ORIGINAL ARTICLE

In Flight Emergency Decision-making Process: Does Intuition Matter?

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ABSTRACT

Objective. This research aimed to describe the origins and contributions of pilot intuition in the decision-making process and gain knowledge on the urgency and importance of pilot intuition in decision-making.

Method. The qualitative methodology used by the researcher is presented along with the phenomenology approach. Three pilots participated in the subject research. In-depth interviews, observation, and data documentation were used to collect the data. The researcher used the triangulation technique (other researchers, methods, theories, and data resources) to affirm data quality and results.

Result. The research result showed that the pilot's intuitive decisions to take necessary action are based on 'unconscious thought' at the beginning of decision-making. However, it develops a more cognitive process where a pilot has time-critical analysis to rationalize his intuitive yet best decision. Such a decision-making process leads to prompt spontaneous and automatic action in the event of emergencies where data and information needed are lacking.

Intuitive decisions and involuntary action are closely associated with the experience and knowledge of pilots in aviation. In an intuitive decision-making process, when time is limited and information/data is adequate, an analysis process can help a pilot identify the problem pattern and help them evaluate possible ideal decisions. An analysis process cannot replace intuition which plays a crucial role in the decision-making process during an emergency.

Conclusion. A pilot's intuition plays a strategic role in decision-making because aviation conditions are dynamic, situational, and constantly changing. Pilot's intuition can be developed by sharpening their awareness of active and evolving aviation situations (situational and safety awareness). In addition, pilots must build longer flying hours, attend training, and expand their knowledge of aviation policies and procedures.

Keywords: intuition, emergency decision making, pilot

INTRODUCTION

Aviation safety is ranked the most critical aspect and has become a significant issue in the aviation industry. Based on a media release published by the National Transportation Safety Committee (KNKT – Komite Nasional Keselamatan Transportasi) in 2016, the data collected from 2010–2016 revealed that the most common cause of aircraft accidents was due to human error (67.12%).[1] Federal Aviation Administration-FAA identifies a human error as something that humans have done, either not intended or intended, which is considered a contributing cause of negative consequences.[2] Simpson highlights that decision-making involving intuition is one of the best strategies in aviation. On the other hand, Simpson also states that analytics-based decision-making is more suitable when the goals are more specific and clearer, not time-limited, and the availability of more comprehensive data or information. Unfortunately,

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it is rare in in-flight operations, particularly in dynamic and changing environments. For that reason, naturalistic decision-making, considered intuitive, is the most proper measure taken by a pilot.[3]

The profession of aviator requires a captain pilot to have the ability to make a quick decision based on available data and information. When facing emergencies where either data or information is insufficient, intuition plays a key role and dominant factor in decision-making. Combining knowledge, long flying hours, and sound judgment in dynamic situations strengthens one's intuition to make optimal decisions.[3]

Simpson explains that naturalistic decision-making involving intuition is an ideal strategy in aviation. The decision maker in this matter is a pilot facing a dynamic situation, in a natural aviation environment, with operations-related issues where there is time constraint in emergencies, active and changing goals (dynamic goals), lack of data, and high-consequence decisions.[3]

On the other hand, Volz and Zander state that intuition is a thinking process. Relevant input is built on gaining knowledge stored in human memories for a long time due to combining all the lessons learned. The information is processed automatically, without involving an individual consciousness, creating a feeling as a basis for assessing or deciding things.[4]

When a controlled strategy cannot help to make a decision, this strategy can be replaced by a more automatic and implicit "intuitive" system.[5] Empirical research on human intuition has been long conducted in psychology as a field of study. Remmers et al. explain that intuition is not produced only by a quick and efficient process but also from an adaptive cognitive function that arises in time-constraint situations, pressing situations, and complicated problems.[6]

One aircraft accident on 16 January 2002, in Bengawan Solo river, Indonesia, was a Garuda Indonesia Boeing 737-500 with flight number GA 421, tail number PK-GWA. Data collected from the final report issued by the National Transportation Safety Committee or KNKT (Komite Nasional Kecelakaan Transportasi) revealed that the accident resulted in one fatality and several casualties suffering minor and serious injuries.[7]

Data issued in the final report identified that the technical cause of the accident was a combination of the following: 1) the airplane entered a thick storm cloud in bad weather, causing both engines to stop working; 2) there was a procedural failure in re-igniting the airplane engine due to poor machine capabilities; 3) the procedure for igniting the auxiliary power unit at the second attempt caused a power failure that needed to restore the electronic flight instrument in the cockpit.

