Human Factors as a Corporate Culture

A thesis presented in partial fulfillment
of the requirements for the degree of
Master of Aviation
At Massey University

Dwinarni Wisnu Astuti

1997

Abstract

Studies on human factors training needs assessment have been conducted within Western airlines. Little, however, is known whether other non-western aviation industries have the same needs. The present study aims to take a small step towards remedying that deficiency. This study concentrates on the identification of specific human factors training which is in line with the organisational objectives, on a sample of Indonesian aviation employees.

The needs assessment questionnaire used in this study was based on Hunt's (1984b) NEBEAT model. The questionnaire also obtains biographical information. Descriptive statistics, Principal component analysis, and content analysis were used on the data.

A clear implication of the findings of this study is that human factors training is less effective if only received by one of the teams in the company. A corporate culture of human factors is a prerequisite of maximum human resource efficiency and effectiveness.

Acknowledgments

I would like to thank my supervisor, Dr. Lynn M. Hunt for her advice, support and encouragement. Thanks also to Dr. Fiona Alpass for her support. Thanks to all staff of the School of Aviation for their encouragement and support.

I would like to acknowledge the support of my colleagues: Farida, Ratna, and Vinda. I am also grateful to members of Garuda who participated so willingly in this study.

I would like to thank my family: My husband, Djoko Wibowo, for his patience, encouragement, and understanding, and my daughter, Vienna Fawzia Djoko Wibowo who was always able to cheer me up in difficult times. Finally, I would like to thank my mother, Mrs. R.A. Murni Insijah who was always around to support me.

Chapter One

Introduction

1.1 Background

June 13th, 1996 was a fine morning in Fukuoka, Japan. Two hundred and sixty passengers were on board flight GA 865; destination Jakarta and Denpasar, Bali (Daimon, 1996). Most of the passengers were Japanese tourists who planned to spend their holiday in the island of Gods, Bali. The passengers were as happy as the flight crew who would be home when they finished their flying duty.

Shortly after the flight attendants heard the announcement from the Captain to assume the take-off position, the accident occurred. The DC-10-30 aircraft lifted about 10 feet off runway 16 of Fukuoka International Airport, before slamming back down, skidding 2000 feet through a road, stopping on its belly and bursting into flames (Daimon, 1996, Anonymous, 1996).

Three passengers were killed, many others were injured and shocked. It appeared that there was a mechanical failure of engine no. 3 General Electric CF6-50C2 located underneath the starboard wing (Sekigawa, 1996). There were many questions, however, about the Captain's decision to abort take-off

when the DC-10 transport had passed V1 (Daimon, 1996). V1 is the speed at which the plane is at the point of no return: the aircraft must take-off.

An experienced Garuda pilot[1], agreeing with Sekigawa (1996), said that the mechanical failure was not limited to engine no. 3. Engine no. 2 was also in trouble and this was the reason why the DC-10 Captain decided to abort take-off. Continuing to fly would have worsened the situation.

In the organisation, PT. Garuda Indonesia, the debate was more complex. Different departments such as Flight Operations, Maintenance, Legal, and Training each had their own versions of the accident. Each department attempted to justify its contribution as being correct and in accordance with existing procedures. In other words, it was not to blame. Questions asked by the Japanese police made the situation within the organisation even worse. Although nobody openly blamed others, it was clear that everybody was quietly pointing their finger at somebody else.

As an airline with a strong concern for *safety* and great pride in its zero accident record for the previous fifteen years, PT. Garuda Indonesia was concerned to find ways of improving its safety record, particularly in light of the tragic accident in Fukuoka. Of all the matters of concern, the training issue

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[1] 1997, Personal communication with a senior Captain who has been with Garuda for more than 20 years.

had become the centre of attention in every discussion about the Fukuoka accident and the Garuda safety record.

Given that the duty flight crew of GA 865 was considered to be proficient and experienced, the issue of technical training was not as strong as the issue of human factors training[2]. Interestingly, the Japanese Police also raised questions concerning the Crew Resource Management training of Garuda crew.

Crew Resource Management (CRM) is the major type of human factors training in the aviation industry. At first, this training was intended for cockpit crew only as research results pointed to problems that arose from flight crew's lack of the so called "soft skills": Ineffective communication, poor decision making, poor management, inadequate leadership (Wiley, 1996; Bovier 1993; Pariès, 1996). As human factors training has evolved, the programmes have been increasingly applied to a broader context than just the cockpit.

