Code switching applied by air traffic controller in air navigation services

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Abstract. Air Traffic Controller is one of the occupations that mostly using language to interact on their service between them or to pilot and related units in air navigation service. To conduct ground to ground communication, a special language or radiotelephony, is deliberately created for air traffic controller and flight crew. In the ground to ground communication Air Traffic Controller using English for Specific Purposes (ESP) or aviation phraseology but in some case the Controller is applied to switch it into local language. The findings obtained regarding code switching in ground to ground communication amongst Air Traffic Service units occur when there is a message to be conveyed and purpose of the conversation not listed in the phraseology, that has been circulated in Document 9432 (Manual of Radiotelephony) published by International Civil Aviation Organization, where the message can be send clearly and precisely on target as desired by the messenger.

1. Introduction
Air traffic service or air navigation services had generic term variously including flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service), an Indonesian Air Traffic Controller (ATC) are one of the most influential parties in controlling air traffic in Indonesia that mostly using English language to do they service as per international rules. There are two Flight Information Region (FIR) in Indonesia, number one is Jakarta FIR and the second one is Ujung Pandang FIR especially for Ujung Pandang FIR had more than 246 routes of domestic flight, connecting 125 town in Indonesia and there at least 57 routes for international flight. All types of services carried out that already have the basis, Standard Operational Procedures and rules internationally by the International Civil Aviation Organization as well as from the national government itself in this case the air transportation ministry of Indonesia that issued Civil Aviation Safety Regulation (CASR). Some brief understanding of related matters in the world of civil aviation, as below:

1.1 International civil aviation organization (ICAO)
ICAO Is a United Nation specialized agency, established by States in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention) ICAO works
with the Convention’s 193 Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices (SARPs) and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector. These SARPs and policies are used by ICAO Member States to ensure that their local civil aviation operations and regulations conform to global norms, which in turn permits more than 100,000 daily flights in aviation’s global network to operate safely and reliably in every region of the world. And Indonesia one of the contracting states that follow and make rules based on international recommendations by ICAO and adjust the conditions based on states situations.

1.2 Objectives of air traffic services
The objectives of the air traffic services shall be to [1]:

a) Prevent collisions between aircraft;
b) Prevent collisions between aircraft on the manoeuvring area and obstructions on that area;
c) Expedite and maintain an orderly flow of air traffic;
d) Provide advice and information useful for the safe and efficient conduct of flights;
e) Notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

1.3 Air navigation services
Services provided to air traffic during all phases of operations including air traffic management, communication, navigation and surveillance, meteorological services for air navigation, search and rescue and aeronautical information services. Air Navigation Services are similar with Air Traffic Services in the event that the main purpose of the service is carried out.

1.4 Ground to ground communication
Two-way communication is carried out between Air Traffic Services related units, with special interests in flight navigation services; in this case the units related to their position can be in the same or different regions.

1.5 Radiotelephony
A form of radiocommunication primarily intended for the exchange of information in the form of speech. Such as from between Pilot and Air Traffic Controller or between air traffic service units that has relation purpose to providing navigation services.

1.6 Flight information region (FIR)
An airspace of defined dimensions within which flight information service and alerting service are provided, and among them handled by air traffic services unit called Area Control Center. Code-switching is a linguistic phenomenon which occurs in multilingual speech communities. The term describes the process in which a communicatively competent multilingual speaker alternates or switches usually between two languages or language varieties or codes during the same conversation. In this research, there will be a lot of code switching in the process of conversation between related ATCs, where communication or the main language used is mostly English phraseology, but under certain conditions will be mixed or switch to Indonesian.

Contracting States shall determine, in accordance with the provisions of the Annexes and for the territories over which they have jurisdiction, those portions of the airspace and those aerodromes or airports where air traffic services will be provided. They shall thereafter arrange for such services to be established and provided in accordance with the provisions of this Annex, except that, by mutual
agreement, a State may delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, control areas or control zones extending over the territories of the former.

