

The Effect of Type of Attributes on the Fill-Ability of Accident Reporting Forms (ARF)

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Abstract

Accident Reporting Form (ARF) is the basic building block of an Accident Database. Incorrect and incomplete forms result into the formation of erroneous database which contains partial or no essential information required for the statistical analysis of accident data. Policies made on the basis of the results of such databases will have little or no effect on the improvement of safety of roadway facilities. In most countries filling of the ARF is the responsibility of Police/Investigating officers. Due to lack of interest, all the details are not recorded by them. Thus, it is very important to investigate the type of attributes and their respective items filled most. The objective of this study is to evaluate the attributes given most importance by the person in charge of filling the ARF and the items most neglected. The probable reasons for the complete/incomplete recording of the details of certain items were also examined. For this study a total of 642 forms were obtained from the Malaysian Institute of Road Safety Research (MIROS) for evaluation. Each form contained 91 attributes, as per number given in the accident reporting form known as POL 27. The items were divided with respect to driver, passenger, vehicle, pedestrian, location, road environment, road information and additional information. The fill-ability for each item was estimated in terms of percent filled. The items were evaluated in terms of least and most filled and the probable reason for the complete/incomplete filling of each item was then investigated. It was found that items related to location were most neglected. The second most incomplete items were associated with the vehicle and the driver. While the attributes related to the road and the environment were found to be the most filled. The probable reason for lack of fill-ability of location related items was their placement in inappropriate sections. The important finding of this study is the high number of items in the POL 27 which makes it difficult for the officer to fill the form completely and is the major cause of reduced fill-ability.

Keywords: Accident Reporting Form, Investigating Officer, Crash Location, Road Environment

1. Introduction

Whenever an accident occurs, an official from a government agency is required to document the details of the event in the form of an official report. In most countries around the world, the government agency responsible for accident reporting is the Police and the official form is known as an Accident Reporting Form (ARF). Accident databases are formulated when information from several ARFs are accumulated together. This makes an ARF the basic building block of an accident database. Incorrect and incomplete forms result into the formation of erroneous database which contains partial or no essential information required for the statistical analysis. Assessment of such data leads to inefficient allocation of resources [1]. Policies made on the basis of the results of such databases will have little or no effect on the improvement of

safety of roadway facilities. This emphasizes the importance of the correct and complete filling of an ARF.

In most countries filling of the ARF is the responsibility of Police/Investigating officers. Due to time limitation or lack of interest, all the details are not recorded by them and Malaysia is no exception. Discrepancy in Malaysian accident data has been highlighted in previous research [2]. Other low and middle-income or developing countries also experience similar problems related to their accident data such as China [3], South Africa [4] and Saudi Arabia [5]. Accumulation of errors in the accident data starts with the incorrect or incomplete filling of an ARF. This in turn is the result of too many or too complex attributes used to define a particular item and too many items related to a single variable. Thus, the database formulated from such ARFs has overrepresentation of responses related to some items, as they are more filled in contrast to some items which are less filled. This indicates that there exists a relationship between the fill-ability of ARF and its number of items.

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Although several investigations have been undertaken by different researchers to highlight and rectify the errors in the accident database but none have ventured into the analysis of the ARF itself. To the best of authors' knowledge, no literature is available that examines the effect of various items and their attributes on the fill-ability of ARFs. This knowledge gap has provided the motivation for this study. This paper aims to investigate all the items in the Malaysian ARF and their fill-ability. The complete/incomplete recording of the details of the items were examined and probable reasons for their respective percentage fill are provided. The most important finding of this study is the high number of items in the ARF which makes it difficult for the officer to fill the form completely. The complexity of the information being asked in some of the items was among the other probable reasons behind the low percentage fill of the various items in the ARF.

2. Methodology

All In this section first the procedure for data collection is described followed by the detailed explanation about the attributes of the Malaysian accident reporting form. The number and type of choices available for each item in the 'POL 27' form have been defined to eliminate any ambiguities related to their understanding.

