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Aviation Research Project: methodology

Collecting data: describing the instruments used

Below are two examples illustrating how to describe the instruments you used when collecting data. Example 1 describes the instruments use, gives reasons why and uses literature as support. Example 2 simple describes the instruments with no justification.

Example 1

A psychometric survey was utilised in this study for several reasons. Foremost, it has proven efficacy as a research methodology in a broad range of safety-critical systems including aviation (Zohar 1980; Soeters and Boer 2000), heavy and light manufacturing (Williamson, Feyer, Cairns & Biancotti 1997), nuclear energy (United States Department of Energy 1999) and medicine (Helmreich and Merritt 1998). Secondly, the use of psychometric methodology is useful when examining phenomena localised and contextual, or lacking in empirical data (see Johnston 1991; McDaniels & Gregory 1991; Nunnally 1978; Schein 1992; Trice & Beyer 1993). Thirdly, psychometric survey methodology can indicate the organisational 'deficiencies' (preconditions to accidents) in aviation not yet detectable by post-incident analyses.

(Adapted from Falconer 2006, p. 95)

Example 2

This study involved the analysis of data received from the 43-item MCAS, taken by maintenance personnel from 27 Navy and Marine Corps aviation units. The MCAS is a self-administered survey consisting of nine demographic and 43 maintenance-related items (see Appendix A). The demographic items are: 1) rank; 2) total years aviation maintenance experience; 3) work center; 4) primary shift; 5) current model aircraft; 6) status (active duty, drilling reservist or active reservist); 7) parent command; and 8) unit's location. The maintenance items are grouped into the six HRO components: process auditing, reward system, quality, risk management, command and control, and communication/functional relationships. The MCAS utilizes a five-point Likert scale to capture participant responses: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree (note: options of Not Applicable and Don't Know are also available).

(Adapted from Hernandez 2001, p. 20)

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Collecting data: describing the procedures used

Example 1: describing participants

The participants comprised 402 Australian Defence Force officer aircrew and engineer personnel that have graduated aviation-specific training such as flying training or aeronautical engineering. The participant sample comprised the full population base of RAAF pilots and engineers to the senior officer rank of Wing Commander. There are only a small number of officers above this level (approximately 50), and the Directorate of Personnel excluded these personnel from the study citing reasons of security.

An invitation to participate in the study was made to the relevant Aviation Safety Director of the three armed services (ARA, RAN and RAAF). The researcher and several aviation safety officers followed up the invitation from the Directorate of Flying Safety on numerous occasions. The RAAF Aviation Safety Director supported the research, however the researcher did not receive replies from the Army and Navy Aviation Safety Directors.

(Adapted from Falconer 2006, p. 96)

Example 2: describing participants

The participants were Navy and Marine Corps officers and enlisted personnel involved in aviation maintenance from 30 units that completed the MCAS on-line. The units comprised of active-duty and reserve units from three different communities: Helicopters (Helo), Fixed Wing - Tactical Air (TACAIR), and Fixed Wing - Non-Tactical Air (Non-TACAIR) (see Table 3). Shore maintenance facilities were not included in this study. Since 20 responses are the minimum number MCAS responses identified by the NPS School of Aviation Safety for an adequate unit sample, no unit 20 with fewer than 20 responses was included. This inclusion criterion resulted in 27 of 30 units being included in this study.

(Adapted from Hernandez 2001, pp. 19-20)

Example 3: describing simulator instruments and procedures

Tower Simulator

Figure 1 is a photograph image of the Tower simulator used in this study. Controllers communicated via radio (voice communications) with pseudo-pilots, who were responsible for controlling all of the aircraft in the simulation. Pseudo-pilots were located in an isolated room adjacent to the tower simulator environment. The pseudo-pilots controlled aircraft via a customized Graphical User Interface (GUI), which sent commands to an application that managed all of the simulation displays. A head-mounted eye tracker (Applied Science Laboratories: Mobile Eye) was used to record the local controllers' visual gaze patterns. The Ground and Local controllers stood side-by-side, facing the following tower components.

(Sanchez & Smith 2010, p. 51)

Example 4: describing literature review procedures

Following a systematic search of abstract databases, a review of 83 peer-review journal and conference papers was conducted. The abstract search was focused on nine human factors (attention, communications, fatigue, mental workload, situation awareness, stress, teamwork, trust, vigilance). These nine factors had been previously identified by subject matter experts as factors that could have a large impact on ATCO performance. The review was guided by two primary aims. The first was to provide justification that the nine human factors, previously specified for inclusion in future investigation, did impact performance. The second aim of the literature review was to identify and summarize previous research on relationships between the nine factors. In order to maintain a clear focus on these aims in the review, strict selection criteria were adopted. Papers were only included in the review if the relationship between at least one of the nine factors, and an additional human factor, also of the pre-established nine, were considered.

(Edwards et al. 2012, p. 60)

Analysing data: describing the procedures used

The examples below show how to write about your data analysis: what procedures were used, why and what literature supports this approach.

Example 1:

The data from the semi-structured interview was organised and transcribed before the data was keyed into analysis software for qualitative data. The software used for this research is QSR NVivo version 9. Bazeley and Richards (2000) highlighted that NVivo is able to categorise data from interview session into nodes that can be explored, organised or changed to answer the research questions. This software allowed the researcher to browse all the data coded at a node, to review the data, to return to the context, or to rethink the idea in interpreting the results. In this way the coding was more systematic and easy to access.

(Adapted from Yunus 2012)

Example 2:

The data for the quantitative approach was analysed using statistical tools. Descriptive and inferential statistics were used to analyse the data collected from the questionnaires. As mentioned in Section 3.1, PASW Statistics 18 were used to analyse the quantitative data. This software is a comprehensive system for analysing data and it is able to assist data interpretation more easily (Allen & Bennett 2010). Tabulated reports, charts, and plots of distributions and trends were generated to show the significance and similarity among the data evaluated.

(Adapted from Yunus 2012)

References

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