \text{(Eq. 4)}$$

where: A=injury crashes per year per approach or leg, Q_{ec}=product $Q_e \cdot Q_c$, Q_e=entering flow (1,000s of vehicle/day), Q_c=circulating flow (1,000s of vehicle/day), P_m=proportion of motorcycles (%).

- Pedestrian Accidents:

$$A = 0.0029 Q_{ep}^{0.5} \quad \text{(Eq. 5)}$$

where: A=injury crashes per year per roundabout approach or leg, Q_{ec}=product $(Q_e \cdot Q_{ex}) \cdot Q_p$, Q_e=entering flow (1,000s of vehicle/day), Q_{ex}=exiting flow (1,000s of vehicle/day), Q_p=pedestrian crossing flow (1,000s of pedestrian/day).
In this model, the major factors that were statistically significant are entry width, circulatory width, entry path radius, approach curvature and angle between entries.

2.2 Arndt-Troutbeck models

Arndt and Troutbeck (1995) developed models using multiple linear regression with independent variables related to driver behaviour and geometric design (Kennedy-Peirce-Summersgill, 2005). These include flow, 85th percentile speed, changes in 85th percentile speed as the vehicle progresses through the roundabout, vehicle path radius on each geometric element and the length of the driver path on this element (Department of Main Roads, 2006). The Australian accident prediction equations, for each type of accident are listed in Equation 6 through 11 (Arndt, 2001):

- Single vehicle Accidents:

$$A_{sp} = 1.64 \cdot 10^{-12} Q^{1.17} L(S + \Delta S)^{4.12} / R^{1.91} \quad \text{(Eq. 6a)}$$

$$A_{sa} = 1.79 \cdot 10^{-9} Q^{0.91} L(S + \Delta S)^{1.93} / R^{0.65} \quad \text{(Eq. 6b)}$$

where: A_{sp}=number of single-vehicle accidents per year per leg for vehicle path segments prior to the give way line, A_{sa}=number of single-vehicle accidents per year per leg for vehicle path segments after the give way line, Q=AADT in the direction considered (veh/day), L=length of the driver path on the horizontal geometric element (m), S=85th percentile speed on the horizontal geometric element (km/h), ΔS=decrease in 85th percentile speed at the start of the horizontal geometric element (km/h), R=vehicle path radius on the horizontal geometric element (m).

- Approaching-Rear-End-Vehicle Accidents:

$$A_r = 1.81 \cdot 10^{-18} Q_a^{1.39} \left(\sum Q_{ci}\right)^{0.65} S_a^{4.77} N_a^{2.31} \quad \text{(Eq. 7)}$$

where: A_r=number of approaching-rear-end-vehicle accident accidents per year per approach leg, Q_a=average annual daily traffic (AADT) flow on the approach (veh/d), Q_{ci}=the various AADT flows on the circulating carriageway adjacent the approach (veh/d), S_a=85th percentile speed on the approach curve (km/h), N_a=the number of lanes on the particular roundabout approach.

- Entering/Circulating-Vehicle Accidents:

$$A_e = 7.31 \cdot 10^{-7} Q_a^{0.47} N_c^{0.9} \left(\sum Q_{ci}\right)^{0.41} S_{ra}^{1.38} / t_{Ga}^{0.21} \quad \text{(Eq. 8)}$$

where: A_e=number of entering/circulating-vehicle accidents per year per approach leg, Q_a= AADT) on the approach (veh/d), N_c=the number of circulating lanes, Q_{ci}=the various AADT flows on the circulating carriageway adjacent the approach from each direction, S_{ra}=the average relative 85th percentile speed between vehicles on the approach curve and vehicles on the circulating carriageway from each direction, t_{Ga}=the average travel time taken from the give way lines of preceding approaches to the intersection point between the entering and circulating vehicles.

- Exiting/Circulating-Vehicle Accidents:

$$A_d = 1.33 \cdot 10^{-11} \left(\sum Q_{ci}\right)^{0.32} \left(\sum Q_{ei}\right)^{0.68} S_{ra}^{4.13} \qquad \text{(Eq. 9)}$$

where A_d=number of exiting/circulating-vehicle accidents per year per departure leg, Q_c=the various AADT flows at the exit point of a departure leg that are continuing to circulate around the roundabout (veh/d), Q_e=the various AADT flows exiting the roundabout at the exit point of a departure leg (veh/d), S_{ra}=the average relative 85th percentile speed between vehicles exiting the roundabout and vehicles continuing to circulate around the roundabout at the particular departure leg (km/h).