The safety management (Standards and Recommended Practices) SARPs are intended to assist States in managing aviation safety risks in coordination with their Service Providers. Given the increasing complexity of the global air transportation system and its interrelated aviation activities required to assure the safe operation of aircraft, the safety management provisions support the continued evolution of a proactive strategy to improve safety performance. The foundation of this proactive safety strategy is based on implementing a State Safety Programme (SSP) that systematically addresses safety risks, in agreement with the implementation of the service providers' safety management systems (SMS).[7]

The technical causes of the accident mentioned above revealed that the pilots must have made a quick and timely decision to perform an emergency landing by considering the minor risks that might occur. The accident experienced by GA 421 in Bengawan Solo river, Indonesia, triggered the researcher to conduct a study regarding decision-making in the aviation industry.

The 'Bengawan Solo' accident illustrated how the pilot and co-pilot must have been able to steer the plane calmly in a highly complicated condition, where the airplane engine stopped, and all electronic flight instruments failed. They somehow could not react that calmly if the pilots did not have long flying experience. This would be impossible also if the pilots were not equipped with good technical skills and were not emotionally mature.

This research aimed to get a picture of how important intuition is in the decision-making made by the pilot in emergencies. Over a decade, the term "intuition has arguably become the preferred term for describing non-analytical human information processing. The term 'intuition' has increasingly been accepted in psychological research and the decision-making domain in particular. Intuition is a thinking process. Relevant input is gained from the knowledge stored in human memories for a long time due to combining all the lessons learned. The information is processed automatically, without involving an individual's consciousness, creating a feeling as a basis for assessing or deciding things.[8]

Hilbig et al., in their research, introduced the concept of heuristic strategy relating to intuition, where intuition is regarded as an automatic thinking process, quick, without much effort, unconsciously done. That intuition involves integrating several information presented in the decision maker's attitude.[9] On the other hand, there is intuition in the decision-making processes. Intuition is a "form" that is experienced from their reasoning and is based on the expertise of sediment clumping of the experience of an expert in a particular field. Intuition is a synthetic physiological function in which the psychological processes provide a thorough understanding of the situation at hand.[10]

Intuitive decision-making involves accumulated unconscious sensory information, resulting in an accurate decision. Lunenburg states that an individual who routinely makes an important decision using their intuition will be able to assess the problems quickly based on their experience and knowledge; the individual would easily and quickly reach a solution. In addition, rational decision-making can verify a decision taken intuitively.[11]

Robbins and Judge explained that intuitive decision-making is an unconscious process derived from experience stored in the memory. Further, Robbin and Judge explained that intuition is helpful in decision making and as a tool to create a hypothesis and rational data to support the decisions.[12]

Intuition results from an individual's experience, of which the difference between one's intuition and those of another reflects the difference in their own experience.[13] Hilbig et al., in their research, introduce the heuristic strategy in the intuition concept, where intuition is regarded as an automatic thinking process, quick involving the integration of several information presented in the attitude of the decision maker; it does not require much effort and unconsciously done; intuition consists of the integration of the decision maker's knowledge.[9]

Intuition is non-inferential knowledge obtained without any inference of facts, premises, or another hypothesis. It has the characteristic of self-evidence, meaning that the knowledge can be understood or accepted directly by an individual without the process of evidence-based practice or that it does not require external evidence. Zander et al. identified 4 (four) aspects of intuition as follows:[14]

1. Non-conscious processing, intuition occurs with a little alertness derived from an ongoing basic cognitive process brought to the surface.
2. Automaticity or uncontrollability is the process of the emergence of intuition automatically, instantly, uncontrollably, and spontaneously.
3. Experientiality is the emergence of intuition based on knowledge gained throughout life.
4. Initiation of action, unconsciousness, experiences, and automatic processes resulting in hints to initiate actions.