2.1. Data Collection

For this study a total of 642 forms were obtained from the Malaysian Institute of Road Safety Research (MIROS) for evaluation. The data, that is the accident forms, was collected only for which the complaints were registered with the Police in 2011. Forms related to unsignalized intersections were selected as they constitute a huge number among the fixed facilities on the road infrastructure of Malaysia [6, 7]. Access points or unsignalized intersections are considered as one of the main contributing factors for motorcycle fatalities in Malaysia and are the probable sources where accidents occur [8]. The data primarily comprised of three-leg, four-leg and staggered intersections located in the state of Penang which lies on the west coast of Peninsular Malaysia. Each form contained 91 items, as per number given in the accident reporting form known as POL 27. The data was obtained in the form of a spread sheet with each column representing a particular attribute while the rows contained the information for each crash recorded. The fill-ability for each item was estimated in terms of percentage filled out of all the entries relevant to a particular item. For example, the percentage fill for the items relevant to pedestrians and passengers were estimated out of the accidents involving pedestrians and passengers only, while the percentage fill for the rest of the items were estimated out of the total number of accidents under analysis, which are 642.

2.2. Malaysian Accident Reporting Form 'POL 27'

The Malaysian accident reporting form is a six page official document known as 'POL 27'. An officer from the Royal Malaysian Police is responsible for filling the above in case of an accident. The form comprises of 91 items, as shown in Table 1, through which different variables related to an accident can be measured such as the vehicle, the driver, the passenger, the pedestrian, the road, the environment, the location of accident, sketch of events and sketch of location. The form begins with a section related to record keeping only, such as an official identification number or 'id' to be assigned

once it reaches the office. There are 13 states in Malaysia excluding the federal territories. Each state and two of the federal territories have been assigned with a code for identification. Therefore, the first item 'state' is to be filled with one out of the 15 codes available. The second item 'district' has to be filled with one out of the 149 codes available, depending upon the district where the accident occurred. The third item is related to the police station number. Every police station has a certain jurisdiction and only the police officer specific to that station responds to the accidents that occur within its jurisdiction. Therefore, there is no other choice available for the item 'police station number' except the number of the station within whose jurisdiction the accident occurred. The fourth item is the report number whiles the fifth, sixth, seventh and eight items are related to the year, month, date and time of accident respectively. The ninth item is related to the day of the week which has seven choices provided in the form, each representing a code given to each day of the week. Number of vehicles involved and number of vehicles damaged are the 10th and 11th item while the number of drivers killed, number of drivers injured, number of passengers killed, number of passengers injured, number of pedestrians killed and number of pedestrians injured are the 12th, 13th, 14th, 15th, 16th and 17th items respectively. Since, there should be atleast one vehicle involved in an accident, therefore, any positive integer from 1to 99 can be filled in the boxes provided for the 10th item while for the items 11 to 17 the boxes could be filled any positive integer from zero to 99 depending upon the number of drivers, passengers and pedestrians killed or injured in the accident.

The 18th item is 'accident severity' which could be fatal, severe, slight or damage only. Hence, there are four choices provided in the form for this item. The next item is the 'road surface type' which could be any among the five choices provided in the form which are; crusher run, brick, bitumen, concrete and earth, depending upon the site. 'Traffic system' is the 20th item which could be any among the four choices given in the form namely; one way, two way, three lane and dual carriageway, as per site. The 21st item is 'road geometry' that can be selected from the seven choices provided in the form which are; straight road segment, curve, roundabout, intersections having 4-legs or more, junction T/Y, staggered junction, or gradient intersection, depending upon the site conditions. The 22nd item 'quality of surface' can be described whether smooth, pothole, rutted, or corrugated as per site conditions, from the choices available in the form. There are only two options provided in the form for the 23rd item 'road condition' which is either flat or steep. For the 24th item 'lane marking' there are six choices provided in the form which are; double, single, one way, divider, U-turn and no marking. The 25th item 'hit and run' is binary in nature; therefore, the two options provided in the form are yes and no. There are nine options provided in the form for the 26th item 'control type' which refers to the traffic control pertinent at the accident site. The nine possible traffic control types are Police, other agencies, traffic signal, zebra crossing, zebra crossing with traffic light, railway crossing, yellow light, yellow box and no control. Next two items are 'road width' and 'shoulder width' respectively, to be measured in meters and could be any value from zero to 99 as per accident site. Two set of boxes are provided to note down the widths of the left and the right shoulders separately. 'Shoulder type' is the 29th item and has two options provided in the form which are paved and unpaved. The 30th item is the 'road defect' for which the officer has to select from the twelve choices provided in the form which are; shoulders low/high, manhole low/high, loose gravel, dusty roads, pothole, slippery road, defective traffic lights,