- Sideswipe-Vehicle Accidents:

$$A_{ss} = 6.49 \cdot 10^{-8} \left(Q \cdot Q_t\right)^{0.72} \Delta f_l^{0.59} \qquad \text{(Eq. 10)}$$

where A_{ss}=number of sideswipe-vehicle accidents per year per vehicle path segment per leg, Q=the AADT for the particular movement on the particular geometric element (veh/d), Q_t=the total average annual daily traffic flow on the particular geometric element (veh/d), Δf_l=difference in potential side friction (km/h^2/m).

- "Other" Accidents:

$$A_o = 4.29 \cdot 10^{-6} \sum Q_a \qquad \text{(Eq. 11)}$$

where A_o=number of 'other' accidents per year per roundabout, Q_a=average annual daily traffic flow on the approach (veh/d).

3. APPLICATION OF ACCIDENT PREDICTION MODELS

3.1 Case Study No. 1

The roundabout is located in Aci Sant'Antonio between two roads: "Aldo Moro-Matteotti streets" (suburban road, V=60 km/h) and "Marchese di Casalotto street" (local road, V=40 km/h). The geometric parameters are quoted in Table 1 and in Figure 1. Peak hour volumes (8.00-9.00) are indicated in Table 2. Accident data were collected for periods of 4 years (Table 3). The Tables 4 and 5 compare the number of accidents, by accident group, obtained with "Arndt-Troutbeck" model and "Maycock-Hall" model.

Accident rates are shown in Figure 2. The Australian value (Arndt-Troutbeck) is similar to real accident rate. The UK value (Maycock-Hall) is triple of real accident rate.

Also "Arndt-Troutbeck" accident rate is the amount of two accident types (entering-circulating and single vehicle), accident that actually happened in the analysis period.

