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The Possible Problem of Similar Callsign in Verbal Air-Ground Communication

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Abstract: - Similar callsign or also called callsign confusion, used in-flight communication. A similar callsign is the identity between the ATC (Air Traffic Controller) and the pilots. Air-Ground Communication is a special means of communication intended to accommodate ATC and Pilots' interaction to conduct a safe and efficient flight operation. The pilot is responsible for flying an airplane. The ATC has responsible to give information and standard separation of all flights under ATC's responsibility or jurisdiction area. The acceptable level of safety will indicate the success of air-ground communication. The purpose of this study: 1) to describe the risk of similar call sign in aviation, especially in Makassar Air Traffic Service Center, and 2) to provide the procedure to minimize the risk of similar callsign or callsign confusion. The method used is the quan-qual research by utilizing Ground Criterion Theory (GTC). The theory postulated that the speaker and the listener (agents) reached a state of the same thought—it about what was said and meant. The data of this study are taken from Makassar Air Traffic Service Center in Indonesia.

Keywords:- *Air-Ground Communication, Similar Call Sign, Aviation, Pilot.*

I. INTRODUCTION

A. Research Background

One of the basic human need is to communicate effectively. As well as in operational flight at the airport, communication is a prerequisite for flight safety. Airlines will be free from trouble if aviation commerce can discover some solutions to all these communication issues. Nevertheless, since people are still the operators and tend to make mistakes, human factors will still occur. However, the successful application of the recommended solutions conferred in this study can help minimize existing communication problems. Therefore, the essential of communication can be maximized.

The important way of communicating in the operational context of aviation between Air Traffic Controller (ATC) and pilots, management and operational personnel is the ability to communicate effectively will help reduce aviation accidents. Verbal communication is one of the main means of communication in the operational context of aviation. It should be improved throughout the practice of all employees. According to many reports, miscommunication between ATC and pilots is one of the major contributing factors to aviation disasters, so it should be considered a great concern. Communication breakdown may result from Call-sign Confusing or Similar Call-sign.

The air traffic controller is responsible for guiding and helping the pilot to navigate safely and efficiently. An air traffic controller's task starts when the aircraft is doing pushback and or starting the engine [1]. According to Eurocontrol (callsign similarity service) [2], the use of similar call signs by aircraft operating in the same zone on the same radio frequency is referred to as callsign similarity. Because of this occurrence, the possibility of a pilot taking and operating on a clearance bound for another aircraft is normal and contributes to flight safety accidents. Aircraft Operators (AOs) de-conflict, such as call signs embedded in their schedules, are supported by the call sign similarity service. This helps to reduce the incidence of confusion incidents with call signs and improves the security of the network.

Again, in the Service levels, the Call Sign Management Cell (CSMC), as part of the Network Manager operations center (NMOC), delivers three levels of service [2]. They are as follows:

First is the service level 0. The key objective is to increase awareness about the processes of CSS reduction. In particular, this includes providing: 1) the CSS rules publication to be applied in the process of resolution and detection of conflicts; 2) assist the Aircraft Operators (AOs) in applying the process of call sign similarity reduction; 3) deliver feedback and control the implementation results and the use of the de-confliction plans during the period.

Second is the service level 1. It provides aid to de-conflict or eliminate similar call signs within a single aircraft operator schedule prior to the summer and winter season. The CSMC monitors and facilitates this procedure with the aim of the Call Sign Similarity Tool or CSST. The CSMC also offers users with a limited feedback on urgency conflicts with other CSST users as part of this service level.

The third is the service level 2. It will support de-conflict or eliminate similar call signs among different schedules of aircraft operators, prior to the beginning of the winter and summer time. This service level will be reliant on the success of Service level 1 operations.

Furthermore, Skybrary [3] sources stated using similar call signs by aircraft operating in the same area. Specially on a similar RTF frequency regularly gives rise to possible and real flight safety incidents. This danger is regularly stated as "call sign confusion". Here are the examples of the more general causes for call sign misunderstanding: 1) Airlines assign commercial flight numbers as callsigns; these are normally consecutive and therefore similar (e.g., RUSHAIR 1481, RUSHAIR 1482, etc.), b) Airlines schedule flights with similar callsigns to be in the same airspace at the same time, c) Callsigns accidentally contain the same alphanumeric characters in a different order (e.g., BA 2314 and AB1234), d) Call signs contain repeated digits (e.g. RUSHAIR 666), and e) Alpha-numeric call signs end in two letters which correspond to the last two letters of the destination's ICAO position indicator (e.g. RUSHAIR 35JJ for a flight inbound to London Heathrow).