Garuda Indonesia started its CRM programme ten years ago. The programme is called the Cockpit Human Interaction Management Exercise (CHIME). This

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[2] Personal communication with a senior CHIME facilitator.

3

training programme has been a success[3]. It has become compulsory training for all cockpit crew in addition to their technical training.

The content of this programme is that recommended by the International Civil Aviation Organization (ICAO) which includes Human Limitations, Situation Awareness, Workload Management, Communications, and Problem-solving.

It has been ten years since the first programme was run. There have not been any changes however, since then. It remains the old CHIME programme which is still assumed to be a success. However, elsewhere the concept of CRM is being broadened. In its first evolution, it became Crew Resource Management to recognise that flight attendants were also part of the team (Weiner, Kanki & Helmreich, 1993). More recently it has been called Corporate Resource Management to recognise that the whole company has a contribution to make to safety (Pariès, 1996).

Captain Fahlgren of IATA (International Air Transport Association) suggested that an aviation human factors training programme was necessary for all airline personnel (Fahlgren, 1993). He considered that air transport safety should be promoted by everyone in the company to bring about a

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[3] 1997, as described by Capt. Daryanto, Director Garuda Aviation Training in a personal communication.

4

better understanding of human limitations and to improve communication. Pariès (1996) advocated Crew Resource Management to become "Corporate" Resource Management which he calls the fourth generation of CRM. He states that in the global aviation industry, every individual involved in the industry should have a common language about air transport safety. Academics and researchers in human factors continue to develop and expand the concept of CRM to become more inclusive. However, in practice little progress has been made.

A small number of organisations have initiated CRM or human factors training in aviation maintenance and joint training between cockpit and cabin crew (Helmreich & Foushee, 1993; Pariès, 1996). The human factors studies in aviation maintenance include the effects of communication and participation in aviation maintenance (Taylor, 1995); and a guidance for the implementation of human factors principles in aviation maintenance (Shepherd, Layton & Gramopadhye, 1995).

While many major airlines and carriers have CRM training programmes, with a few exception as described above, the focus has not changed a lot. In most cases the focus remains on cockpit issues. Dallas-based Southwest airline, however, has made a noticeable shift in its CRM training to a direction that "some CRM experts predict is the wave of the future" (Bovier, 1993, p.1).

Focusing on teamwork and communication, Southwest includes personnel beyond the Flight Operation Department in the programme. Although no hard evidence is available, anecdotal evidence suggests that the integrated CRM training programme has been beneficial in terms of better corporate communication and teamwork (Bovier, 1993).

Research has lagged behind even the limited advances in human factors training made by airlines. The focus of almost all human factors research has been on the cockpit environment, although the topics themselves have expanded and now range from automation to cultural issues (e.g. Merrit & Helmreich, 1996) in addition to a cockpit focus.

Most CRM programmes in non-western airlines are based on western human factors programmes and philosophies. For example, Cathay, Singapore Airlines (SIA), and Garuda Indonesia have all used human factors experts from the USA, Australia and New Zealand to develop their programmes. The assumption has always been that the values and philosophies of human factors are somehow generic and can be readily transferred across cultures. Stephens and Greer (1995) believe that national culture powerfully influences people's interpretations, understandings, and assessment of those with whom they relate. They also suggest that cross-cultural differences have the potential to diminish the success of cross-border relationships. Discounting and

ignoring this may increase the potential for conflicts and failures. It is clear that the above assumption warrants a cautious approach.

No significant research has been undertaken to understand human factors training needs in the context of a non-western culture. This study aims to take a small step towards remedying that deficiency.

1.2 The Need for Research

The purpose of the present study was to identify corporate human factors training needs in a non- western airline. The findings from this project should contribute to the development of Human Factors training in Asian airlines. As safety is the concern of every individual in the aviation industry, each individual has a need for human factors training.

Training Needs Assessment (TNA) is a comprehensive process used to identify and compare an organisation's actual performance level to its projected performance level (Olivas, 1983). Although it can be time and money consuming, it is an important device in training programme development and delivery. Since not every organisational problem is training related, TNA is valuable because it separates training problems from other problems.