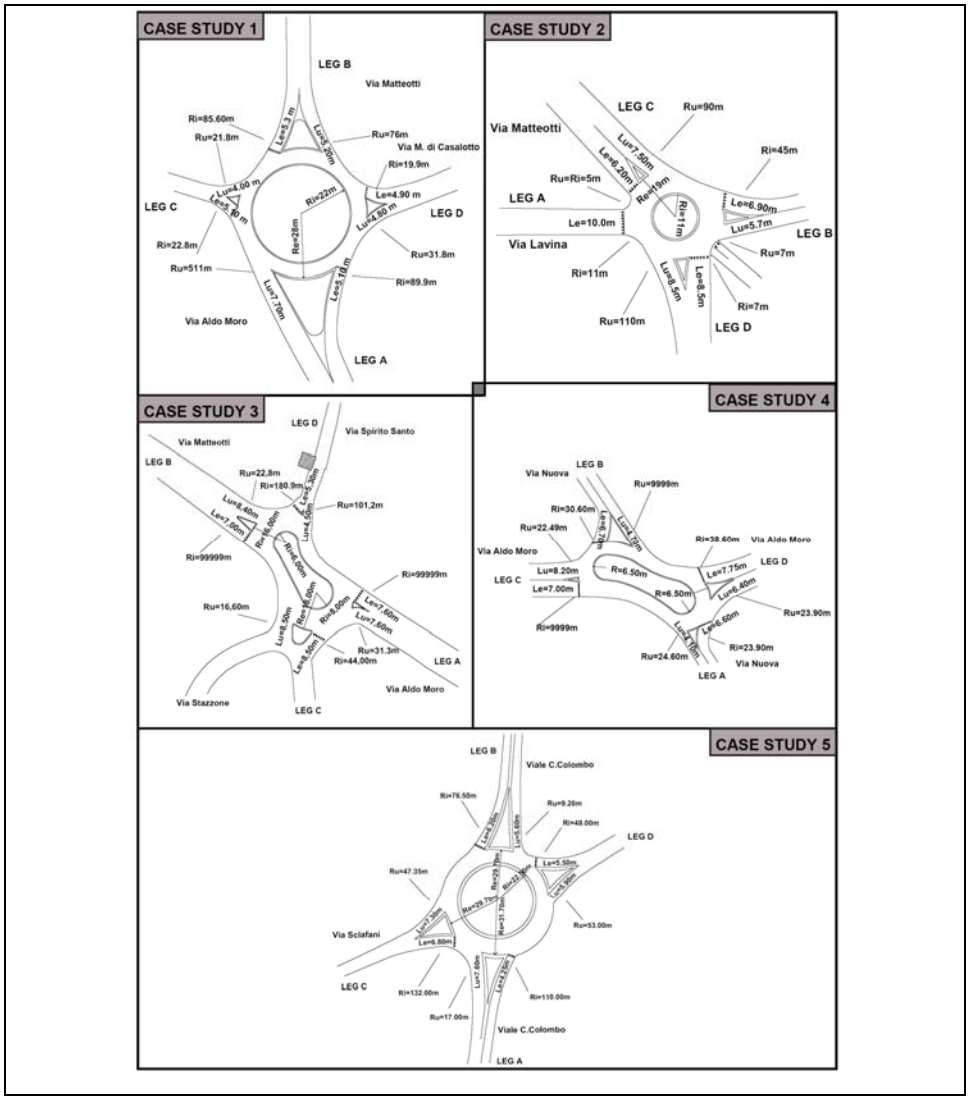

Figure 1 Cases study (5 Roundabouts)

Table 1 Geometric parameters (case study No. 1)

	Leg A	Leg B	Leg C	Leg D
Entry width (m)	5.10	5.32	5.10	4.90
Entry radius (m)	89.9	85.6	22.8	19.9
Exit width (m)	7.70	5.20	4.0	4.80
Exit radius (m)	510	76	22	32
Central island radius (m)	22,00			
Inscribed circle radius (m)	28,00			

Table 2 Peak hour volumes (8.00-9.00) (case study No. 1)

	Leg A	Leg B	Leg C	Leg D
Leg A	0	188	398	70
Leg B	444	0	186	50
Leg C	149	32	0	47
Leg D	114	27	149	0

Table 3 Accident data (2002-2005) (case study No. 1)

Year	Accident description
2002, 2005	No accident
2003	Entering-circulating accident (leg C) between a car and a truck.
2004	Single vehicle accident (a car from leg C)

Table 4 Predicted accident "Arndt-Troutbeck" model (case study No. 1)

Leg	Single-Vehicle Accidents	Approaching-Rear-End-Vehicle Accidents	Entering/ Circulating-Vehicle Accidents	Exiting/ Circulating-Vehicle Accidents	Sideswipe -Vehicle Accidents	"Other" Accidents	TOTAL
A	0,08098	0,00635	0,04519	0	0	0,02251	**0,15503**
B	0,03558	0,01633	0,07419	0	0	0,02334	**0,14943**
C	0,00629	0,00051	0,03022	0	0	0,00782	**0,04484**
D	0,01790	0,00032	0,01951	0	0	0,00995	**0,04768**
	0,14075	**0,02350**	**0,16909**	**0**	**0**	**0,06363**	**0,39698**

Table 5 Predicted accident "Maycock-Hall" model (case study No. 1)

Leg	Entry-Circulating	Approaching	Single Vehicle	Other (Vehicle)	Pedestrian	TOTAL
A	0,0955	0,0621	0,2528	0,0233	0	**0,4337**
B	0,1330	0,0695	0,285	0,0696	0	**0,5571**
C	0,0307	0,0125	0,0651	0,0222	0	**0,1305**
D	0,0611	0,0343	0,1638	0,1108	0	**0,3700**
	0,3203	**0,1784**	**0,7667**	**0,2259**	**0**	**1,4913**

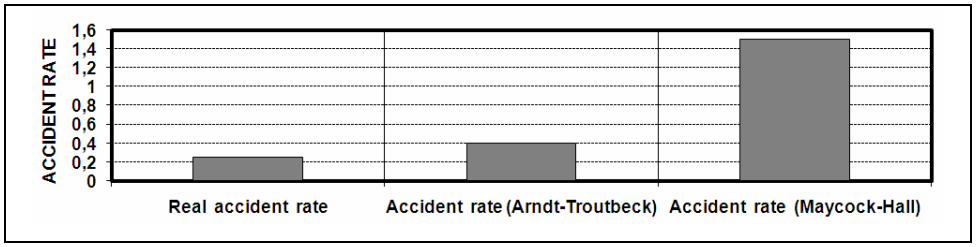

Figure 2 Comparison between real and predicted accident rate (case study No. 1)