narrow railway crossings, narrow bridge, no guard rails, no/insufficient street lights, not relevant. The next item is the ‘speed limit’ for which six options are provided in the form which are 50, 70, 80, 90, 110 km/h and “other”. The 32nd item is the ‘road surface condition’ that can be described through the six options provided in the form which are dry, flooded, wet, oily, sandy and reconstruction work. The next item is the ‘collision type’. To describe this item there are 13 options provided in the form which are head on, rear end, 90 degree, angular/side, side swipe, squeezed, hitting animal, hitting object on road, hitting object off road, hitting pedestrian, overturned, out of control, and broken windscreen. To measure the variable ‘Environment’ there are two items available; ‘weather’ and ‘light condition’, each having four options provided in the form. The 34th item ‘weather’ could be clear, windy, foggy or rainy, while the 35th item ‘light condition’ could be day, early morning/evening, night time with light and night time without light.

The fourth section in the order of the variables in the ‘Pol 27’ deals with the items related to accident’s location. It contains item number 36 to 39 which are road type, route number, location type, and area type respectively. The choices given in the form to describe ‘road type’ are expressway, federal road, state road, municipal road, and other, while boxes are provided to note down the ‘route number’ with respect to the highway or road where the accident occurred. There are four ‘location type’ given in the form which is city, town, small town, and rural, while the ‘area type’ could be any among the seven choices provided which are residential, office, shopping, industrial/construction, bridge/pedestrian bridge, school, other/unknown. The fifth section is related to the vehicle involved in the accident. It has 12 items. The first three items, which are vehicle model, vehicle year of manufacture, and vehicle number, are numbered 40, 41 and 42 respectively and have boxes in which the relevant information could be noted. The 43rd item is ‘vehicle type’ and has 20 choices provided in the form which are express bus, stage bus, factory bus, mini bus, tour/excursion bus, school bus, 4 wheel drive, special duty vehicle, bullock cart, lorry trailer, rigid lorry, small lorry, motorcar, motorbike > 250 cc, motorbike < 251 cc, taxi, trishaw, van, hired car, and bicycle. The next item is the ‘vehicle ownership’ that can be described as per the six choices provided in the form, which are; personal, goods, services, government, police, and military. The item of ‘vehicle damage’ is supported by the diagram of a motorcycle and a car provided in the POL 27 showing the seven options marked along the picture as none, front, rear, right, left, roof, and multiple. The 46th item is ‘vehicle movement’ that could be parked, suddenly stopped, diverging, converging, out of control, right turn, left turn, overtaking, U-turn, forward, reversing, and others, as per the 12 choices provided in the form depending upon the movement of the vehicle involved in the accident. The choices provided to describe ‘vehicle defects’ are brakes, broken windscreen, no light, defective lamps, steering, old tyre, rethread tyre, bald tyre, wiper, excessive smoke, and not relevant. The items ‘vehicle modification’ and ‘tyre burst’ are binary in nature, each having two options yes and no while boxes are provided to note down the information related to ‘length of skid marks’ to be measured in meters. The last item in the fifth section is ‘foreign vehicle’. It has six options which are Singapore, Thailand, diplomat, Brunei, others, and not applicable.

All the items pertinent to the driver are contained in the sixth section of POL 27. There are 15 items provided, all of which are numbered from 52 to 63 except three which are license class, its date of expiry and ‘PSV Permit’ to be chosen either yes or no. The names of the numbered items are driver sex,