B. Call-sign and Air-Ground Communication

An ATC operator in charge is based on processing information provided in aural, both visual and written forms. Of the most skills needed by an ATC, there are two of the most important ones, namely: 1) the ability to communicate and 2) the ability to receive and spread information.

Every ATC job requires some verbal communication, including information vocalized to the controller by the pilot or vice versa. Almost all of them are very dynamic information, such as separation between planes in-flight traffic and information on avoiding bad weather and changing information from flight plans to radio media. Hamilton [4] has written, "a system is only as reliable as its weakest link, and it can be said with reasonable confidence that the weakest link in the aviation system is the human component".

Humans contribute to the flexibility needed in the air traffic system. Still, they do not rule out the possibility that humans can make mistakes either made by ATC officers or pilots that can cause serious events. The method used to protect pilots and ATC officers from errors caused by humans and an operational system in communication is the standardization of communication procedures. An opinion for taking stricter procedures, to communicate information and operate hardware. Byron[5] said "since the human involvement in communication is greater and, in air traffic control, requires 'double-handling' where errors can occur at either end".

C. Similar Callsign and Its Problem

a. Flight number

In the aviation manufacturing, a flight number or flight designator is a code for an airline service consisting of two airline identification characters and 1 to 4 digit numbers [6]. Several conventions have been developed to determine flight numbers, although these vary widely from airline to airline, and are increasingly being modified according to the rate at which aviation grows [7]. Flights to the east and north traditionally use even numbers, while flights to the west and south have odd numbers. Other airlines will use the odd number for outgoing flights and use the next even number for the return flight. For example: GIA603 (GA603) is the flight number for Garuda Indonesia aircraft for flights from Jakarta (CGK) to Makassar (UPG). Meanwhile, GIA604 (GA604) is a Garuda Indonesia flight with the aim of Makassar (UPG) to Jakarta (CGK). Flight numbers less than three digits are often used for the long haul or first-class flights. For instance, flight number 1 is often used for VVIP / VIP flights or airline "flagship" services.

Four-digit numbers in the 3000 to 5999 range typically represent regional affiliated flights, while numbers greater than 6000 are generally codeshared numbers for airlines' flights. Likewise, flight numbers that are greater than 9000 typically refer to ferry flights; it does not carry passengers and is used to move aircraft to or from a maintenance base, or from one air travel marketplace to another to start new profitable flights. Flight numbers beginning with 8 (eight) are often used for charter flights but always depend on the commercial airline's choice.

b. Similar Callsign – Call-sign Confusion

Call-sign is an airline marker or code established by the International Civil Aviation Organization (ICAO) which is used as a call-in radio communication in accordance with the regulations contained in ICAO Document 8585: Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services. Most airlines use a call sign which is normally used during air-line radio transmissions [7].

In accordance with ICAO Annex 10 chapter 5.2.1.7.2.1, the call sign must be one of the following types:

TABLE I. THE CALL SIGN TYPE FROM ICAO ANNEX 10 CHAPTER 5.2.1.7.2.1,

No	Type	Description
1	A	This type tells the characters corresponding to the aircraft registration marking.
2	B	The B type shows the aircraft operating agency's telephony designator, followed by the last four characters of the registration marking of the aircraft.
3	C	The last is type C, which indicates the aircraft operating agency's telephony designator, followed by the flight identification.

The most broadly used in commercial aviation is the C type. Flight identification is regularly found with the similar flight number. This can impact the mention of callsign by an Air Traffic Controller in an air-ground communication (radio communication). Callsign confusion occurs when two or more flights with similar flight numbers fly close together or in an area that uses the same radio frequency, such as the KLM 649 and KLM 645 or Speedbird 996 and Speedbird 669.

The procedures for handling similar callsign have not been regulated either nationally or internationally. This results in the absence of standard standards in each aviation navigation service provider unit, especially in Indonesia. The procedure for handling similar callsign is very urgent because similar callsign is or is identified as hazard identification, which can cause the breakdown of separation and even cause mid-air collision.

II. RESEARCH OBJECTIVES

The objectives of this research are formulated as follows:

1. Describe the risk of similar callsign in aviation, especially in Makassar Air Traffic Service Center.
2. Provide a procedure to minimize the risk of similar call sign or callsign confusing.