The research result of Klein stated that 90% of important decisions are made based on intuition. Even though intuitive choices are frequently made, the decision makers do not explicitly state that their decision was made intuitively. Usually, once a decision is made, it is produced in a rational decision-making model to make it formally accountable and explain why such a decision was taken. Klein defines intuition as a basic element used in decision-making that cannot be replaced by analytical thinking or procedures. Intuition is built by experiences for which the pattern of information is stored in a mental map. Klein's argument is strengthened by Simpson, stating that the decision-making process occurs on a cognitive continuum where intuitive decision-making is the opposite of analytic decision-making.[15-17]

In general conceptualizing intuition refers to intuitive decision-making when confronting problems, and it is used when someone is facing a dilemma of problem-solving and decision-making. Further, Hogart states that in the process before intuition, deliberating a decision, there is the matching of a pattern of information of which this process can be boosted through training and repeated exercises; thus, intuition in the context of decision making is closely associated with a combination of tacit knowledge and skills.

Burke and Miller conducted a study focusing on decision-making. They believe intuition does not emerge suddenly but arises from long experiences and emotional states. Intuition is formed in a long process, automatically, unconsciously, without realizing how and why it appears. Intuition can be developed by long built-up knowledge and stored in human memories.

METHODS

The study design chosen is qualitative research presented along with the phenomenology approach in which the procedures require the researcher to focus on a group of participants' lived experiences of a particular phenomenon and to develop the patterns of information and correlated meaning.[18]

The recruiting of participants was conducted using the snowball (chain) sampling technique by asking for information from the concerned participants who have been interviewed or contacted before, and so forth.[19] This qualitative research initially chose 3 (three) participants to obtain maximum information (expected to be clear and deep), which was determined based on multiple criteria or conditions and consisting of the following minimum requirements: 1) must have a minimum of 5,000 flight hours, 2) actively working as a professional airline pilot, 3) works in the commercial aviation industry and having a career as a flight instructor, 4) aged between 45-55 years, and 5) tenure of more than 20 years. The data and information used the snowball sampling technique in recruiting the three participants. This research was conducted for six months (July-December 2017) in Jakarta, and articles were compiled in April 2020.

The data collection method of this research used 2 (two) techniques, namely (1) primary data collection technique and (2) secondary data collection technique. In the primary data collection technique, data was collected through observation and in-depth interviews.

Meanwhile, in the secondary data collection technique, data were derived from available documents, books, journals, research papers, or documents containing data from an airline company or institution.

The questions in this research aimed to discover and understand the following: 1) The role of a pilot's intuition in the decision-making process; 2) How a pilot can develop intuition in the decision-making process.

Supporting tools used in this research were the guidelines for interviews and observation. The guidelines for conducting an interview contain a set number of questions regarding the issues studied without displaying the questions in random order. This interview guideline was helpful as a reminder for the researcher to focus on the issues to be discussed.[19]

The guidelines for observation were a written guide about all the things heard, seen, experienced, and thought during

data collection, including all data collected in the qualitative research.[20] Meanwhile, according to Guba and Lincoln, a written observation guide is generally used by observers in an un-participative situation, such as 1) informed consent and 2) tape recorder for recording the interviews.

Data analysis is a process of transforming and modeling data to simplify it to make it understandable to read and to be interpreted.

Data from interviews was studied using a comparative method after the interviews with the research subjects. Further, the interview result was analyzed to improve the validity and reliability of the data. According to Sugiyono, data analysis involves three activities, namely:[21] 1) Data Reduction: is the process of selecting, centralization, simplification, and classification of raw data collected from written documents obtained in a field study. Data reduction is employed continuously when a study takes place; 2) Data Display: means putting a set of information into place to be interpreted in a statement before drawing it to a conclusion. Qualitative data is displayed in the form of a text, which in the preliminary study is scattered and unorganized, then classified according to need analysis. A good data display can visualize qualitative data validly; 3) Conclusion Drawing and Verification are part of some complete configuration activities. The conclusion is verified when the study takes place. The decision is drawn based on data reduction and data display completed in the earlier phase. The conclusion is generally drawn in the preliminary phase before summarizing details to make it more meaningful.