age, race, how got license, license classification, driver injury, driver belt wearing, driver part of body injured, driver errors, driver qualification, drinking driving, and driver occupation. The two choices available for ‘driver sex’ are male and female while boxes are provided to note down the ‘age’ of the driver. Options of 11 races are given in the form which are Malay, Chinese, Indian, Kadazan, Murut, Melanau, Bajau, Bidayuh, Iban, foreign, and other, to classify the driver’s ‘race’. The three options given in the form about ‘how got license’ is private, driving school, and irrelevant. In terms of ‘license classification’ there are seven classes available in the form which are no license, L License, full license < 5 years, full license > 5 years, international license/foreign, police license, and military license. The four options provided to describe ‘driver injury’ are fatal, serious, slight and no injury. For describing the ‘driver belt wearing’ status the six options provided in the form are belt, no belt, helmet, turban, helmet but unprotected, and no helmet. The item of ‘driver part of body injured’ is elaborated with the help of a diagram showing the nine options marked along the picture of a human body as head, neck, chest, arms, back, hip, legs, multi, and none. In order to describe ‘driver errors’ the 15 choices given are careless entry/exit, negligent signalling, overloading (goods), overloading (passengers), wrong parking, drugs, careless driving, dangerous driving, dangerous turning, dangerous overtaking, driving too close, speeding, traffic light violation, other offences, and not at fault. The ‘qualification’ of the driver could be chosen from the four options provided which are none, primary, secondary, and higher institute/university. The last two items, which are ‘drinking driving’ and ‘driver occupation’, have three attributes each to describe them respectively. The options available for ‘drinking driving’ are not suspected, positively tested, and negatively tested, while for ‘driver occupation’ the options are working, student and none. All the items related to the vehicle and the driver, that is from item number 40 to item number 63, is contained in one page. A similar page is provided in the ‘POL 27’ to note down all the information related to another vehicle and driver, if involved in the accident.

The seventh section of the form is related to passenger and pedestrian. Both sections seven and eight, which is additional information, are arranged on a single page. This is the fourth page of POL 27. It also contains item number 80, 81 and 82 which are; animal fault, vehicle damage cost, and property lost respectively, which do not belong to any section. Boxes are provided to note down the value of the ‘vehicle damage cost’ and ‘property lost’ while four options are available for ‘animal fault’ which are dog, goat, cow, and not applicable. Information upto 12 passengers can be noted down on one sheet as the items related to them are arranged in column and each row represents each passenger. The first column is the name of the passenger while the rest of the columns starting from number 64 and ending at number 71 represent vehicle code of the passenger injured, sex of the passenger injured, race of the passenger injured, age of the passenger injured, type of injury of the passenger injured, part of body of the passenger injured, belt wearing status of the passenger injured, and position of the passenger injured respectively. In a similar manner information upto six pedestrians can be noted down on one sheet as the items related to them are arranged in column and each row represents each pedestrian. The first column is the name of the pedestrian while the rest of the columns starting from number 72 and ending at number 79 represent sex of the pedestrian injured, race of the pedestrian injured, age of the pedestrian injured, type of injury of the pedestrian injured, part of body of the pedestrian injured, action of the pedestrian injured, location of the pedestrian injured and school pupil

Table 1. Name, number of choices/attributes of each item and their number in Pol 27

Serial No. in POL 27	Name of Item	No. of attributes /choices provided in the form	Serial No. in POL 27	Name of Item	No. of attributes /choices provided in the form	Serial No. in POL 27	Name of Item	No. of attributes /choices provided in the form
1	state	*	32	road surface condition	6	63	driver occupation	3
2	district	*	33	collision type	13	64	vehicle code of the passenger injured	*
3	police station number	*	34	weather	4	65	sex of the passenger injured	2
4	report number	*	35	light condition	4	66	race of the passenger injured	11
5	year	*	36	road type	5	67	age of the passenger injured	*
6	month	*	37	route number	*	68	type of injury of the passenger injured	3
7	date	*	38	location type	4	69	part of body of the passenger injured	8
8	time of accident	*	39	area type	7	70	belt wearing status of the passenger injured	6
9	day of the week	7	40	vehicle model	*	71	position of the passenger injured	3
10	number of vehicles involved	*	41	vehicle year of manufacture	*	72	sex of the pedestrian injured	2
11	number of vehicles damaged	*	42	vehicle number	*	73	race of the pedestrian injured	11
12	number of drivers killed	*	43	vehicle type	20	74	age of the pedestrian injured	*
13	number of drivers injured	*	44	vehicle ownership	6	75	type of injury of the pedestrian injured	3
14	number of passengers killed	*	45	vehicle damage	7	76	part of body of the pedestrian injured	8
15	number of passengers injured	*	46	vehicle movement	12	77	action of the pedestrian injured	8
16	number of pedestrians killed	*	47	vehicle defect	11	78	location of the pedestrian injured	6
17	number of pedestrians injured	*	48	vehicle modification	2	79	school pupil	4
18	accident severity	4	49	length of skid marks	*	80	animal fault	4
19	road surface type	5	50	tyre burst	2	81	vehicle damage cost	*
20	traffic system	4	51	foreign vehicle	6	82	property lost	*
21	road geometry	7	52	driver sex	2	83	kilometre post	*
22	quality of surface	4	53	driver age	*	84	nearest kilometre post	*
23	road condition	2	53	driver race	11	85	map series	*
24	lane marking	6	54	how got license	3	86	map code	*
25	hit and run	2	55	license status	7	87	longitude	*
26	control type	9	56	driver injury	4	88	latitude	*
27	road width	*	57	driver belt wearing	6	89	nod 1	*
28	shoulder width	*	58	driver part of body injured	9	90	nod 2	*
29	shoulder type	2	59	driver errors	15	91	direction of travel	8
30	road defect	12	60	driver qualification	4			
31	speed limit	6	61	drinking driving	3			