Much has been documented on the validity and utility of TNA in educational settings and in business and industry (Oboh, 1990), although the focus of most studies has been the effectiveness of the training methods rather than the specific training content (Taylor, O'Driscoll, & Binning, 1996). Gagne (1962) has argued that careful identification of the training content is more important than the choice of training methods. Studies on human factors training needs assessment have been conducted within western airlines (for example, Helmreich worked on such a project with Alaska Airlines in 1989). Little, however, is known whether other non-western aviation industries have the same needs. The present study concentrates on the identification of specific human factors training content, which is in line with the organisational objective, on a sample of Indonesian aviation employees.

1.3 Organisation of the Thesis

The thesis proceeds with the introduction in Chapter One. This chapter includes sections on the background of the study, the need for study, and the organisation of the thesis. Chapter Two presents the review of the literature. The review provides two bodies of literature, one concerned with training needs assessment and the other concerned with aviation human factors training widely known as CRM training, in order to explore the nature of human factors training needs assessment.

Chapter Three presents the methodology of the thesis research. Sections include: Subjects, research sites, data collection methods, research instruments, the pilot test of the instruments, and treatment of data.

The analysis and results of the study are presented in Chapter Four. Sections include the results from principal a component analyses of the needs assessment, the content analysis of the critical incidents and the respondents' demographic summary.

Chapter Five provides discussions of the results together with implications and recommendations for future research. References are located at the end of the text. The appendices contain the information sheet and the final questionnaire used in the study.

Chapter Two

Literature Review

The present study raises several issues which are discussed in this chapter: Literature Review. The first deals with the need of organisations to become aware of the increasing necessity of training to retain their competitive edge. Secondly, training itself is defined and the conditions required for success are discussed. These two topics provide the foundation for discussing training needs assessment itself. Several needs assessment methods are discussed. Following the discussion of needs assessment, issues in aviation human factors, and the development of Crew Resource Management are also considered.

2.1 Environmental Change

In the latter part of the Twentieth Century all countries face rapid social, economic and technological change and development which has presented problems as well as opportunities. There is ever-growing competition from other countries in all business arenas. In conjunction with the development of technology, a prosperous market and business growth these have created a need for a highly skilled work-force (Johnston & McClelland, 1994). At the same time, demographic changes have impacted on the training policies of organisations.

Johnston and McCelland (1994) indicate that in the United Kingdom labour force will grow slowly. Goldstein (1993), has made similar claims for demographic change in the United States. While Asian countries lag behind this trend, it is clear that eventually they will also follow. Consequently, an older work-force will characterise the work place and this creates problems of retraining. Moreover, these writers indicate a likely increase in the number of female joining the work-force. For example, in Australia, as the result of Equal Employment Opportunity (EEO) policies, participation rates for female workers in the Australian work-force have increased from 46.2% in 1981 to 53.7% in 1992 (Valenta, 1992 cited in Nankervis, Compton, & McCarthy, 1993).

While fewer people are available to enter the work-force, the demand for workers is and will remain high (Goldstein, 1993, Johnston & McCelland, 1994). Their work suggests that individuals who will be available for entry will be mostly unskilled and undereducated and this will in the future, make the issues of training more complex.

The key for organisations to survive and succeed in this environment lies in developing their human resources. This means that organisations or companies wanting to remain competitive in the market (international, regional or local) must take responsibility for developing their human resources. Improving

education and training will increase their flexibility and enable them to respond appropriately in a changing environment.

2.2 Training

Training may be defined as any procedure initiated by an organisation to foster learning among its members. The primary purpose of a training programme is to help achieve the overall organisation's goals or objectives (Nankervis, Compton & McCarthy, 1993). At the same time, an effective training programme must contribute to the satisfaction of the trainee's personal goals (Laird, 1985). Training is an essential tool to help people cope with change and improve motivation. It can equip individuals with skills and knowledge they need or will need to perform their work (Sobthorpe, 1994).

There is a tendency for practitioners and academics to use the terms "training", "education", and "development" interchangeably. For clarity, it is necessary to make a distinction. Education has been defined as human development activities which are designed to improve the individual's general knowledge and overall competence (Rudman, 1994). The focus of education is the person rather than the job, even though education will generally improve an individual's employment prospects (Rudman, 1994). Training tends to be more specific rather than general. Training, according to Rudman (1994), encompasses learning activities

which improve an individual's performance in a particular job. Nankervis, Compton & McCarthy (1993), however, suggest that training may go beyond the immediate job requirement.