3.2 Case Study No. 2

The roundabout is located in Aci Sant'Antonio between two roads: "Matteotti street" (suburban road) and "Lavina street" (local road). The geometric parameters are quoted in Table 4 and in Figure 1. Peak hour volumes are indicated in Table 5. Accident

data were collected for periods of 4 years (Table 8). The tables 9 and 10 compare the number of accidents obtained with "Arndt-Troutbeck" model and "Maycock-Hall" model.

Accident rates are shown in Figure 3. The Arndt-Troutbeck value is similar to real accident rate; the Maycock-Hall value is triple. Also "Arndt-Troutbeck" accident rate is due to entering-circulating accident, that is the most frequent accident type.

Table 6 Geometric parameters (case study No. 2)

	Leg A	Leg B	Leg C	Leg D
Entry width (m)	10,00	6,90	6,20	8,50
Entry radius (m)	11,00	45,00	5,00	7,00
Exit width (m)	0	5,70	7,50	8,50
Exit radius (m)	5,00	7,00	90,00	110,00
Central island radius (m)	11,00			
Inscribed circle radius (m)	19,00			

Table 7 Peak hour volumes (8.00-9.00) (case study No. 2)

	Leg A	Leg B	Leg C	Leg D
Leg A	0	325	223	84
Leg B	0	0	167	164
Leg C	0	82	0	99
Leg D	0	128	307	0

Table 8 Accident data (2002-2005) (case study No. 2)

Year	Accident description
2002, 2005	No accident
2003	Entering-circulating accident (leg A) between a car and a motorcycle
2004	Approaching/rear end accident between two car

Table 9 Predicted accident "Arndt-Troutbeck" model (case study No. 2)

Leg	Single-Vehicle Accidents	Approaching-Rear-End-Vehicle Accidents	Entering/ Circulating-Vehicle Accidents	Exiting/ Circulating-Vehicle Accidents	Sideswipe -Vehicle Accidents	"Other" Accidents	TOTAL
A	0,02009	0,00079	0,04876	0	0	0,02169	**0,09132**
B	0,00903	0,00082	0,05300	0	0	0,01136	**0,07421**
C	0,00880	0,00074	0,02977	0	0	0,00622	**0,04552**
D	0,02112	0,01035	0,17601	0	0	0,01492	**0,22241**
	0,05904	**0,01270**	**0,30754**	**0**	**0**	**0,05419**	**0,43346**

Table 10 Predicted accident "Maycock-Hall" model (case study No. 2)

Leg	Entry-Circulating	Approaching	Single Vehicle	Other (Vehicle)	Pedestrian	TOTAL
A	0,0336	0,0664	1,1279	0,0262	0	**1,2561**
B	0,0601	0,0178	0,0877	0,0228	0	**0,1924**
C	0,0341	0,0103	0,1690	0,0097	0	**0,2231**
D	0,1573	0,0217	0,1794	0,0384	0	**0,3968**
	0,2851	**0,1162**	**1,5640**	**0,0971**	**0**	**1,6608**

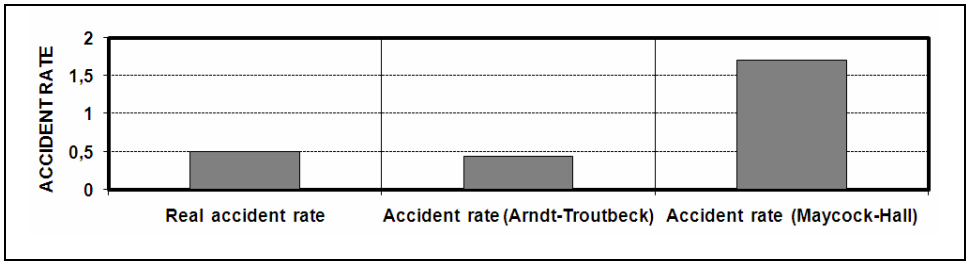

Figure 3 Comparison between real and predicted accident rate (case study No. 2)

3.3 Case Study No. 3

The roundabout is located in Aci Sant'Antonio between two roads: "Matteotti street" (suburban road) and "Spirito Santo street" (local road). It isn't circular but has a "8" configuration. The geometric parameters are quoted in Table 11 and in Figure 1.