Bungin states that one of the most important methods and the easiest one to verify the validity of research results is by using the triangulation technique, which involves other research results, methods, theories, and data sources: 1) Researcher Triangulation: a verification process for research result to make the data valid by asking other researchers to interview, observe, and record the same data; 2) Data Source Triangulation: is done by comparing and checking the information in a different way and time; 3) Method Triangulation: is done by comparing the data result from observation with the data resulting from the interview; 4) Theory Triangulation: is done by breaking down the pattern and find any possibilities to get more data result.

RESULTS

Analysis of Research Subjects Regarding Aspects of Intuition

Analysis of research subjects illustrates that the three subjects use intuition in deciding to take quick action, even though at the beginning of the interview it should be explained first about intuition, that the researcher should have discussed it with the participants to make the definition of intuition clearer, both its conceptual and applicative meaning. The three subjects believe that intuition emerged out of unconscious states in abnormal flight conditions and emergencies, where quick and accurate decisions are crucial in both situations when making decisions. Abnormal and emergencies (dynamic conditions) include turbulence, and the pilot must make sound decisions with minimal information and data.

The three research subjects decide to take an intuitive action from 'false belief' at the beginning; however, as the decision-making process proceeds and the evaluation results show that the decision is ideal, the three participants can rationalize the intuitive decision made.

The process of intuitive decision-making produces intuitive action as the three participants take such action spontaneously and automatically in pressing situations with relatively minimum data and information. Both intuitive decisions and action happen due to the three participants' rich flight hour experience.

Table 1 on the next page shows the analysis of the research subjects regarding aspects of intuition.

Subject 1 believes that intuition plays a vital role in solving problems during flight operations requiring creative thinking. That statement is appropriate with Dane and Pratt's research result that highlighted the role of intuition on 3 (three) aspects; (a) as a tool to solve the problem; (b) as the data to make a moral decision; and (c) as the instrument to facilitate the creativity.

Subject 2 states that intuition comes from the long, automatic, unconscious mind and cannot be explained where it comes from. The participant uses the word 'feeling' and emphasizes that 'feeling' can be developed and sharpened by adding knowledge and experience.

Conceptualization from intuition refers to problem-solving intuition, used when facing several problems solving or decision making. Subject 3 believes intuition plays a critical role in decision-making when time is limited with minimum data and information.

The researcher, in this case, compares the initial concept to the concept of characteristics of intuitive decision making as explained by Robbins and Judge that intuitive decisions are usually made under the following conditions: 1) high level of uncertainty, 2) relatively little / minimal evidence or data, 3) variables are unpredictable and irrational/ illogical, 4) lack of facts, 5) facts not fully relevant to problems, 6) minimal data to be analyzed, 7) more than one sound alternative solutions which also argumentative, and 8) time constraint.[12]

The other concept used to deepen the previous research concept is that according to the study conducted by Smith et al., it explains the typical characteristics of decision-making in critical conditions or emergencies.[22]

DISCUSSION

A pilot uses intuition to interpret their flying experience by storing the patterns of information gained during those processes to recognize conditions during a flight, detect possible problems, and make ideal decisions to take action quickly and accurately.

Table 1. Analysis of Research Subjects Regarding Aspects of Intuition

Aspects of Intuition	Subject-1 (HM)	Subject-2 (AR)	Subject-3 (AS)
Non-Conscious Processing	Making decisions in abnormal flight conditions and emergencies and asking oneself afterward, "why did I take that decision?".	Taking actions with uncertainty and believing it's based on feeling because of inadequate data.	Taking quick actions unconsciously and believing that it's the right action.
Automaticity or Uncontrollability	Taking automatic and spontaneous actions in pressing situations with minimal data.	Performing an emergency landing to merely save the airplane and not consider the other reasons.	Taking over a flight operation quickly and making the right decisions.
Experientiality	Making the experience a basis for actions in particular situations requiring configuration deviation awareness.	Using the previous flying experiences to make quick decisions.	Making experiences as a lesson-learned process in making more ideal decisions.
Initiation of Action	Believing that actions are emerging in pressing situations.	Taking actions not according to SOP but still prioritizing the aspects of flight safety.	Initiating quick actions in abnormal conditions or emergencies in particular.