This research takes a case study in Upper Ujung Pandang as an area control service within Ujung Pandang Flight Information Region which has responsibilities in terms of air navigation services ranging from 24,500 feet to 60,000 feet and has 21 local adjacent unit air traffic services in a form of an approach control office and aerodrome control tower that is Makassar, Manado, Gorontalo, Kendari, Luwuk, Ternate, Sorong, Ambon, Timika, Merauke, Jayapura, Biak, Manokwari, Bali, Kupang, Surabaya, Pangkalan Bun, Banjarmasin, Balikpapan, Palu, and Tarakan and also has 5 international area control center unit such a Brisbane, Manila, Port Moresby, Oakland, and Kota Kinabalu. And all these adjacent units are connected through a line call VCSS (Voice Communication Switching System) which is where communication between units can be directly carried out right way and easily to use because all that adjacent unit’s channel are available on display of VCSS. VCSS is a part of ATS (Air Traffic Services) direct speech circuit for exchange of information between ATS unit. VCSS services are very useful in supporting air navigation services it can help an air traffic controller to coordination with other unit without problem, except maintenance. However, this can already be addressed with the availability of several other options in coordinating with other units such us make a call with PABx (Private Automatic Branch Exchange) or (IDL) International Direct Line.

According to Letter of Operational and Coordination Agreement (LOCA) [2] between Upper Ujung Pandang and other adjacent unit air traffic services, all of the communication amongst them are used in the form of aviation phraseology or English for Specific Purposes (ESP) that made specifically to include harmonized communication between air traffic service units which contains rules or Standard Operational Procedure (SOP) and must be understood and implemented very well by both parties concerned, in this case Ujung Pandang Area Center or Ujung ACC has a lot of LOCA with other related adjacent units and every units has differences and similarities in it depend on the agreement that had been established before.

In Document 9432 (Manual Radiotelephony) [3] ICAO phraseologies are developed to provide efficient, clear, concise, and unambiguous communications, and constant attention should be given to the correct use of ICAO phraseologies in all instances in which they are applicable. Phraseologies have evolved over time with periodic initiatives by bodies responsible for codifying and standardizing their use. ICAO phraseologies are developed to provide maximum clarity, brevity, and unambiguity in communications. Phraseologies are applicable to most routine situations; however, they are not intended to cover every conceivable situation which may arise. The success and widespread adoption of the ICAO phraseologies has given rise, to some degree, to an expectation on the part of some users that phraseologies alone could suffice for all the communicative needs of radiotelephony communications. ICAO provisions related to the use of language adopted by the ICAO Council in 2003 better clarify that, while ICAO phraseologies should always be used whenever they are applicable, there also exists an inherent requirement that users also have sufficient “plain” language proficiency. ICAO documents make this clear in several instances. It is further emphasized that the phraseologies contained therein are not intended to be exhaustive, and when circumstances differ, pilots, ATS personnel and other ground personnel will be expected to use appropriate subsidiary phraseologies which should be as clear and concise as possible and designed to avoid possible confusion by those persons using a language other than one of their national languages. “Appropriate subsidiary phraseologies” can either refer to the use of plain language, or the use of regionally or locally adopted phraseologies. Either should be used in the same manner in which phraseologies are used: clearly, concisely, and unambiguously. Additionally, such appropriate subsidiary phraseologies should not be used instead of ICAO phraseologies, but in addition to ICAO phraseologies when required, and users should keep in mind that many speakers/listeners will be using English as a second or foreign language.
According to Document 4444 [4] by ICAO, the coordination and transfer of control of a flight between successive ATC units and control sectors shall be affected by a dialogue comprising the following stages:

a) notification of the flight in order to prepare for coordination, as necessary;
b) coordination of conditions of transfer of control by the transferring ATC unit;
c) coordination, if necessary, and acceptance of conditions of transfer of control by the accepting ATC unit; and

d) the transfer of control to the accepting ATC unit or control sector.

There is also a document Annex 10 (Aeronautical Communication) [5] that has been published by International Civil Aviation Organization (ICAO), that which provides a variety of phraseology in air navigation services and how to use it.