Table 11 Geometric parameters (case study No. 3)

	Leg A	Leg B	Leg C	Leg D
Entry width (m)	7,60	7,00	8,50	5,30
Entry radius (m)	9999	9999	44,00	180,09
Exit width (m)	7,60	8,40	8,50	4,50
Exit radius (m)	31,25	22,83	16,60	101,15
Central island radius (m)	min 6,00 – max 8,00			
Inscribed circle radius (m)	min 16,00 – max 18,00			

Table 12 Peak hour volumes (8.00-9.00) (case study No. 3)

	Leg A	Leg B	Leg C	Leg D
Leg A	0	64	4	24
Leg B	76	0	180	140
Leg C	57	99	0	184
Leg D	39	227	95	0

Table 13 Accident data (2002-2005) (case study No. 3)

Years	Accident description
2002, 2003, 2004, 2005	No accident

Table 14 Predicted accident "Arndt-Troutbeck" model (case study No. 3)

Leg	Single-Vehicle Accidents	Approaching-Rear-End-Vehicle Accidents	Entering/ Circulating-Vehicle Accidents	Exiting/ Circulating-Vehicle Accidents	Sideswipe -Vehicle Accidents	"Other" Accidents	TOTAL
A	0,00363	0,00104	0,03743	0	0	0,00316	**0,04528**
B	0,02758	0,00383	0,05751	0	0	0,01359	**0,10251**
C	0,01914	0,00059	0,03458	0	0	0,01167	**0,06598**
D	0,00807	0,00038	0,06180	0	0	0,01239	**0,08265**
	0,05842	**0,00585**	**0,19134**	**0**	**0**	**0,04081**	**0,29642**

Peak hour volumes (8.00-9.00) are indicated in Table 12. Accident data were collected for periods of 4 years (Table 13). The tables 14 and 15 compare the number of accidents obtained with "Arndt-Troutbeck" model and "Maycock-Hall" model.

Accident rates are shown in Figure 4. The Australian value (Arndt-Troutbeck) is similar to real accident rate.

Table 15 Predicted accident "Maycock-Hall" model (case study No. 2)

Leg	Entry-Circulating	Approaching	Single Vehicle	Other (Vehicle)	Pedestrian	TOTAL
A	0,0783	0,0016	0,0476	0,0098	0	**0,1373**
B	0,0539	0,0201	0,1531	0,0071	0	**0,2342**
C	0,1920	0,0144	0,0703	0,0153	0	**0,2920**
D	0,1180	0,0285	0,1039	0,0140	0	**0,2644**
	0,4422	**0,0646**	**0,3749**	**0,0462**	**0**	**0,9279**

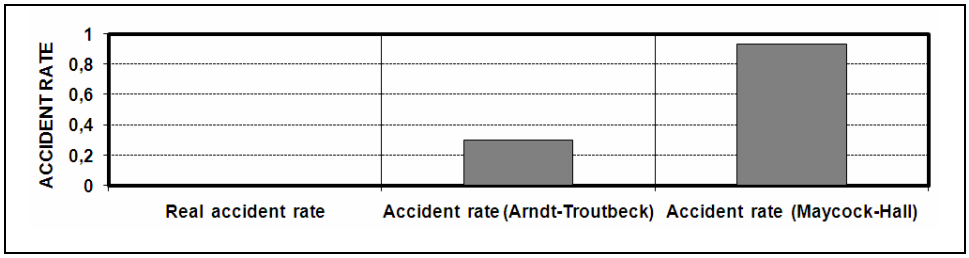

Figure 4 Comparison between real and predicted accident rate (case study No. 3)

3.4 Case Study No. 4

The roundabout is located in Aci Sant'Antonio between two roads: "Matteotti street" (suburban road) and "Nuova street" (local road). It isn't circular but has a "8" configuration. The geometric parameters are quoted in Table 16 and in Figure 1. Peak hour volumes are indicated in Table 17. Accident data were collected for periods of 4 years (2002 – 2005) (Table 18). The tables 19 and 20 compare the number of accidents, by accident group, obtained with "Arndt-Troutbeck" model and "Maycock-Hall" model.