"Development" is a term used to express the notion of going beyond educating a person for a specific position. It is a process of assisting people to develop and fulfill their potential. Development programmes prepare "an organisation's members which will allow them to grow individually alongside the organisation" (Wesley & Latham, 1981, p. 6).

Although training may be accomplished on an informal basis, better results are gained from a formal and well-organised training programme (Nankervis Compton & McCarthy, 1993). Further, Sobthorpe (1994) suggests that training activity should be proactive in the sense that it should be related not only to the present-day needs but also to the planned future of the organisation's business. Mitchell (1987), in the same way, indicates that future-oriented training needs assessment is an important tool for gaining control of the business environment in anticipating and preparing the future training needs of the organisation.

One, however, should not jump to the conclusion that training is the only solution to all organisational problems (Dalziel, 1994). Mager and Pipe (1984,

cited in Oboh, 1990) have suggested that performance deficiencies can result from many variables other than training needs, including equipment, facilities, deficient programmes, and unsystematic methodology and procedures. Training professionals should determine if training or other development techniques are required in solving the problems. This is important because applying training as a solution to a problem that is not related to training will lead to a waste of time, money, and other resources. Moreover, Sellers (1985) states that training which is not timely, that is not delivered to the right audience, and that is not sufficient in its content is simply wasted.

Traditionally, training was for new recruits in order to enable them to do their job properly. To meet the challenge of the developments and changes discussed previously, training has come to be important for the whole work-force. A significant problem for businesses is that training always means spending money. Sobthorpe (1994) argues that training is not an investment because an investment should be profitable and increase its value. Rather, training is more closely related to a maintenance cost. Whatever its called, training generally expensive. Garuda Indonesia, for example, estimates its yearly employee training budget to be not less than $ US 5 million.

Conversely, there are benefits to be derived from training. In fact, the benefits should far exceed the costs as long as the objectives of the training are clearly defined and the programmes are carefully developed (Nankervis, Compton & McCarthy 1993). The major benefits of employee training are increased productivity and the ability of trained employees to assume more responsible roles in the organisation.

McClelland (1993) believes that training is an integral part of almost any productivity improvement effort in an organisation. Training and productivity, according to McClelland (1993), share a common goal that is to improve performance on individual and collective levels which, in turn, increase efficiency and quality output.

Considering the amount of time and money expended on training, it is essential that it should be linked to the organisation's goals or objectives (Harp, 1995; Oboh, 1990; Sobthorpe, 1994). Training is a part of, and must be compatible, with the total strategic plan of Human Resource (HR) Management (Nankervis, Compton & McCarthy 1993). Otherwise, training will simply be a waste of financial resources, human resources, and other organisation resources.

Like other HR functions, the success of training will largely depend on the support of the management. However, it is up to training practitioners to prove that training programmes contribute to organisational profits, which in turn, will generate support from management if they have a positive attitude towards training.

Harp (1995) suggests that conducting a comprehensive training needs assessment in order to reveal skills deficiencies in critical areas could link training and the organisation's strategic missions or goals. Linking training to organisational goals, according to Harp (1995), means that every job should be considered in light of those goals, which also mean that every training programme in an organisation should be consistent with the organisation's goals.

Organisational strategic planning is defined as a method for determining the long-term direction of the organisation (Ulchack, 1983 cited in Oboh, 1990). Strategic planning is concerned with the future of the organisation to answer the following questions:

- What do you want to do?
- What future factors might affect your ability to do it?
- How well equipped are you to deal with these factors?

- How can you achieve what you want relative to those factors likely to affect achievement, (Oboh, 1990 p. 19) ?

Making training functions more definite and linking them to organisation's strategic planning will make training more fulfilling and meaningful (Robinson & Robinson, 1989).

- Given the potential benefits of training to organisations, team and individuals, it is surprising that relatively little has been written about the identification of training needs, especially when compared with other kinds of organisational needs, such as facilities and employees (Oboh, 1990). Front-end analysis, needs analysis, job analysis, learning analysis, and training needs assessment are among the processes that have been used to date for determining training needs. Task analysis can also be used to determine training needs (Oboh, 1990). As these differing concepts, however, have resulted in confusion about needs assessment (Hunt, 1986), the concept of training needs assessment (TNA) will be discussed in the following section. It will include a summary of approaches available for identifying and determining training needs in organisations and to find an answer to the question "what are the most important training needs of an organisation?". In order for training specialists to be more proactive in identifying training needs, they should ask themselves the following questions:

17

- What type of skills are new employees bringing with them, what are the trends regarding skills, and what does the future look like?