*No attribute/choice provided in the form or not applicable to the item

respectively. Boxes are provided for all items numbered from 64 to 79, to enter the code of the relevant option applicable to the case under investigation.

The set of options provided for ‘sex’ and ‘race’ of the passenger or pedestrian injured is the same as that of driver while three and eight options are provided for the ‘type of injury of the passenger/pedestrian injured’ and ‘part of body of the passenger/pedestrian injured’ respectively, instead of four and nine, omitting the option of *none*. To describe the ‘belt wearing status of the passenger injured’ six options are provided which are same as that of ‘driver belt wearing’ status. The three options available to describe the ‘position of the passenger injured’ are front passenger, rear passenger, and not

applicable. The third last item related to the pedestrian is ‘action of the pedestrian injured’ for which the options available are; walking/working/playing on the street, sport, handicap, careless crossing, drugs, drunk, not using crossing facilities, and sick/crazy. The second last item related to the pedestrian is ‘location of the pedestrian injured’ for which the options available are; crossing area, around 50m from pedestrian crossing, divider, in the middle of the road, walkway, and other. The last item related the pedestrian injured is to be filled if he/she is a student. The options available to describe ‘school pupil’ is not student, to/from school, outside school hours, and other.

The eighth and the last section of the ‘POL 27’ form is additional information which contains items numbered from 83 to 91 which are kilometre post, nearest kilometre post, map series, map code, longitude, latitude, nod 1, nod 2, and direction of travel. Boxes are provided to note down the information related to item number 83 to 90 while a wagon wheel diagram is given in the form to elaborate the eight options provided to describe the ‘direction of travel’. Some of the items were part of the form but were not numbered such as name of road or intersection, name of place which lies before as well as after the kilometre post where the accident occurred, serial number of road section, in case of no kilometre post the name of place and its distance from the location of accident as well as the name of place which lies towards the location of accident. These items were provided on the first page of the form in a section that has no number. The last two pages are provided to draw the accident collision sketch and location sketch and to note down any details related to the scheme of events such as how the collision took place, how many vehicles and drivers/passengers/pedestrians were involved and what were the directions of travel of each vehicle.

3. Results and Discussion

Technically the Malaysian accident reporting form ‘POL 27’ is divided into 14 sections out of which eight are alphabetically numbered from ‘A’ to ‘H’. The percentage fill of the items which were numbered as well as the items which were not numbered or do not belong to any section are also shown in Table 2. The results indicate that all the items in the first five sections, including the one which is for office use and contains information related to report ID, were found to be 100% filled. There could be two reasons for the good fill-ability of these sections. The primary reason being that the complexity of information being asked is low. The first section is merely related to office work such as report ID while the second section, which is related to the first-hand information about the accident, has 18 items which require simple information such as the state and the district codes, police station number, the date, the day of the week, the number of vehicles involved and damaged, the number of drivers, passengers or pedestrians killed or injured. The third and fourth sections require the officer to note very obvious information related to the road and the environment at the time of accident. The third section contains 15 items related to the road and the fourth section contains only two items related to the environment. Just by observing the accident site once the officer can identify the road surface type, traffic system, road geometry, quality of surface, road condition, lane marking, control type, shoulder type, road defect, speed limit, and road surface condition, while the road and the shoulder width could be measured using a measuring wheel or tape. Items such as ‘hit and run’ and ‘collision type’ along with the weather and lighting condition at the time of accident can be obtained by the victim or the person reporting the incident. The fifth section is related to very general information about the accident location. It contains items such as road type, route number, location type, and area type. Therefore, with the least effort and time spent, the officer can fill the first five sections, making them the most filled among all the sections of the POL 27.