Language is a means of communication, Montgomery [6] commented that language informs the way of person or people think, experience, and interact with each other. Language can be learned as a system of communication. Cowie [7] stated that in linguistics, phraseology is the study of set or fixed expression, such as idioms, phrasal verbs, and other types of multi-word lexical units (often collectively referred to as phrasemes), in which the component parts of the expression take on a meaning more specific than otherwise not predictable from the sum of their meanings when use independently.

Dudley-Evans [8] explain that English for Specific Purposes is one of those activities where practitioners are so concerned with keeping up with the work and with discussing recent developments that they do not make time to define in any kind of detail exactly what they are doing. Phraseology is the branch of linguistics; it refers to the language used by air traffic controller in communication with pilot or with other air traffic controller adjacent units as the functions of conveying the meaning in language use. The researcher interests with phraseology used amongst air traffic controller units, which had been standardized and had certain meaning in conveying the information or instruction between related units.

Even though there is nothing in the language itself that made English more suitable than other languages to become the foundation of the standard phraseology, the ICAO made a conscious decision after the Second World War to make it the international language of aviation when pilots and controllers speak different languages. However, English used in aviation is not a standard variety of the English language in a sense that it has native speakers, but a ‘phraseology’ constructed for the specific purpose of air traffic communication. Aviation English, and not plain English, is the lingua franca of aviation communication.

2. Background problem
Based on some theories, phraseology can be concluded commonly that phraseology is a group of words which build a new meaning and it can be called as a phrase. In other words, phraseology means words and phrases as they are used in speech or writing to convey a specific meaning. In line with aviation field, phraseology becomes a main language in communications between Air Traffic Controllers (ATC) and pilots and it uses English as the natural language in phraseology itself. In Document 4444 of International Civil Aviation Organization, there are six types of phraseology used by ATC:

a. General Phraseology (GP) which used in general situations, wherever the operations of flight were running.
b. Aerodrome Control Phraseology (Aero CP) used in the airport surroundings.

c. Approach Control Phraseology (App CP) used when flight operation is closer to the airport area. It is expected to use a navigation system such as ILS (Instrument Landing System), VOR (Very high Omni Range), and NDB (Non-Directional Beacon) to getting closer even leaving out the airport.
d. Area Control Phraseology (Area CP) which used in the area where the aircraft has been close or reached the certain position in airspace (cruising level). It is commonly more than 25000 ft up to 60000 ft, which called as flight level 250, shortened as FL 250.

e. Radar Control Phraseology (RCP) which used by using radar. This radar assists controllers to getting down the aircraft for landing, avoiding accident, and in the right way. The tools are used in Area Control Center (ACC) and Approach Control Office (APP). Almost airport in the world use this facility and commonly international airport.

f. Coordination Phraseology used by ground to ground station to coordinate the responsibility of air traffic controllers from one unit to another. Example of coordination among Area Control Center and Approach Control Office, Approach Control Office and Aerodrome Control Tower (ADC), Area Control Center and Flight Service Officer.

In order to providing service, an Air Traffic Controller surely had the differences situation of air traffic, depend on the weather, timing, type of aircraft, schedule of flight, etc. There is a lot of procedure and phraseology to make coordination with other adjacent units involved on the condition to manage of air traffic and providing services and listed or agreed by both adjacent units filled in Letter of Agreement. One of kind situation that can describe application of code switching is “subjecting traffic”, which mean the conditions of air traffic involve two or more airplane with position opposite direction and will intersecting in point or route in flight and that two adjacent unit shall make an agreement via VCSS or phone to decide that condition will be resolved by which Air Traffic Service unit. And the aviation phraseology for this case is not available or listed in the document outlined above, so sometimes the air traffic controller using local languages or Indonesian Language which is switching from aviation English phraseology before, so the message can easily understandable each other and reached very well by other adjacent or interlocutors and then so the problem will be solved very soon and it will be easier to avoid confusing. And many other condition communications that applied code switching depend on the context of conversation and purpose. The researcher knowing that the use of the code switching amongst ATS unit is intended that the exchange of information or message can be done quickly, precisely and accurately, but there is some of advantage and disadvantage as well if the sentence used does not cause confusion or multiple meanings.