- What areas of organisational performance can be improved by increasing the performance of employees responsible for the organisational performance?

- What significant procedure and policy changes will be implemented or are being planned?

- What current programmes or products will be expanded or shifted in the organisation so that employees become involved?

- What new technology will be employed or is being planned?

- Are there groups of employees whose performance should be corrected?

(Oboh, 1990)

2.3 Training Needs Assessment

Although it may be given a different name, training needs assessment is widely discussed in the literature on training (Kaufman, 1982; Rossett, 1985; Taylor, O'Driscoll & Binning, 1996).

Management often comes to Training and Development department to ask whether a training programme is worth doing. Challenged by the pressure of justification, many practitioners have suggested simple, generalised models of TNA (for example, Schwaller & Slipy, 1985, Wircenski, Sullivan, & Moore, 1989,

18

McClelland, 1993). Such simplification of procedures may encourage the use of TNA. Without changes to make TNA more accessible, the use of TNA may cease altogether (Wircenski, Sullivan & Moore, 1989).

Several writers have considered needs assessment as the first step of all training activities which provides a road map for subsequent activity. Goldstein (1993) describes needs assessment as the most important phase in the entire training programme. Further, Goldstein (1993) states that the entire training programme, including feedback or evaluation phase, is dependent on the assessment results. In other words, it should be a prerequisite of any training programme (Oboh, 1990). This notion of needs assessment generates its own definitions, such as the use of needs assessment as a way of identifying skills necessary to improve performance (Oboh, 1990), or a process used to specify training requirements of every employees in an organisation (Wircenski et al., 1989).

Other writers have seen needs assessment in a wider context (Kaufman & English, 1979; Kaufman, 1982). According to Kaufman (1982) needs assessment should be associated with organisational philosophy. TNA is seen as a macro-level organisation planning tool to assess the organisation's contribution to, or impact on, society before the micro-level analysis is implemented on problems such as performance deficiencies (Kaufman, 1982).

These differing views of needs assessment and the tools they offer provide choices for organisations and training specialists. Which tools to use will depend on the problems to be solved. Each method offers a different approach to the needs assessment process.

Stufflebeam, McCormick, Brinkerkoff, and Nelson (1985) have summarised some basic approaches to identifying needs, including the advantages and disadvantages of these approaches.

The discrepancy view is the first approach identified by Stufflebeam and his colleagues (1985). According to this view, the problem arises when there is a gap or discrepancy between current outcomes or performance and desired or required outcomes or performance. So, "need" in this context is the identified gap. Needs assessment, then, may be described as a process of identifying the discrepancies or gaps or needs to be filled or closed (Kaufman & English, 1979). As this view concerns the importance of the end results or outputs as has been argued by Kaufman and English, (1979), it presents several drawbacks. One is that this view may exclude the assessment of inputs or processes (Stufflebeam McCormick, Brinkerkoff & Nelson, 1985).

The second approach is called the democratic view. According to Stufflebeam, McCormick, Brinkerkoff and Nelson (1985), this approach has been derived more from the practice rather than from the theory of needs assessment. A need, in this view, is a direction or a change preferred by a majority of some reference group. As this approach can involve numerous respondents, it may yield a wide range of variables and information for determining the importance of potential needs. Automatically, it involves many people in the goal-setting process. The democratic view, however, has several disadvantages. A major one is that this approach can confuse needs with preferences since it depends on the information which is most preferred by the members of the reference group. Consequently, it may yield invalid goals because the most popular choice will be picked up rather than the most needed ones.