Problems in aviation are un-similar; however, in dealing with issues, a pilot must have the ability to recognize the similarities of situations based on their flying experiences. A pilot will somehow use it automatically to take action without a long thought. In intuitive decision making, if sufficient time is available and information/data is adequate, an analysis process can help an individual to identify the pattern of the problems and help them evaluate possible ideal decisions. Still, an analysis process cannot replace intuition, which plays a vital role in decision-making.

In aviation, an analysis of the cognitive process for aviation situations is fundamental to observing safety procedure guidelines. Lunenburg highlights that intuitive decision-making is an automatic analysis process from the unconscious mind. It is a result of experiences that create creativity and innovation potential.[23]

When encountering possible unique and dynamic problems, the existing procedures must be applied as a rationale and reasoning of a pilot that led to a decision. This calls for a sufficient number of flying hours to become a captain pilot. The number of flying hours will indicate the experience and competence of pilots in making decisions. The more experienced a pilot is in handling problems in various situations and flight conditions, the identification of a problem can be made quicker and more accurate. The quicker a problem or situation is identified, the faster decision can be made.

In this case, the experience can be used for solving the problems encountered during a flight because the experience-based decision is beneficial as practical knowledge. Experience and competence can be used to identify the causes of problems and what is the most effective solution to get to facilitate problem-solving.

Simpson explains that in the aviation industry, the naturalistic decision-making strategy, which involves intuition, is ideal because the decision maker, in this case, the pilot, faces a dynamic situation, natural environment, and live (real-time) operations where they're facing very limited time, with dynamic purposes, minimum data and high-risk consequences of the decision implemented.[3]

Naturalistic decision-making using intuition is ideal because it is suitable for dynamic situations in the natural aviation environment. The analytic process can boost the pilot's intuition in making decisions. The two strategies, both analytic and intuitive thinking, are crucial for pilots of which their significance can be perceived and trained. Flight simulator training can be scheduled regularly and regarded as mandatory training with the hope that the pilot's skills in analyzing situations can be upgraded. It can expand a pilot's flight skills experience to deal with problems and sharpen their intuition in making decisions. Both strategies, analytical and intuitive, play an important role for pilots to understand comprehensively. Mandatory flight simulator training and a lot of flying experience hopefully will sharpen a pilot's intuition in making the right decision.

CONCLUSIONS

There are two conclusions: 1) Pilot's intuition plays a strategic role in the decision-making process because aviation conditions are dynamic, situational, and changing at all times; 2) Pilot's intuition can be developed by sharpening their awareness of dynamic and changing aviation situations (situational and safety awareness). In addition, pilots must build longer flying hours, attend training, and expand their knowledge of aviation policies and procedures.

Limitation

The researcher, who still learns without a doubt, has some limitations in this study, among others: 1) the researcher only used a qualitative approach in data processing and analysis; 2) he has relatively limited comprehension and understanding of the phenomenology research as a specific qualitative method in psychology; and 3) he has relatively limited time available to deepen the analysis of data, less valid and incomplete or incomprehensive research data, integrating data in a holistic perspective.

Recommendation

The analysis, discussion, conclusion, and research limitations suggest several propositions expected to be helpful for the stakeholders: 1) theoretical suggestions: a) further study needs to be conducted to develop a more holistic approach by combining both qualitative and quantitative approaches, whether it's a combined or mixed method, b) further study needs to be conducted to develop a broader and more profound analysis of phenomenology research, c) considering the issues of minimal time, the results of this research is not faultless. The researcher suggests the need to conduct a similar study with sufficient time to spare and more involvement in observing the decision-making process; 2) practical suggestions: a) it requires stronger awareness for pilots and flight attendants of the importance of intuitive decision-making process in aviation to enhance aviation safety, both through regulations, training or other education initiatives, b) it needs continuous support from the aviation management and relevant aviation institutions to preserve all records of pilot's decisions, particularly decisions made intuitively, c) intuitive decisions made by a pilot need to be backed up with more concrete and objective-oriented policies and regulations, to ensure that intuitive decision making can be integrated into the whole process of decision making in aviation.

Statement of Authorship

All authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising, and approved the final version submitted.

Author Disclosure

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