The secondary reason for the good fill-ability of the first five sections could be the interest level of the officer filling the form. As he moves forward to the later sections the interest level decreases. Unfortunately the complexity of the information being asked also increases, because the later

sections are related to the identification of the exact spot where the accident occurred, the vehicle and the driver. The sixth section is not numbered but it is the most important section with respect to the information being asked. In this section, the officer is required to measure the distance from the kilometre post, where the accident occurred, to the nearest town or city that lies before as well as after the accident spot. Even if there is no kilometre post available, as in the case of an accident happening on a local road, the officer is still required to measure the distance from the nearest town or city that lies before as well as after the spot where the accident occurred. Measurement of such a long distance is very difficult and time consuming, especially if the nearby towns or cities are located far away from the accident spot. As a result, this section was the second least filled among all the sections. The seventh and the eighth sections contain 13 items related to the ‘vehicle’ and 12 items related to the ‘driver’ respectively. Except ‘vehicle type’, none of the items in the section related to the ‘vehicle’ was 100% filled. Since, the vehicles involved in the accident are quickly removed from the carriageway or completely removed from the accident site to restore the movement of traffic; therefore, this could be the probable reason of the low fill-ability of the items related to ‘vehicle’. While information related to the type of vehicle involved in the accident could be obtained from the victim or the person reporting the incident, information related to other items, such as vehicle model, vehicle year of manufacture, vehicle number, vehicle ownership, vehicle damage, vehicle movement, vehicle defect, vehicle modification, tyre burst, and foreign vehicle; are difficult to obtain unless the vehicles involved in the accident are available for observation. The only item in this section which does not require the observation of the vehicle at all is the length of the skid marks. In some cases there are no skid marks on the road and the officer might be confused whether to put zero or leave this item blank. Therefore, the fill-ability of this item was 80%, as blanks were considered as not filled. In the section related to driver, the only item which was 100% filled was ‘driver error’. As information related to it could be obtained from the victim or the person reporting the incident, therefore, it might be the probable reason for the high fill-ability of this item. The rest of the items related to drivers were found to be 83% to 96% filled except ‘how got license’, which was found to be only 56% filled. As the options available for this item are either private, driving school or irrelevant. Therefore, there seems to be no reason for the low fill-ability of this item except that the officer found this item to be not important and left it blank.

The ninth section, numbered as ‘G’, is related to the items pertinent to the passengers and the pedestrians if involved in the accident. Among all the cases in the data set under investigation, only one case was observed that included a pedestrian. All the attributes related to it were found to be 100% filled. Since, accidents that involve a pedestrian are very rare; therefore, much attention is paid to the information noted. Thus, resulting into high fill-ability of the items related to it. Similarly, accidents that include a passenger being injured or killed might also be less in number as compared to typical accidents that usually occur on Malaysian roads. Therefore, most of the items related to it were also found to be 100% filled. The tenth section, which was not numbered, contained only three items; animal fault, vehicle damage cost, and property lost. Since the information related to the property lost or vehicle damage cost is very important to the victim or the person reporting the accident and information related to animal fault can be easily obtained from the victim or the person reporting the accident; therefore, this could be the probable reason for the 100% fill-ability of these three items.

Table 2. Name of items under each section, their number in POL 27 and percent filled