The analytic view is the third approach. In this view, a need is described as "the direction in which improvement can be predicted to occur, given information about current status " (Stufflebeam, McCormick, Brinkerkoff & Nelson., 1985, p. 8). From this definition, it is clear that this approach is future-oriented. It is concerned with the future needs people (that is, learners) should encounter due to changing technology, policy, or requirements. Predictions are based on informed judgment, systematic thorough analysis, and complete descriptive information. In short, it depends heavily on reliable judgments and analysis of

both the current and the future situations. Unlike the discrepancy view, this approach concerns not only the treatment of immediate single performance deficiency, but also the broad improvements of performance deficiencies for the future needs. Consequently, it requires expertise to apply the approach.
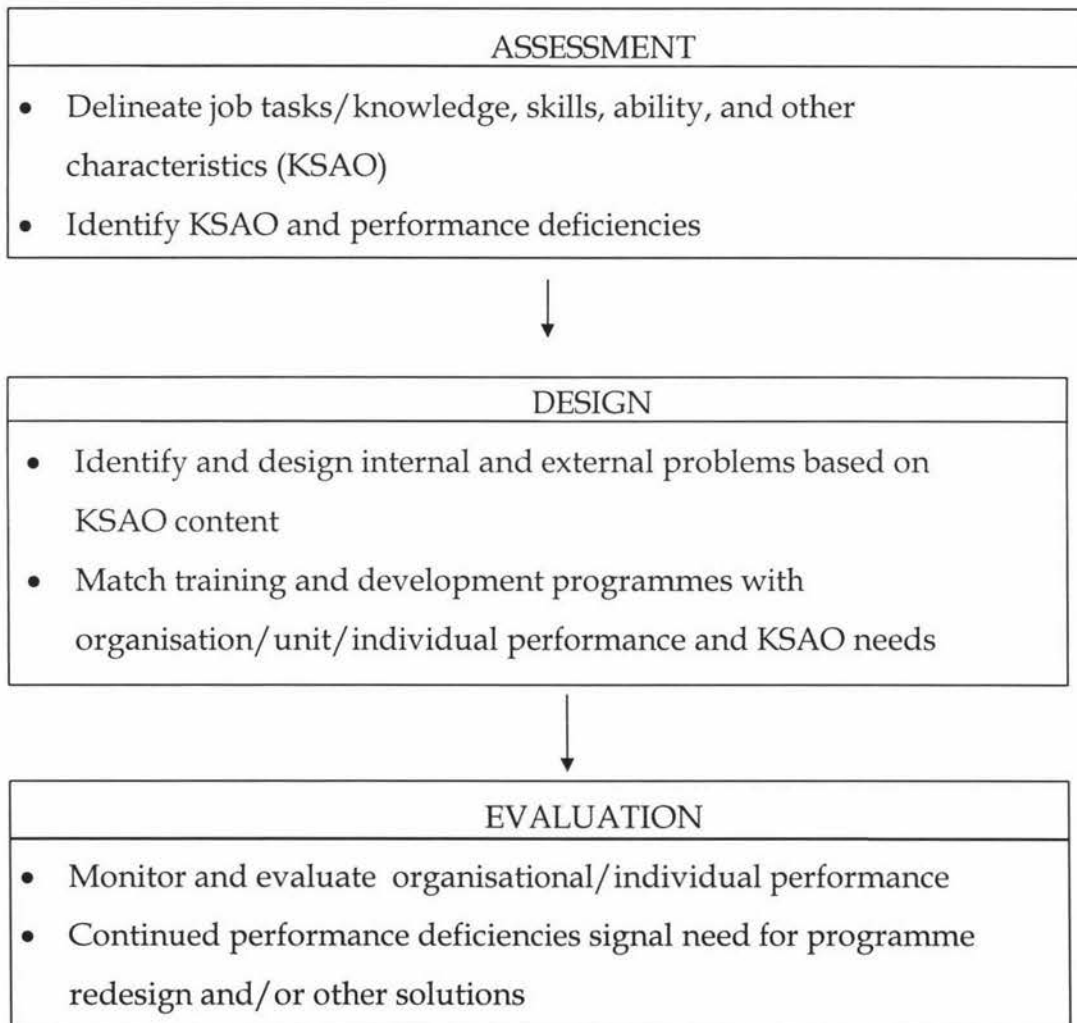
The fourth and the last approach is called the diagnostic view. A need in this view is defined as "something whose absence or deficiency proves harmful or whose presence is beneficial" (Stufflebeam, McCormick, Brinkerkoff & Nelson, 1985, p. 8). This approach relies on logic and available research data to determine which deficiencies would be damaging. Basically, it is a survival approach with which survival needs may be identified. However, this approach may exclude the identification of other than survival needs. Because it concentrates only on removing harmful effects of deprivation, this approach may underemphasise the importance of finding ways to improve practice or performance that is already satisfactory.

