Evaluation of Airport Security Training Programs: Perspectives and Issues

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Abstract—While many governments and airport operators have emphasized the importance of security training and committed a large amount of budget to security training programs, the implementation of security training programs was not proactive but reactive. Moreover, most of the security training programs were employed as a demand or a trend-chasing activity from the government. In order to identify issues in airport security training and to develop desirable security training procedures in an airport, this preliminary study aims at providing (1) the description of current state of airport security training and training in general, (2) the study design and interview guide for studying airport security training, and (3) expected outcome from the study.

Keywords-airport security; training; security management

I. INTRODUCTION

Airport security regulations are constantly evolving, thus the need for staff to be fully trained to comply with the regulations and to ensure security of an airport is of vital importance. Moreover, today's radical changes in the forms of security threats require exerting even more effort to develop the desired knowledge, skills and attitudes in the workforce. Employee training to keep up with new trends and practices therefore has generally been considered as a crucial factor for airport security management (ASM). As stated by many security managers and airport security experts, security training for airport personnel is widely recognized as a very important activity for guaranteeing airport security and can be a powerful facilitator of enhancing airport security. However, the efficacy of security training programs in enhancing the security attitude and the capabilities of employees cannot be taken for granted.

After 9/11, many governments and airport operators even more emphasized the importance of training and committed a large amount of budget to training programs [1], [2]. The monetary commitments to training programs were made in response to various challenges that many governments and airport operators are facing today, including the adoption of new security measures and new forms of strategies. Generally, the common basic standards about security training for airport personnel in Europe are laid down by the Commission Regulation No 185/2010[1] and all the security training delivered in European countries should be compliant with European Community Regulations, national laws and National Civil Aviation Security Programmes. In detail, the aviation security training in Europe can be divided into the following main categories:

- General training obligations.
- Basic training.
- Job specific training for persons implementing security controls.
- Specific training for persons directly supervising persons implementing security controls (i.e., supervisors).
- Specific training for persons with general responsibility at national or local level for ensuring that a security program and its implementation meet all legal provisions (i.e., security managers).
- Training of persons other than passengers requiring unescorted access to security restricted areas.

More specifically, in Europe, detailed background and pre-employment check are compulsory requirements to be completed before the person undergoes any security training involving access to confidential information. Mental and physical abilities to carry out the designated tasks effectively have to be tested at the outset of the recruitment process and before the completion of any probationary period. Furthermore, after the initial obligatory training course(s), each personnel category shall undergo recurrent training at a frequency sufficient to ensure that competencies are maintained and acquired in line with security developments.

Unlike general work performance which can be improved relatively easily by everyday work practice, knowledge and skills for security may not be fully developed by workplace practice alone since security-related incidents rarely occur (but can cause huge losses). Security training programs, therefore, can offer a way of improving the competencies of employees in airport security. The continued use of traditional training methods for airport security might contribute to inadequate presentation, however, because the complexity of today's security environment necessitates the use of more integrated and coordinated knowledge and skills than those traditionally required.

As a result, security training programs should be designed strategically to reflect the evolving security environment, and evaluated and developed on a consistent and longitudinal basis [3]. However, similarly with training programs in other fields, training programs in ASM have

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[1]EU COMMISSION REGULATION No 185/2010 of 4 March 2010, articulates detailed measures for the implementation of the common basic standards on aviation security.

not been proactive but reactive and have implemented merely as a demand from the government or a trend-chasing activity. Fundamental questions are then how a security training program has been designed and implemented; how the performance of a security training program has been evaluated; and what the impact of a security training program on trainees' behavior and on ASM is.

As workpackage 1 (WP1) partners in the SECONOMICS project[2], which focuses on developing a decision supporting tool related to ASM, in this study the authors aim at providing:

- The description of current state of airport security training (AST) and training in general.
- A general framework for studying AST.
- Expected outcomes from the study.

As an initial step, a series of preliminary interviews with four airport security managers and two certified security training instructors have been carried out. These interviews focused mainly on better understanding the current state of airport security training. Specifically, we aimed at identifying the rules and regulations relevant to AST at the national and EU level to get better knowledge on the level of compliance, the dedicated resources including both monetary and nonmonetary investments, relevant constraints, and open issues. Furthermore, we tried to security culture and procedures in an airport (e.g., optimization effort for security processes and communication of security issues among employees). In these interviews, preliminary insight into AST has been gained and forms the backbone of this study.