The strategy to answer the first objective is to inventory many similar callsign in aviation and then categorize, group, and classify. Based on the categories, groups, and classes, then proceed by analyzing the possible chances of errors. It may occur to avoid miscommunication and misunderstanding between speakers and listeners, while the way to answer the second one is to find an initial procedure, as a result of question number one, to minimize the risk of similar callsign or callsign confusing. The results of this analysis will be donated to the agency authorized to regulate and determine callsign in aviation.

III. LITERATURE REVIEW

A. Basic Principle of Communication

Miscommunication is one specific case of a poor alignment of agents' rational state, specifically one in which they diverge on the occurrence or results of communication [8]. The type of miscommunication is classified as the source of non-alignment. It about the communicative act and whether the problem was recognizing the action, as having occurred or interpreting the point. Clark, [9] identifies four different conversation levels at which problems for maintaining common ground may arise. In Dillenbourg [10], these levels' discussion generalizes them to apply to grounding in multi-modal collaboration and take up these points again in the next segment. Still, here we can apply them specifically to aspects of miscommunication. Likewise, the results of perception possibly will indicate that other related beliefs are not consistent with others' beliefs, or the world's facts and lead to other actions to reconcile this non-alignment. It is measured point that miscommunication is part of a more common framework of lack of alignment of agents' mental states and efforts to repair miscommunication as cases of acting to decrease this non-alignment.

Generally, the communicative issue is more complicated than just a comparison between two communicating agents' mental states. The world in which agents are embedded and communicate is also present. For the mental states of agents to get out of alignment with the world; an agent's objective misconception occurs when the beliefs of the agent do not reflect the actual state of the world.

Language is a complicated, changed, and subtle thing [11]. Furthermore, perception and action can be used for implicit communication, conveying information to an observer without an explicit natural language utterance in the world [12]. Thus, in realism, all communication among agents channeled through the perception and action in the world, even though some actions will take communication as their main, conventional (illocutionary) purpose, while others might have the communication only as a perlocutionary effect [13].

The world to agents' mental relation states plays an significant role in both miscommunication and recovery from miscommunication. First, perception or errors in action are frequently the cause of the lack of alignment in mental state which causes miscommunication. Next, the world can be a prime resource for recognizing mistakes and arbitrating between conflicting interpretations. There are three different vantage points for considering miscommunication at least: the objective, view of the world, and each of the two agents' views.

A subjective view of non-alignment is reached by embedding (-1) or (0) within the beliefs of A or B. It is this subjective view of non-alignment, which will be the (partial) motivation for communication. A very universal case of non-alignment is where the object is basically a belief held by one agent and not another. This can be the main motivation for performing acts such as in the first place, including initial presentations, acknowledgements, and miscommunication repairs. The researcher now considers some approaches to the more general problem of reaching alignment (or common ground) in mental state, including, but not limited to, repairing miscommunication.

B. Grounding Criterion and Collaborative Effort

Grounding is the method of adding to the common ground between agents [5][14]. Taken narrowly, this involves reaching a state of mutual understanding (or belief) about what was said and meant. More generally, it is able to include any achievement of commonality among agents, including actual beliefs about the communicated information and joint intentions or goals for future action. Clark and Wilkes-Gibbs [15] argue that it is regularly not essential to ground every aspect of the interaction fully. Merely that the agents range the grounding criterion: The partners and the contributor mutually trust that the partners have understood what the contributor intended to a criterion sufficient for the current purpose. What this criterion could be depends on the motives for wanting this information in common ground and can diverge with the type of information and the collaborators' local and overall goals.

Furthermore, Clark and Wilkes-Gibbs [15] also consider another important principle, that least collaborative effort. Contrary to classical efficiency principles, which try to minimize effort on the receiver, or the number of repairs, Clark and Wilkes-Gibbs's principle trues to minimize the total effort of the collaborators. This means that in some cases, the cost of producing a perfectly interpretable utterance may be more than producing a flawed utterance, which can be easily

repaired. These costs include both efforts to produce and understand an utterance and total time for the collaboration.

Clark and Brennan[16] stated grounding in different media. They point out that different media bring different resources and constraints on grounding and have other associated costs. They describe several media (including email, face-to-face, video-teleconference, telephone, and terminal teleconference) according to whether they have the following properties: copresence (able to see the same things), visibility (able to see each other), audibility (able to hear each other), contemporality (messages received at the same period as sent), simultaneity (able to both parties send messages at the same period or do they have to take turns), sequentiality (able to the turns get out of sequence), reviewability (able to they review messages, after they have been first received), and reviseability (can the producer edit the message privately before sending).