There are several situation necessary between ATS related units to communicate amongst them for example like request permission for the aircraft that will depart from one airport to the other airport, traffic conflict solution handle, weather condition require, runway in use information, the level of aircraft traffic density, direct waypoint by pilot request and many more. This research is focusing in code switching application amongst ATS units, how the ATC using it, why is that type of communication is required, and for what kind of purpose also what is the risk if code switching misused. ATS units should, to the extent possible, establish and apply standardized procedures for the coordination and transfer of control of flights, in order, inter alia, to reduce the need for verbal coordination. Such coordination procedures shall conform to the procedures contained in the following provisions and be specified in letters of agreement and local instructions, as applicable. Such agreements and instructions shall cover the following as applicable:

a) Definition of areas of responsibility and common interest, airspace structure and airspace classification(s);

b) Any delegation of responsibility for the provision of ATS;

c) Procedures for the exchange of flight plan and control data, including use of automated and/or verbal coordination messages;

d) Means of communication;

e) Requirements and procedures for approval requests;
f) Significant points, levels or times for transfer of control;  
g) Significant points, levels or times for transfer of communication;  
h) Conditions applicable to the transfer and acceptance of control, such as specified altitudes/flight levels, specific separation minima or spacing to be established at the time of transfer, and the use of automation;  
i) ATS surveillance system coordination procedures;  
j) SSR code assignment procedures;  
k) Procedures for departing traffic;  
l) Designated holding fixes and procedures for arriving traffic;  
m) Applicable contingency procedures; and  
n) Any other provisions or information relevant to the coordination and transfer of control of flights.

3. Research methodology

This research was conducted by applying a descriptive qualitative method. The source of data derived from the interaction between ATC Ujung Pandang area control center with other adjacent related units and analyzing the conversation from ground-ground between air traffic service unit using the prescribe language of radiotelephony or phraseology obtained from Manual of Radiotelephony issued by the International Civil Aviation Organization (ICAO). The data were limited because the communication between ATC are already using standard phraseology but only in some case, they will use code switching to providing information.

Observation: observation was the main method in collecting the data based on qualitative principles, the phenomenon use of code switching was observed as deep as possible based on reality and actual. The researcher was collected the conversation with transcription recording after done the observation then separate the conversation that using code switching and not.

Interview: in this research, some question was prepared to interview the subject (ATC) about his/her activity while providing service such us make coordination with other related ATC units involve. This was as the additional information to elaborate of why code switching used in phraseology when coordinating with other ATC units.

4. Data sources

Data for this research will be collected from conversation that has been established and entered in the machine record with permission from Security, Safety and Standardization unit of Makassar Air Traffic Services Centre that has been set between Air Traffic Controller at Makassar Air Traffic Service Centre with other Air Traffic Controller (Ground to Ground Communication) at other adjacent airports inside of area jurisdiction and will be transform into transcript of conversation.

5. Data analysis

In this research, the first step to collecting data began with observing one of the ATS unit in Ujung Pandang Area Center with position as Planner or assistant of executive controller which is in charge of doing all of the coordination to other ATS units under its jurisdiction, where the conversation are happen using code switching between them, after that continue to the second step where the researcher requesting permission to the Security, Safety and Standardization Unit to retrieve the intended recording data and convert it into transcript of communication, because all of the recording communication inside air traffic service are very classified and require permit from watchdog unit ant then the recording was listened repeatedly to get the maximum result and classify the conversation that use code switching and not use.

After the data were displayed descriptively in words the researcher will be analyze the transcript to filter the sentence that used code switching. The results of this recording will be taken samples of conversation
that existed over a span of 1-2 hours or 1 cycle of duty and occurred at peak hours airplane traffic condition in one of the area jurisdictions inside Ujung Pandang air space at Makassar Air Traffic Service Center. The data for this research will be taken as much as possible to gather all of conversation have been made by ATC and will be analyzed where the code switching occurs. and there will also be a questionnaire for ATC in charge of coordinating between relevant Adjacent at certain airports, where the contents of the questionnaire will know in detail that how often and the importance of code switching is done when the ATC carries out the task.