The succeeding sections of this article are organized as follows: first, the available literature on training evaluation is reviewed in Section II; some relevant issues related to AST are addressed in Sections III and IV; and Section V concludes the article and discusses possible outcomes and extensions of the study.

II. LITERATURE REVIEW: BACKGROUND KNOWLEDGE FOR TRAINING

The literature on training has generally focused on addressing the following three features: (1) needs analysis (i.e., an assessment of employees' training needs); (2) design of training methods (i.e., defining appropriate training methods based on needs); and (3) evaluation of the training program (i.e., evaluating the program using various criteria and strategies) [4], [5]. However, as Tracey & Tews [6] noted, in spite of the usefulness of these features in conducting an analysis related to training, the emphasis on training-specific features and the exclusion of the consideration of factors outside the training domain may be inadequate. Therefore, in the subsequent sections,
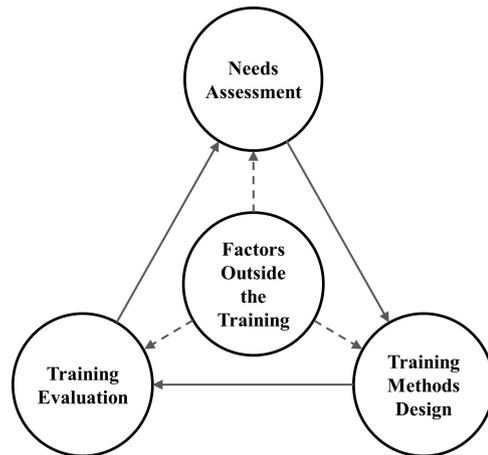
Figure 1. Training Procedures and Features

we will provide a brief description of the factors outside the training program that may affect training program effectiveness, as well as the above mentioned three features typical of training design and delivery (see Figure 1).

A. Needs Analysis

Training begins with investigating needs of training to guarantee that a training program tackles central issues and problems [6]. In general, a needs analysis is conducted by collecting data through observations, surveys and interviews and by investigating individual and organizational performance. It then determines where in the organization training is necessary, which employees need training and what types of knowledge and skills are needed. When this step is omitted, an employer may inadvertently believe that training is required when the problems should be solved with different methods [6].

B. Defining Training Objectives and Methods

Once a needs analysis is conducted, an organization needs to establish concrete training objectives and to define appropriate training methods. The training methods widely used are on-the-job training and on- or off-site classroom instructions through such means as lectures, demonstrations, exercises, games, role plays and simulations [4].

C. Evaluating Training Programs

Training programs should be periodically and systematically assessed to verify whether the desired training outcomes have been realized [6]. There is a wide array of conceptual frameworks and criteria for evaluating training programs including Kirkpatrick's four-level taxonomy [7], Phillips' five-level model [8] and Swanson & Holton's model [9]. For example, Kirkpatrick [7] proposed the following criteria: reactions to training, knowledge acquisition, changes in job-related behavior and performance, and improvement in organizational-level results.

D. Factors outside a Training Program

While it seems clear that an employee's attitudes and the work environment influence the outcomes of a training program, there has been relatively little attention on these factors. For example, if desired outcomes are not accomplished with a training program, the management tends to search for a reason of the failure, probably focusing on the root processes of the training: needs assessment, training design, and implementation [6]. Nevertheless, the reasons for the failure may actually have nothing to do with the training itself, because other variables – outside of the training program – may also affect the training effectiveness. From the interviews carried on with security instructors, for instance, we identified that the real applicability of the training contents in the work environment, as well as the gap between the declaratively-acquired knowledge and the procedural knowledge, represents a big concern for them in making a training program effective. In addition, other external factors such as attitudes, motivation and expectation of the personnel can also play an crucial role in determining the success of a training session especially when temporary employees and/or third parties sub-contractors are involved in security tasks [10]. According to Baldwin and Ford [11], for example, failure to link rewards with the use of newly acquired knowledge and skills on the job could be commonly responsible for the lack of training transfer.