Report details/time of accident	Serial No. in POL 27	Name of Item	%Filled	Serial No. in POL 27	Name of Item	%Filled	Serial No. in POL 27	Name of Item	%Filled	
Road Information	1	state	100	Location	34	weather	100	Passenger	vehicle code of the passenger injured	100
	2	district	100		35	light condition	100		sex of the passenger injured	100
	3	police station number	100		36	road type	100		race of the passenger injured	98.6
	4	report number	100		37	route number	100		age of the passenger injured	100
	5	year	100		38	location type	100		type of injury of the passenger injured	100
	6	month	100		39	area type	100		part of body of the passenger injured	100
	7	date	100		40	vehicle model	96		belt wearing status of the passenger injured	86
	8	time of accident	100		40	Vehicle model1	85		position of the passenger injured	100
	9	day of the week	100		41	vehicle year of manufacture	79		sex of the pedestrian injured	100
	10	number of vehicles involved	100		42	vehicle number	*		race of the pedestrian injured	100
	11	number of vehicles damaged	100		43	vehicle type	100		age of the pedestrian injured	100
	12	number of drivers killed	100		44	vehicle ownership	83		type of injury of the pedestrian injured	100
	13	number of drivers injured	100		45	vehicle damage	83		part of body of the pedestrian injured	100
	14	number of passengers killed	100		46	vehicle movement	82		action of the pedestrian injured	100
	15	number of passengers injured	100		47	vehicle defect	83		location of the pedestrian injured	100
	16	number of pedestrians killed	100		48	vehicle modification	83		school pupil	100
	17	number of pedestrians injured	100		49	length of skid marks	80	Additional Information	kilometre post	23
	18	accident severity	100		50	tyre burst	81		nearest kilometre post	24
	19	road surface type	100		51	foreign vehicle	82		map series	0
	20	traffic system	100		52	driver sex	93		map code	0
	21	road geometry	100		53	driver age	92		longitude	56
	22	quality of surface	100		54	driver race	91		latitude	52
	23	road condition	100		55	how got license	56		nod 1	0
	24	lane marking	100		56	license status	83		nod 2	0
	25	hit and run	100		57	driver injury	96		direction of travel	31
	26	control type	100	Driver	58	driver belt wearing	84		animal fault	100
	27	road width	100		59	driver part of body injured	84		vehicle damage cost	100
	28	shoulder width	100		60	driver errors	100		property lost	100
	29	shoulder type	100		61	driver qualification	84	Items with no section or number	Name of road/intersection	100
	30	road defect	100		62	drinking driving	84		Nearest Km Post	0
	31	speed limit	100		63	driver occupation	96		Post From 1	40
	32	road surface condition	100			Post From	34		Post From 2	40
	33	collision type	100			Post Towards	34		Post Distance3	39
Items with no section or number						Post Number section1	33		Post From 3	39
						Number section	33		Post Towards 3	39
						PSV Permit	54		Post Km 1	38
						Model	31		Post Km 2	38

*May be due to privacy no information is provided, Veh=Vehicle

The last numbered section of POL 27 is 'additional information'. It contained the last nine items numbered from 83 to 91. Since, the name of the section states that it is the additional information related to the accident, it gives a kind of wrong message to the officer that the information contained in this section is not important and it will not make too much of a difference if it is not being noted. This might be the probable

reason why this section was the least filled among all the sections of POL 27. Although the items listed in this section are the most important with respect to the location of accident, such as latitude and longitude. Inaccurate definition of location related variables have also been reported in previous studies [10, 11] as mentioned in [1]

The last three sections are blank spaces provided to draw the accident collision sketch and location sketch and to note down any details related to the scheme of events such as how the collision took place, how many vehicles and drivers/passengers/pedestrians were involved and what were the directions of travel of each vehicle. Since, it is difficult to convert this information into a spread sheet; therefore, no information related these sections were available in the data obtained from MIROS.

None of the forms, for which the data was obtained, were found to be completely filled. This is a very important finding. It indicates that the ARF contains too many items to be filled and is too lengthy for the Police officer incharge of investigation. As compared to ARFs of other low and middle-income countries like Bangladesh, in which the total number of items is 67, the Malaysian ARF is much lengthier and contains 91 items with several attributes. In high-income and developed countries like USA the total number of items is even less. In some states, such as New York, the total number of items are as less as 30. The total number of items in the UK's ARF, known as 'STATS 19', is 69 [1]. In contrast to the examples of various ARFs given, the verboseness of POL 27 is obvious, which is the main cause of the less percentage fill of its items and incomplete filling of the entire form.

4. Conclusion

It is concluded that the fill-ability of ARFs is highly dependent upon the type of attribute being introduced to describe a particular variable. Items related to accident location were the least filled because the attributes pertinent to it were not only difficult to measure but also irrelevant in some cases. A very good example of such attribute is the 'Kilometre Post' and the 'distance from the nearest town to the spot where the accident occurred'. There are no Kilometre Posts on the local roads and in case of an accident occurring within a particular town, there is no need to measure the distance from the nearest town. Even if the accident occurred on the road in between two villages, it is a cumbersome task for a Police officer to measure the distance from each town to the accident location, especially if the towns are located far away from the accident site. The availability of modern day technology such as smart phones equipped with GPS makes the requirement of distance measurement, from the accident spot to the nearest town, redundant.