Accident rates are shown in Figure 5. The value of Arndt-Troutbeck is similar to real accident rate; the value of Maycock-Hall is quadruple of real accident rate. Also "Arndt-Troutbeck" accident rate is due to entering-circulating accident, that is the most frequent accident type.

Table 16 Geometric parameters (case study No. 4)

	Leg A	Leg B	Leg C	Leg D
Entry width (m)	6,60	6,70	7,00	7,75
Entry radius (m)	23,90	30,60	9999	38,56
Exit width (m)	4,10	4,70	8,20	6,40
Exit radius (m)	24,55	9999	22,49	23,93
Central island radius (m)	6,50			
Inscribed circle radius (m)	13,00			

Table 17 Peak hour volumes (8.00-9.00) (case study No. 4)

	Leg A	Leg B	Leg C	Leg D
Leg A	0	33	204	72
Leg B	24	0	21	20
Leg C	120	27	0	352
Leg D	143	29	288	0

Table 18 Accident data (2002-2005) (case study No. 4)

Year	Accident description
2002, 2004, 2005	No accident
2003	Entering-circulating accident (leg C) between a car and a motorcycle

Table 19 Predicted accident "Arndt-Troutbeck" model (case study No. 4)

Leg	Single-Vehicle Accidents	Approaching-Rear-End-Vehicle Accidents	Entering/ Circulating-Vehicle Accidents	Exiting/ Circulating-Vehicle Accidents	Sideswipe-Vehicle Accidents	"Other" Accidents	TOTAL
A	0,01808	0,00056	0,06661	0	0	0,01060	**0,09586**
B	0,00353	0,00010	0,02136	0	0	0,00223	**0,02722**
C	0,03232	0,00644	0,05997	0	0	0,01713	**0,11585**
D	0,04033	0,00425	0,05511	0	0	0,01579	**0,11548**
	0,09426	**0,01135**	**0,20305**	**0**	**0**	**0,04575**	**0,35441**

Table 20 Predicted accident "Maycock-Hall" model (case study No. 4)

Leg	Entry-Circulating	Approaching	Single Vehicle	Other (Vehicle)	Pedestrian	TOTAL
A	0,1418	0,0187	0,0871	0,0369	0	**0,2845**
B	0,0383	0,0011	0,0209	0,0057	0	**0,0660**
C	0,1516	0,0298	0,1842	0,0242	0	**0,3898**
D	0,0959	0,0310	0,2366	0,0200	0	**0,3835**
	0,4276	**0,0806**	**0,5288**	**0,0868**	**0**	**1,1238**

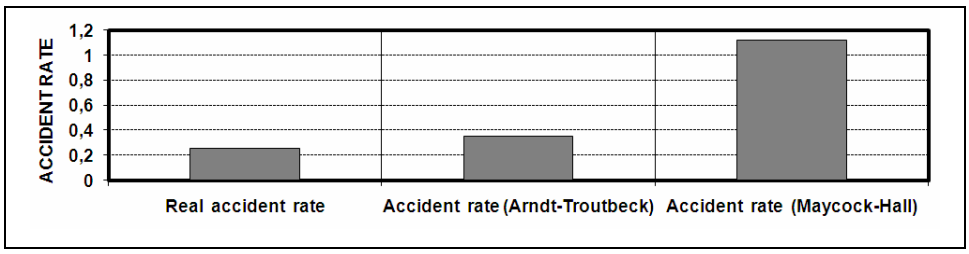

Figure 5 Comparison between real and predicted accident rate (case study No. 4)

3.5 Case Study No. 5

The roundabout is located in Acireale between two roads: "Cristoforo Colombo street" (suburban road, V=60 km/h) and "Sclafani street" (local road, V=40 km/h).

This roundabout merge vehicular flows coming from "A18" highway, vehicular flows heading to commercial area and vehicular flows heading to city hospital. There is an important "U-turn" flows.

The geometric parameters are quoted in Table 21 and in Figure 1. Peak hour volumes (18.00 – 19.00) are indicated in Table 22.

Accident data were collected for periods of 4 years (2002 – 2005) (Table 23).

The tables 24 and 25 compare the number of accidents, by accident group, obtained with "Arndt-Troutbeck" model and "Maycock-Hall" model.