III. How and What to Study for AST

There are several issues in conducting an analysis on a training program. In this section, we explore the issues specifically related to AST programs and provide a guide for studying AST programs.

A. Issues in Studying AST

In conducting a study regarding AST in the project, the authors have identified several difficulties. First, while the typical studies of training have used the experimental method which requires the use of control groups and/or longitudinal time series, it would be very difficult to use such a method in our study. Obtaining control groups and the random assignment of trainees to control and experimental groups, is almost impossible and relying on time series designs would not be practical. Furthermore, in the study, it would also be challenging to measure the pre-post performance difference of trainees.

Second, surveys of post-training reactions of trainees might not be reliable. While most of the training programs conduct a post-training reactions questionnaire, it is questionable whether such information is credible. Since most trainees might react positively to all training experience, reaction measures asked in a post-training questionnaire might be inadequate estimates for measuring actual training effectiveness. Moreover, the questionnaire might only be appropriate for measuring the acquisition of declarative knowledge (refers to the acquisition of facts), while the acquisition of procedural knowledge (refers to the integration of facts into a set of orchestrated behavior chains) will not be measured by the questionnaire.

Third, previous studies have developed various output-related performance measures of training programs, including quantity and quality of the product and time and cost saved, to investigate the performance shift caused by training. It would, however, not be feasible for us to use such quantitative measures since it is very difficult to estimate the output shift of security caused by training. Furthermore, when training programs are aiming at improving soft-skills (e.g., attitudes or decision making styles), it would be more problematic to measure the impact of the programs.

B. Guide for Studying AST

Broadly speaking, our purpose of studying AST in the project can be listed as follows: (1) having a clear picture regarding the problems in security training programs; (2) investigating the security training procedures currently used by airport operators and the impact these procedures having on the performance of individual and organization; and (3) exploring how different types of airports and different levels of management have different views on security training.

As a preliminary study, in this article, we limit ourselves to offering the study design and interview guide prior to conducting an actual study and to providing an initial body of a research framework that is suitable for use. In the following subsections, we present a more detailed guide and questions that are relevant for studying AST.

1) Defining Training Methods: Many forms of instructional methods and learning tools have served the airline industry's security training programs for many years. As security issues become more complex, however, the traditional instructional tools may be found to be inefficient and lacking in effectiveness. For example, Harris & Cannon [3] argued that traditional formats that have restricted the amount of interaction or one-way communications are limited in effectiveness. As a result, instructional formats selected for security training programs might be effective only when they involve interactive communication methods and stimulate an individual's involvement.

As an initial step, therefore, the study first needs to identify the training methods and tools currently used in AST (i.e., review the methods and tools which have been used to improve security) and different impacts of these on security. In order to achieve this objective, it would also be necessary to interview various training personnel to get answers to the questions including: (1) How did they develop and implement training programs?; and (2) What is the relative effectiveness of different training methods or combinations of training methods?

2) Training Evaluation: As mentioned in the previous section, various training evaluation criteria have been widely investigated and developed. While identifying good criteria for measuring the security training effectiveness might be very interesting and should be done, as an initial step, we focus more on identifying the current

state of training evaluation such as the existence of pre-training tests and the use of performance indicators for measuring training effectiveness. More specifically, the following questions will be addressed: (1) What are the major perspectives influencing the evaluation of training programs?; (2) What training evaluation methods and frameworks are most frequently used?; (3) For what job categories is training evaluation most often conducted?; and (4) What training evaluation methods are perceived by top managers to be most effective?

Furthermore, we need to identify how different stakeholders evaluate the effectiveness of training differently. For example, Harris & Cannon [3] identified that different levels of managers (i.e., training directors vs. low-level trainers) have different views on the success of training programs. They indicated that the response to training effectiveness from higher level of management is substantially higher than the opinions of trainers at the lower level, those who are actually involved in training programs [3]. In order to cover the diverse views of different stakeholders on training effectiveness, we will conduct three levels of interviews which will be explained in detail in the subsequent section. Consequently, the following questions will be addressed in the interviews: (1) Who conducts training evaluation?; and (2) What role does top, medium and low management play in training evaluation?