Likewise, the following costs are considered for these media: production costs (articulating or typing the message), delay costs (creating the receiver wait during formulation), reception costs (listening to or reading the message, including attention and waiting time), understanding costs (interpreting the message in context), formulation costs (how easy is it to decide exactly what to say), start-up costs (initiating a conversation, together with summoning the other partner's attention), fault costs, asynchrony costs (not being able to tell what is being responded too), speaker change costs, and repair costs,. Since different media have different combinations of these constraints and costs, one would assume the principle of least collaborative effort to predict different grounding styles for use in various media.

Schaefer and Clark [13] presented an off-line descriptive account of the grounding process in conversation. This was followed up by Traum [17] with an on-line computational model of grounding in conversation. In order to achieve a kind of predictive model of grounding behaviour in a multi-modal context, and relate the grounding process to repair and broaden communicative action beyond just spoken conversation.

It needs to focus on why an agent would perform a particular communicative act as part of the grounding process. Towards this end, we collect and examine data of how grounding is performed in multi-modal collaborative problem solving.

One of the problems in communication is words sound alike that is a homophone. Homophones are words that sound alike or nearly alike, but they have different definitions. Let us see the example for word, “discreet” means careful and circumspect, while “discrete” means distinct or separate. Good communication depends on a good speaking. That is why, speaking is a way of conveying the idea through a message spoken in communication [18]. Since the communication for flight controlling in English so some homophones that sound alike or nearly alike are presented in the follwing examples:

TABLE II. HOMOPHONES THAT SOUND ALIKE OR NEARLY ALIKE

No	Words	Words Sound Alike
1	horde	hoard
2	alternate	alternative
3	all ready	already
4	disassemble	dissemble
5	flounder	founder
6	disassemble	dissemble
7	emigrate	immigrate
8	loose	lost
9	abhorrent	aberrant
10	weather	whether

The words choice is significant for the reason that the incorrect word can cause confusion the listener or reader [18]. When in uncertainty, refer a dictionary – or just do not take the word.

IV. RESEARCH METHOD

This study uses quan-qual presenting research data. Data are taken from back office data-based of TFF (time flight frequency). The research data were obtained from AirNav Makassar as the research location. With various considerations, data was taken as of January 1st, 2020 as recorded in the system. One of the considerations is that the average number of flights per day in a year is between 4485-4650 flights that are monitored within the AirNav Makassar area. Data per January 1st, 2020 recorded 4514 flights. Based on tracking through the system, 10% of every flight day has callsign similarity in all sectors.

The data sampling was taken as the following method and procedure. The formula as follows;

TFF = Population (μ) = Σ X = 4514 flight in sector
X = 10(%) N where N = similar callsign
Data Sample (purposive) = 10(%) N/3 categories

Therefore, data of callsign similarity of this research are 10% of callsign similarity ratio per day (Σ X = 45 flight), 15 data of flight per category, 15 for Call-sign: All Parts, 15 for Call-sign: First Two Parts, and 15 for Call-sign: Last Two Parts.

The theory applied for this research is Ground Criterion Theory (GTC) proposed by Clark and Schader of 1989. This theory postulated that the speaker and the listener (agents) involving to reach a state of mutual understanding (or even belief) about what was said and meant [14]. Generally speaking, this theory includes any achievement of commonality between agents (in this case, ACT personnel and pilots), including actual beliefs about the communicated information and joint intention or goals for taking action.

V. FINDING AND DISCUSSION

A. Similar Call-sign Data

This research data was flights data as of January 1, 2020. Data collection purposively was from recorded in the ATC system of AirNav Makassar. It is assumed to be a representative all flight data in an annual average. Data-based of flights per January 1, 2020, This research counts purposively a 10% of the flight callsign similarity and then it is divided it into three categories (based on researcher's monitoring), namely 1) Similar Call-signs: All Parts, 2) Similar Call-signs: First Two Parts, and 3) Similar Call-signs: Last Two Parts. Data Similar Callsigns: All Parts. Table 3 are as follows:

TABLE III. TABLE 3 SIMILAR CALLSIGNS: ALL PARTS

No	Sector	Call-sign	ADEP	ADES	Callsign	ADEP	ADES	PERIOD
1	USBY	CTV779	WAHH	WAAA	LNI779	WAAA	WIII	10:00-11:00
2	USBY	LNI696	WIII	WARR	GIA696	WIII	WAWW	10:00-11:00
3	USBY	GIA323	WARR	WIII	AWQ323	WMKK	WARR	11:00-12:00
4	USBY	CTV426	WIII	WAAA	GIA426	WIII	WADD	15:00-16:00
5	USBY	AWQ691	WARR	WIII	CTV691	WADD	WIII	15:00-16:00
legend; ADEP= aedrome of departure, ADES= aedrome of destination								

Apart from the data categories mentioned above, this study also found a number of callsign similarity which was indicated by similarity in the first two parts. Such data can be seen in Table 4 below:

TABLE IV. SIMILAR CALLSIGNS: FIRST OF TWO PARTS

No	Sector	Call-sign	ADEP	ADES	Callsign	ADEP	ADES	PERIOD
1	UBPN	GIA467	WALL	WAQT				02:00 - 03:00
					LNI267	WAQQ	WARR	
2	UBPN	CEB280	WADD	RPLL				02:00 - 03:00
					CPA780	WARR	VHHH	
3	UBPN	LNI674	WALL	WAQQ				03:00 - 04:00
					SLK274	WSSS	WAMM	
4	UBPN	LNI868	WAHH	WALS				06:00 - 07:00
					GIA468	WALL	WAHH	
5	UBPN	BTK6273	WAMM	WIII				07:00 - 08:00
					SLK273	WAMM	WSSS	
legend; ADEP= aedrome of departure, ADES= aedrome of destination								

For the following data, here will be presented data from the third category, namely Similar Callsigns: Last Two Parts. Look at the Table 5 in the following;

TABLE V. SIMILAR CALLSIGNS: LAST OF TWO PARTS

No	Sector	Call-sign	ADEP	ADES	Callsign	ADEP	ADES	PERIOD
1	UBPN	GIA467	WALL	WAQT				02:00 - 03:00
					LNI267	WAQQ	WARR	
2	UBPN	CEB280	WADD	RPLL				02:00 - 03:00
					CPA780	WARR	VHHH	
3	UBPN	LNI674	WALL	WAQQ				03:00 - 04:00
					SLK274	WSSS	WAMM	
4	UBPN	LNI868	WAHH	WALS				06:00 - 07:00
					GIA468	WALL	WAHH	
5	UBPN	BTK6273	WAMM	WIII				07:00 - 08:00
					SLK273	WAMM	WSSS	
legend; ADEP= aedrome of departure, ADES= aedrome of destination								

Thus, the data of this study, once again, are divided into three categories as seen in the previous table. For analysis purposes, the data from each table are reformatted in the simple table presentation to show the digit similarities

TABLE VI. EXAMPLES OF PARTS OF SIMILARITIES

No	Description	Similarities Examples	
1	**All Parts**	CVE**779** XAX**221**	CPA**779** SIA**221**
2	**First Two Parts**	GIA**29**0 LNI**69**2	GIA**29**2 LNI**69**4
3	**Last Two Parts**	BTK6**27** CEB2**80**	SLK2**27** CPA7**80**

The table above explains that each callsign consists of two elements; flight names and numbers. In principle, similar callsign can be something dangerous because of two things, namely flights in one sector and flights that intersect flight hours. In other words, similar callsign with different sectors and flight hours does not have the potential for callsign confusion.

B. Analysis

Many issues involved in miscommunication between ATC operator and pilot, one of them is similar callsign caused. It is important to make sure that the correct callsign used does not potentially raise miscommunication and misunderstanding. When the similar callsign aircraft operate on same radio frequency may result in one pilot executing a clearance intended for another aircraft due to improper use of callsign. Human error is one of the causes of the disaster. Human negligence is included in the category of man-made disaster [19] and it should not occur in the aviation industry

Relating to the discussion of the topic of this research, based on the data of Table 6, it seems each callsign consisting of two elements, namely a code (generally the name of an airline) and a number. The callsign similarity comes from the airline's own policy. Furthermore, ATC operators and pilots follow the provisions. The similarity whether due to coincidences or due to certain other factors cannot be explained in this study.

