A Case Study for Runway Incursions

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Abstract
This research presents the process for a systematic literature review examining factors that contribute to runway incursions (RIs). A systematic literature review uses other research results as data for systematic analysis. Runway safety is a top priority in the US. The IRS has been increasing and typically three RIs occur every day. In this paper, 122 articles were used, and 141 variables were identified through the analysis. These variables were included in the literature search. The aim of the systematic literature review is to develop a consensus on the factors that contribute to runway incursions and to discover research gaps to stimulate new research. The research gap is identified in the field of psychology, aviation, and human factors. The results of this study indicate that further research is required to address the gap of knowledge in this field.

Introduction to Systematic Literature Review
What is a systematic literature review? A systematic literature review is a summary of previous research using a systematic and explicit method to identify, select, and critically appraise relevant studies and to collect and analyze data from them.

Systematic Literature Reviews in Other Disciplines
Systematic literature reviews are used in many other fields as shown in Figure 2. Systematic literature reviews are rarely used in aviation, and have not been used to address runway safety or RIs. Systematic literature reviews in aviation are related to medical and health-related aviation topics.

Runway Incursion Incident Types
Incursion type: Incursion types refer to the action of a pilot that violates any Federal Aviation Regulation. A RI due to a pedestrian or vehicle entering any portion of the airport movement area include an incident in which the incorrect presence of an aircraft, person or vehicle on the protected area of a surface designated for the landing and take-off of aircraft.

Methodology
The methodology used in this study is a systematic literature review based on guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement. These guidelines were used to conduct a systematic literature review of correlating factors contributing to higher incidence of RIs.

Inclusion Criteria and Search Strategy
Peer review journal articles and conference papers published in English in 2003 that provide quantitative and qualitative assessment with any of the following words as key words or in the title or abstract: studies, statistics, the number of flights in the transportation system, in the worst case, a RI can result in a collision and loss of life.

Comparison of Quantitative Research and Qualitative Research
Qualitative research typically identifies more contributing factors for RIs than quantitative research. The majority (if not) of qualitative research studies identified at least four contributing factors for RIs, whereas only one (of 12) quantitative research studies identified four contributing factors. Quantitative research papers often focus on only one or two specific contributing factors. This may reflect challenges capturing some categories of contributing factors with statistical methods. All quantitative research studies were published after 2011, whereas most qualitative research studies were conducted before 2013.

Recommendations and Discussion
This study demonstrates that reducing RIs is a top priority for FAA and an important activity to ensure aviation safety. The percentage of RIs contributing to RIs includes the following categories: human factors, airport geometry, technical factors, airport characteristics, environmental factors, and organizational factors. The research demonstrates the value of this systematic approach to synthesis research findings from multiple studies, and advance research, increase safety, and optimize efficiency in the aviation sector.

Conclusions
A reduction of RIs is a top priority for FAA and an important activity to ensure aviation safety. This study demonstrates the process for a systematic literature review of factors contributing to RIs, and qualitative and quantitative research published in peer-reviewed journal and conference papers. Six contributing factors to RIs identified were classified as human factors, airport geometry, technical factors, airport characteristics, environmental factors, and organizational factors. The research demonstrates the value of this systematic approach to synthesis research findings from multiple studies, and advance research, increase safety, and optimize efficiency in the aviation sector.