3) Individual Characteristics and the Work Environment: Our primary objective for this matter is to identify additional factors that can influence the effectiveness of training, besides training contents, design and implementation. Several studies (e.g., [5], [12]–[14]) identified various factors outside training that can influence the effectiveness of training. In the study, we will focus on investigating the impact of individual characteristics (e.g., abilities, attitudes and motivation) and work environment (e.g., job characteristics, social networks and organizational systems) on training.

4) Comparison of Training Provision between Different Types of Airports: According to Westhead & Storey [15], employees in small and medium-size enterprises (SMEs) are much less likely to receive training than their counterparts in larger organizations. Since airport operators need to comply with various regulations related to training, their argument might not be true for small airport operators.

However, it is still interesting whether different types of airport operators (e.g., hubs and spokes) provide different levels of training to their employees. For example, Westhead & Storey [15] suggested two possible reasons for under-provision of training: the "ignorance" explanation suggests that managers are not aware of the benefits of training and consequently provide only minimum level of training that is stipulated in the regulations and the "market-forces" explanation suggests that managers provide a minimum level of training because they anticipate the costs associated with training may exceed the benefits (returns) to be derived from it. These two explanations have different policy implications. In providing security training programs the study will investigate what are the

differences for different airport operators and which policy direction they are following.

IV. RESEARCH DESIGN

To conduct this research we defined a method based on the qualitative case study, identified as the core approach to explore how airport operators design, conduct and evaluate training since "compared to other methods, the strength of the case study method is its ability to examine in-depth a 'case' within its 'real-life' context" [16].

However, due to the reasons presented in the previous section, data collection will be a mixture of both qualitative (in-depth interviews, direct observations of the training centers and review of documentation/existing literature) and quantitative (questionnaires, tables and graphs) research strategies. Following Maxwell [17] who suggested the identification of five components to address different sets of issues in a research design (i.e., goals, conceptual framework, research questions, methods and validity), we generated a research design for the study of the effectiveness of the AST as shown in Table I. It should be noted that, while our unit of analysis is a specific security training program in a different setting, we will also take into account the characteristics of different security training programs: mandatory vs. voluntary training or ad-hoc vs. recurrent training.

Table I
RESEARCH DESIGN

Goals	Practical: evaluate the impact of the security training program on the airport organization (and more in general on the overall system security) Intellectual: identify good variables in a security training program, improve current security training programs
Conceptual Framework	Behavioural model, expectancy theory and motivational theory
Research questions	Is the applied security training program effective? • Training procedures currently in use • Practical application of skills / competencies / tools / methods acquired in the training phase
Methods	Interviews, direct observations, documents analysis, questionnaires
Validity	Rich data, respondent validation, searching for discrepant evidence and negative case
Context	Unit of analysis: a specific security training program Scenario: • Broad: Different types of airports (e.g., big or small, or hub or spoke) • Narrow: Select some security areas (e.g., security check points) Actors involved: • Security managers and training managers • Security trainers • Trainees (e.g., security staff or generic airport staff)

First hand data will be collected through sets of interviews, considered the foundation of case study evaluation as they are the path to understanding both what happens

from the perspective of those involved and how they react to it. Table II shows the interview design. While the inclusion of all sets of stakeholder groups (e.g., security managers, trainees, security trainers, representatives of the organizations and the program administrators) in the analysis would be desirable to cover the entirety of perspectives on the topic analyzed, this might not be feasible due to various access constraints. Moreover, since the objective of the study is to identify possible gaps between the expected results and the achieved results of the training program, we decided to limit our in-depth interviews to security managers and training managers (Actor 1), security trainers (Actor 2) and trainees (Actor 3), more deeply involved in the training phase. Another reason for this selection is our need of practical data, namely data related to the real application of the training content in the everyday work activities (e.g., experiences, examples, considerations about application procedures and simulations) (see Table II).

Specifically, for each group of actors at least four interviewees will be contacted in order to have respondents from the four different types of airports identified (hub, spoke, big size, small size). This will allow us to have a wider comprehension of the training issues in different context. From these interviews we will be able to have an overview on the current situation, focusing on the problems the actors are facing/have faced in training programs, both in teaching and in learning.