6. Findings and discussions

Based on some theories, phraseology can be concluded commonly that phraseology is a group of words which build a new meaning and it can be called as a phrase. In other words, phraseology means words and phrases as they are used in speech or writing to convey a specific meaning. In line with aviation field, phraseology becomes a main language in communications between Air Traffic Controllers (ATC) and pilots and it uses English as the natural language in phraseology itself.

In Document 4444 (Air Traffic Management) there is only five language that allow by ICAO in order to providing Air Traffic Services, English, French, Russian, Arabic, Chinese, and Spanish. Amongst that six language, English was the most commonly used around the world including in Indonesia Air Traffic Services. But in fact the author found in some case Air Traffic Controller are using local language while providing service, referred to here is coordination amongst one unit to another in special situation such as subjecting traffic to solve, weather condition information experienced by airplane, Notam (Notice to Airmen) information, special request by Pilot on Arrival, etc. Which is in fact that kind of type communication are not a violation because according to Civil Aviation and Safety Regulation part 170 [9] about Air Traffic Rules state “Except when communications between air traffic control units are conducted in a mutually agreed language, the plain language shall be used for such communications”. In that statement plain language means a local or mother tongue language that usually use for purpose in order air navigation service in this case coordinating amongst air traffic service unit.

But in some case of coordination between related unit code switching does not fit in place, instead to deliver the message very quick and accurate on the contrary in fact creating a miss understanding, for example see conversation below:

ATC unit 1: “ATC unit 2 pesawat ini mau subject mana?”
ATC unit 2: “Subject sana saja” (which mean the conflict will solving by ATC unit 1)
ATC unit 1: “Okay subject sana” (in his/her mind there are misunderstanding for word “sana”)

What happen is the ATC unit 1 are thinking “subject sana” means the conflicting traffic or airplane should be solve by ATC unit 2 instead ATC unit 2 want the conflict are solve by ATC unit 1. The problem here are very complex, beside using code switching for deliver the message very quick and accurate other aspect have to be more concern such as readback and hear back the message, the author suggest for that kind of conversation better do not using code switching, but using plain language in English even that not listed in phraseology, such as like this conversation below that should be:

ATC unit 1: “ATC unit 2 confirm subject traffic (explaining the traffic situation)?”
ATC unit 2: “Roger ATC unit 2 subjecting traffic”
ATC unit 1: “Copied, traffic subject by ATC unit 2”
Using that kind of conversation above are simpler but with high accurate, and not create confusion between each other. Actually there are many advantages for code switching that use in conversation between related ATC unit, one of them is the message that will or wants to be conveyed can be quickly understood and avoid miss understanding and then also can establish intimacy in making conversation so that it can avoid stiffness while providing service, such as this conversation below:

ATC unit 1: “ATC unit 2 aircraft callsign kalau sudah clear traffic direct ke (waypoint) mana?”
ATC unit 2: “Silahkan ATC unit 1 jika sudah clear boleh direct ke (waypoint)

Using that kind of code switching are more suitable and simpler, which is when it used in the right phrase it will be easy to understand and can avoid miss understanding of the message. And then also the conversation will feel brief but right on target. Imagine if that conversation is totally using local language, it will be like this:

ATC unit 1: “ATC unit 2 pesawat dengan nama panggilan ini kalau sudah selesai konfliknya boleh langsung ke titik ini (waypoint) ?”
ATC unit 2: “Silahkan ATC unit 1 jika sudah selesai konfliknya pesawat tersebut boleh langsung ke titik (waypoint)”

It going to takes a lot of minutes to through that conversation, and even could be make misunderstanding between related units, so the code switching is applied to make it simpler and easier to understand.