Take a look closely, and the similarity generally occurs in numbers. This is potential to raise confusion. In Air Traffic Communication, it is called 'callsign confusion'. In Table 7 data regarding the evidence of Similar Callsigns: All Parts, for example, it can be seen that the 3 digits of the callsign are similarity as follows;

TABLE VII. RESUME OF CALL-SIGNS: ALL PARTS

Data No.	Sector	Callsign Similarity	
		I	II
1	USBY	CTV779	LNI779
2	USBY	LNI**696**	GIA**696**
3	USBY	GIA**323**	AWQ**323**
4	UPKN	XAX**223**	LNI**223**
5	UPKN	AXM**377**	LNI**377**

Furthermore, the data on Table 8 shows that there is a callsign similarity in the form of First of Two Parts. This kind of callsign requires a good comprehension for ATC operators and pilots. Look at the following table:

TABLE VIII. RESUME OF CALL-SIGNS: FIRST OF TWO PARTS

Data No.	Sector	Callsign Similarity	
		I	II
1	USBY	GIA**32**2	AWQ**32**3
2	UBLI	GIA**43**5	GIA**43**8
3	UMKS	AWQ**64**5	GIA**64**2
4	UMKS	LKN**65**0	LKN**65**5
5	UNSA	MXD**17**7	MXD**17**1

The Resume of Call-signs: First of Two Parts as in the table above is more difficult to distinguish from the other two types. This is because, in theory, it is much easier to remember the whole number and or the last two. Let us compare it with callsigns: Last of Two Parts is like in the following table

TABLE IX. RESUME OF CALL-SIGNS: LAST OF TWO PARTS

Data No.	Sector	Callsign Similarity	
		I	II
1	UBPN	GIA4**67**	LNI2**67**
2	UMNO	GIA6**99**	LNI7**99**
3	UAMN	THA4**74**	CPA1**74**
4	UPUA	GIA6**94**	LNI7**94**
5	UMKS	GIA6**11**	SLK8**11**

Based on the memory theory, Call-signs: Last of Two Parts psychologically, it is easier for anyone listening to a series of numbers to remember the last two digits so that the type Callsigns: Last of Two Parts, and therefore requires accurate *readback* and *hearback* to avoid confusion.

Furthermore, the following are the research results found from the discussion:

- Some countries have supplementary call alerting requirements. For example, the FAA needs that the following criteria be met if a callsign is to be allowed in the National Airspace System (NAS),
- The combination of callsign and flight number has not exceeded seven alphanumeric characters,
- To avoid confusing of the similar or the same call sign, the letters marking the callsign must be directly followed consecutively only by the digits of the flight number.
- No extra letters of the alphabet are permitted after the call sign markers (except the bullet below);
- For operational purposes, regular aircraft operators Parts 131 and 135 can use letters as the last character of the aircraft identification provided and they are preceded by a number (i.e. say AAL531A);
- Examples of the FAA callsigns can admit with flight numbers: SWA2604, MDSTRl, AAL351A, ABX91, and RDDL172.
- Examples of call signs that the FAA cannot accept with flight numbers : RDDL1320 (more than seven characters), NEWS43G (Additional letter alphabets are used for unscheduled operators), BKA19CH (two letters of the alphabet) and LBQ17623 (more than seven characters).

According to many reports, miscommunication between ATC and pilots is one of the major contributing factors to aviation disasters, so it should be considered with great concern. Communication breakdown may result from callsign confusing or similar callsign.

VI. CONCLUSION

A research on similar callsign in the context of verbal air ground communication, especially in relation to the perspective of procedure and risky problem, might be a specific relation to a linguistic study. But callsigns themselves are linguistics points as media for interaction between ATC operators and pilot from the ground communication. The interaction between ATC operators and Pilots must accurate, understandable, and match - with there is no ambiguity and unclear point in order to avoid (not to minimize) an incidents and accidents

Based on the discussion, this study draws some points of conclusion as follows; 1) the similar callsign refers to three parts, namely 'all parts', first two parts, and last two parts, 2) similar callsign is considered dangerous if the similar callsign is in the same sector with a flight schedule that is more or less the same, 3) if the situation very not conducive, the callsign can be changed temporarily at the initiative of the ATC operator, this is done in order to avoid callsign confusion, 4) similar callsign used do not potentially rise miscommunication and misunderstanding,

The implication of this research is to offer a solution to the problem of similar callsign or callsign confusing; 1) increasing flight number management regulations, 2) tightening the standard operational procedure (SOP) for Air Ground communication, and 3) the awareness for the *readback* and *hearback* system must be increased

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