To ease the further analysis Actors 1 and 2 will be required to provide an example of a new tool (e.g., the integrated Liquids, Aerosols and Gels and the Liquid Explosives Detection System screening devices, or the 3D Body Scanner) that has been introduced during the training phase by a technical expert: this will allow us to identify a specific application scenario, useful to analyze the training in a concrete way instead of concentrate on general questions and abstract concepts[3]. Moreover, how the introduction of new security tools is presented to security operators will serve as a practical case to be analyzed and discussed with stakeholders to guide our study.

Actors 2 will be interviewed about the methods of training (e.g., frontal lessons, exercises, course materials and simulations) and the contents of a training course. They constitute a medium point between the theoretical level and the practical level. The data for Actors 3 will be collected in the last phase of the study as employees deposition will be used as the last step of the applied training program: after having interviews with trainers and security/training managers, employees should be interviewed and observed, with the support of an expert, while working to evaluate the acquisition of procedural knowledge. Moreover, employees will be interviewed about problems that arise in the real application of the training. In this case the analysis of the individual characteristic

and the work environment will also be conducted.

In the analysis of the data collected from the interviews, a categorizing strategy will be adopted: codes from the interviews will be extracted to populate categories previously derived from existing theories (organizational categories); participants' concepts and beliefs emerging from the interviews will be placed in substantive categories and finally theoretical categories representing the researcher's concepts will be used to build a more general and abstract framework.

Table II
INTERVIEW DESIGN

Actors	Method	Objectives	Analysis	Level
1. Security managers / training managers	• Semi-structured interviews • Purposeful sampling	• Identify problems in the training program • Identify key issues in security training	Coding through organizational, substantive and theoretical categories	Theoretical
2. Security trainers	• Semi-structured interview • Purposeful sampling • Analysis of course materials	• Identify problems in the training program • Identify method and contents used in the training	Coding through organizational, substantive and theoretical categories	From theoretical to practical
3. Trainees	• Semi-structured interviews /observation • Convenience sampling	• Identify possible gaps: declarative knowledge vs. procedural knowledge	To be defined after the interviews with Actors 1	Practical

V. CONCLUSIONS AND DISCUSSION: EXPECTED OUTCOMES AND POSSIBLE EXTENSION

During the past decades, a consensus crystallized among scholars, practitioners and policy-makers that a security training program would increase the overall level of airport security and promote the benefits from security investment. As a result, several security training programs have been aggressively employed and mandated by local, national and international governments. However, AST programs have likely implemented as a fad without ascertaining the effectiveness of the programs. Furthermore, while validating the effectiveness is particularly urgent at a time when transnational terrorist organizations flourish, no coherent vision for this has yet been devised.

In this article, we have explored how to develop and design successful methodologies for AST. Based on this study, we expect to generate a clear framework of the current selection and delivery of training programs in different airport settings (e.g., small and big hub and spoke) and to identify whether there is a conflict between

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[3]This "case in the case" is frequently used in case study research as way to deepen a topic driving the attention of the interviewee on something he/she directly experienced.
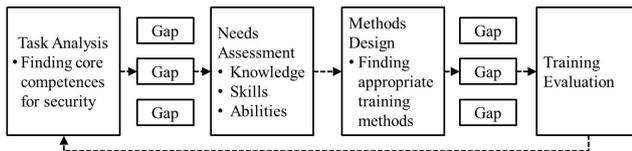
Figure 2. An Example of a Conceptual Model

an administrator's awareness and the reality. For example, in our preliminary interviews, we identified that there might be competing alternatives in investing in training due to factors such as security-first culture vs. business-first culture. Some airport operators may therefore believe training can give huge benefit to their airports, while they reserve only small amount of resources for training.

Furthermore, the analysis will allow us to identify optimal selection of different training solutions (e.g., classroom courses, e-learning, on the job training, etc.) taking into account various economic and social constraints faced by trainers and trainees. We will then be able to develop a conceptual model (for example, see the following figure) or a theory which can overcome current gaps in security training and can provide a guide to effective security training (see the following example figure). This research study moreover allows us to understand if and how current airport security training can properly detect new security threats and malicious attacks that affect the functionality of the airport (e.g., innovative IT based multiple attacks and/or bio-terrorism) or if more focus on technology, human factors and organizational aspects, as well as 'adhoc' training for profiling for example would be needed. This specific case study becomes then a model to analyze other aspects related to the security measures in the some context (see Figure 2 as an example).

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