Philips [10] explored how official phraseology of air traffic communications differed from natural English. As discussed previously, phraseology is not general English, it is the language how Air Traffic Controller speak while providing service in order to communicate with pilot and other air traffic services unit. By saying everything based on phraseology, ATC also had the patterns of phraseology used in communication. It had been answered by a controller who had been asked by the researcher that there were some dominant words appear when they were coordinating with other units such as “subject traffic”, “approved” “direct”, “request”, etc. Which categorized in general phraseology. Even it was only one word or phrase. But in other way, controllers had to combine to other phraseology with local language so it could make a clear statement completely to other air traffic services unit about information in their communication. The functions of patterns in phraseology are to make controller easier in distinguish the coordination between ATS unit. It was created and has been continually updated by the International Civil Aviation Organization to cover the most common and ordinary situations encountered in air navigation in order to optimize and ensure safety in radiotelephony. In this area, ICAO absolutely has right to update their phraseology.

7. Conclusion
What the researcher can conclude is placement of using code switching should be right on the content of messages, while making conversation there will be many possibilities of multi interpretations especially in conducting one of the navigation or air traffic service which will be fatal if there is a miss communication while coordinating between ATS units. And code switching can occur because of the communications habits of air traffic controller who speak two language which is Bahasa as mother tongue and English phraseology as main language for ATC when doing their work such us make coordination with other local adjacent units, only the use of the words must be precise to avoid miss understanding.
ICAO phraseologies are developed to provide efficient, clear, concise, and unambiguous communications, and constant attention should be given to the correct use of ICAO phraseologies in all instances in which they are applicable. However, it is not possible to provide phraseologies to cover every conceivable situation which may arise, and the examples contained in the Document 9432 are not exhaustive, but merely representative of radiotelephony phraseology in common use. Users may find it necessary to supplement phraseologies with the use of “plain” or local language. When it is necessary to use plain language, it should be used according to the same principles that govern the development of phraseologies in that communications should be clear, concise, and unambiguous.

8. Suggestion

The use of plain or local language and mix it with English language as formal phraseology required when phraseologies are not available should not be taken as licence to chat, to joke or to degrade in any way good radiotelephony techniques. All coordination communications should respect both formal and informal protocols dictating clarity, brevity, and unambiguity.

Generally, linguistic elements of radiotelephony are mostly delineated as very close to robot-like or telegraphic language carried through a limited set of lexical units within the rigid discourse structures which only people involved in the same field of expertise would understand [11]. Confined turn organization and structural organization in the discourse of ground-ground communication and the formation of distinctive lexical items, are influenced by specific means of communication technology, certain flight operation activities and the unique institutional goal of interaction. And, communication in air navigation services is the main weapon in order to create flight safety as expected and should happen.

The use of code switching is very good to supports communication between units so that the message delivered can be received quickly, accurately and informative, but the use of the word must also be appropriate. Code switching also can use as consideration understanding of the interlocutor because in providing coordination between ATS unit the message should be simple and understandable no matter what language is used the most important thing that interlocutor can understand the message to be conveyed, it is only done on communication between related local ATS units, not on flight crew. In the use of code switching the users should be more careful in placement of mixed words and sentences, so that they do not have multiple meanings and lead to multiple interpretations.

References

[1] ICAO 2001 Annex 11: Air Traffic Services Annex 11 to Conv. Int. Civ. Aviat. Air Traffic Serv.
[2] International Civil Aviation Organization 2007 Manual of Radiotelephony
[3] Doc I 9432 (2007) Manual of Radiotelephony
[4] Doc I 2016 4444–procedures for air navigation services–air traffic management Montr. QC, Canada
[5] Annexe I 2001 10–Aeronautical Telecommunications Vol. II Commun. Proced.
[6] Montgomery M 1995 An introduction to language and society ed 2 (Routledge)
[7] Cowie A P 1998 Phraseology: Theory, analysis, and applications (OUP Oxford)
[8] Dudley-Evans T 1998 An Overview of ESP in the 1990s.
[9] Civil Aviation Safety Regulation 2009 Part 170 Air Traffic Rules by Minister Transportation of Indonesia ed Subpart 170.029 Point 2
[10] Philips D 1991 Linguistic security in the syntactic structures of air traffic control English English world-wide 12 103–24
[11] Nitayaphorn P 2013 Message from the sky: Radiotelephony in air-ground communication