Table 21 Geometric parameters (case study No. 5)

	Leg A	Leg B	Leg C	Leg D
Entry width (m)	4,25	6,20	6,80	5,50
Entry radius (m)	110,00	76,50	132,00	48,00
Exit width (m)	7,60	5,60	7,30	5,90
Exit radius (m)	17,00	9,20	47,35	87,90
Central island radius (m)	22,50			
Inscribed circle radius (m)	min 29,70 – max 31,70			

Table 22 Peak hour volumes (18.00-19.00) (case study No. 5)

	Leg A	Leg B	Leg C	Leg D
Leg A	685	1810	113	125
Leg B	1462	0	67	9
Leg C	20	171	0	4
Leg D	121	195	36	0

Table 23 Accident data (2002-2005) (case study No. 5)

Year	Accident description
2003	Sideswipe accident between two cars (leg B)
2004	Single vehicle accident (leg D)
2004	Entering/circulating accident between a car (leg D) and a motorcycle
2004	Single vehicle accident (leg B)
2004	Accident of unsure details
2004	Approaching/rear-end accident between two cars (leg B)
2005	Approaching/rear-end accident between two cars (leg A)
2005	Accident of unsure details
2005	Entering/circulating accident between a car (leg A) and a motorcycle

Table 24 Predicted accident "Arndt-Troutbeck" model (case study No. 5)

Leg	Single-Vehicle Accidents	Approaching-Rear-End-Vehicle Accidents	Entering/ Circulating-Vehicle Accidents	Exiting/ Circulating-Vehicle Accidents	Sideswipe -Vehicle Accidents	"Other" Accidents	TOTAL
A	0,37768	0,03700	0,14280	0,02642	0,04885	0,09380	**0,72654**
B	0,17284	0,02878	0,10649	0,03333	0,02673	0,05280	**0,42097**
C	0,00720	0,00117	0,00643	0,01585	0,00232	0,00669	**0,03966**
D	0,02593	0,00216	0,00683	0,00444	0,00741	0,01208	**0,05885**
	0,58365	**0,06910**	**0,26256**	**0,08004**	**0,08530**	**0,16537**	**1,24602**

Table 25 Predicted accident "Maycock-Hall" model (case study No. 5)

Leg	Entry-Circulating	Approaching	Single Vehicle	Other (Vehicle)	Pedestrian	TOTAL
A	0,0951	0,7559	0,7802	0,0510	0	**1,6822**
B	0,0734	0,2559	0,5506	0,0438	0	**0,9237**
C	0,1125	0,0065	0,0442	0,0347	0	**0,1979**
D	0,1281	0,0249	0,0912	0,0841	0	**0,3283**
	0,4091	**1,0432**	**1,4662**	**0,2136**	**0**	**3,1321**

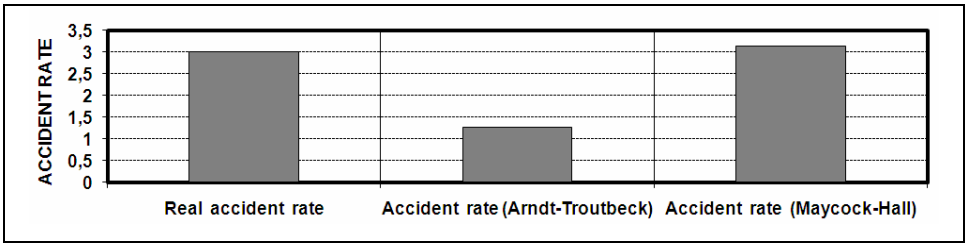

Figure 6 Comparison between real and predicted accident rate (case study No. 5)

Accident rates are shown in Figure 6. Unlike previous case, the value of Maycock-Hall is similar to real accident rate; the value of Arndt-Troutbeck is 1/3 of real accident rate.

4. CONCLUSION

Comparing real accident rate with previsional model results, the Arndt-Troutbeck model is more reliable. Out of four roundabout, the values of this model are similar to real accident rate, whereas "Maycock-Hall" values are over-estimated.

In the roundabout with high vehicular flows and high delays, the value of Maycock-Hall is similar to real accident rate.

Finally, survey sample must be extended, in order to understand how the traffic condition (medium/low vehicular volumes, congestion) influence the accident previsional model.

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