Revision of the Malaysian ARF 'POL 27' can help improve the fill-ability as some items such as latitude and longitude were placed under the section of 'additional information'. This made the Police officer assume that this information is not important and even if it is not noted it will not make too much difference in the accident analysis. As a result these were among the least filled items. The probable reason to put latitude and longitude in the additional information could be the lack of technology at the time the form was introduced. Numerous gadgets are available nowadays that can measure the co-ordinates and most contemporary cell phones are either equipped with or have the option of GPS application. Therefore, measurement of latitude and longitude is no longer difficult. Similarly relocation of all the items from the section of 'additional information' to other appropriate sections will help improve their respective fill-ability. Furthermore it is recommended that the total number of items in the POL 27 should be reduced to 80. Police officers responsible for the filling of ARFs should be interviewed and in the light of their suggestions the Malaysian ARF should be revised.

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References

- [1] Austin, K., 1995. The identification of mistakes in road accident records: Part 1, Locational variables. *Accident Analysis and Prevention* 27 (2), 261–276. [https://doi.org/10.1016/0001-4575\(94\)00065-T](https://doi.org/10.1016/0001-4575(94)00065-T)
- [2] Abdul Manan, M.M., Jonsson, T., Várhelyi, A., 2013. Development of a Safety Performance Function for Motorcycle Accident Fatalities on Malaysian Primary Roads. *Safety Science*, 60 (0), 13–20 <https://doi.org/10.1016/j.ssci.2013.06.005>
- [3] Wang, Y.-G., Chen, K.-M., Pei, Y.-L., Wang, Y., 2011. Integrating Before and After Crash Features into Measuring the Effectiveness of Intersection Safety Improvement Project in Harbin. *Transport* 26(1), 111–120. <https://doi.org/10.3846/16484142.2011.565599>
- [4] Chokotho, L.C., Matzopoulos, R., Myers, J. E., 2013. Assessing Quality of Existing Data Sources on Road Traffic Injuries (RTIs) and Their Utility in Informing Injury Prevention in the Western Cape Province, South Africa. *Traffic Injury Prevention* 14(3), 267–273. <https://doi.org/10.1080/15389588.2012.706760>
- [5] Al-Ghamdi, A.S., 2003. Analysis of Traffic Accidents at Urban Intersections in Riyadh. *Accident Analysis and Prevention* 35, 717–724. [https://doi.org/10.1016/S0001-4575\(02\)00050-7](https://doi.org/10.1016/S0001-4575(02)00050-7)
- [6] Ahmed, A., Sadullah, A.F.M., Yahya. A.S., 2014. Accident Analysis using Count Data for Unsignalize Intersections in Malaysia. *Procedia Engineering* 77, 45–52. <https://doi.org/10.1016/j.proeng.2014.07.005>
- [7] Ahmed, A., Sadullah, A.F.M., Yahya. A.S., 2015. .Effect of Roadside Development on the Safety of Intersections without Signals. *Applied Mechanics and Materials* 802, 393–398. <https://doi.org/10.4028/www.scientific.net/AMM.802.393>
- [8] Ahmed, A., Sadullah, A.F.M., Yahya. A.S., 2015. Field Study on the Behavior of Right-Turning Vehicles in Malaysia and Their Contribution on the Safety of Unsignalized Intersections. *Transportation Research Part F*. DOI:10.1016/j.trf.2015.03.006 <https://doi.org/10.1016/j.trf.2015.03.006>
- [9] Abdul Manan, M.M., & Várhelyi, A., 2012. Motorcycle Fatalities in Malaysia. *IATSS Research* 36 (1), 30–39. <https://doi.org/10.1016/j.iatsr.2012.02.005>
- [10] Austin, K. P., 1993. The Collection and Use of Additional Sources of Road Safety Data in Highway Authorities. *Traffic Engineering and Control* 34, 540–543.
- [11] Ibrahim, K., Silcock, D. T., 1992. The Accuracy of Accident Data. *Traffic Engineering and Control* 33, 492–496.