Taylor, O'Driscoll & Binning, (1996) indicate that there is a gap between what TNA is and how it is actually practiced, and research results and recommendations. Latham, (1988, cited in Taylor, O'Driscoll & Binning, 1996) has suggested that it is a failure to filter the theory and recommended practice to practitioners that has caused the gap. Taylor, O'Driscoll and Binning (1996)

argue that bridging the gap could be facilitated by improving the existing TNA conceptual framework which guides TNA and training decisions.

Schneier, Guthrie & Olian, (1988) in their attempt to fill the gap, have suggested a TNA model as shown in the following figure:

Figure 1. TNA Model

ASSESSMENT
• Delineate job tasks/knowledge, skills, ability, and other characteristics (KSAO)   • Identify KSAO and performance deficiencies

DESIGN
• Identify and design internal and external problems based on KSAO content   • Match training and development programmes with organisation/unit/individual performance and KSAO needs

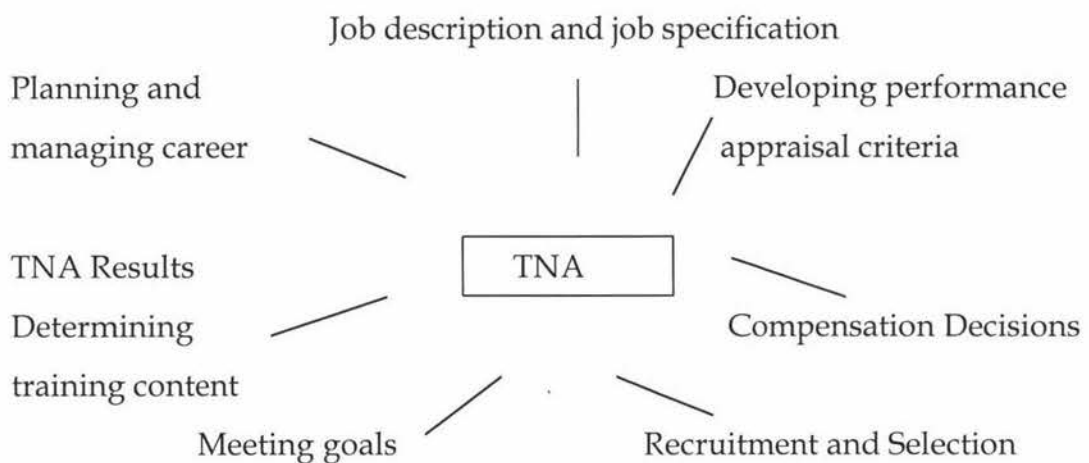| EVALUATION |
|---|
| • Monitor and evaluate organisational/individual performance
 • Continued performance deficiencies signal need for programme redesign and/or other solutions |

(Source: Schneier, Guthrie, & Olian, 1988)

23

Schneier, Guthrie & Olian (1988) further suggest that a training needs assessment should be integrated with other human resource management (HRM) activities. The TNA may serve as a foundation for both effective training and other HRM functions such as developing performance appraisal, compensation decisions and so on. In fact, TNA results provides "a data base to support and enhance those functions" (p.193). The following figure shows how Schneier, Guthrie and Olian, (1988) associate TNA with other HRM function:

Figure 2. Relationship between TNA and HRM Functions

Job description and job specification

Planning and
managing career

Developing performance
appraisal criteria

TNA Results
Determining
training content

TNA

Compensation Decisions

Meeting goals
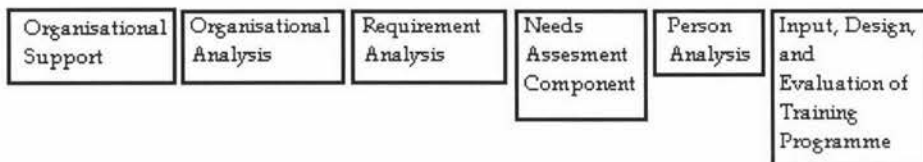
Recruitment and Selection

Goldstein (1993) suggests that the process of needs assessment is a type of organisational intervention. It is called an intervention because it is a procedure that changes employees' daily routine pattern and work behaviour. This is why a needs assessment should be carefully designed to minimise disruption.

24

Goldstein, (1993) believes that the success of a needs assessment process depends on the total commitment of the organisation and its members. The support and commitment from all parties will overcome misunderstanding, including, the "us versus them" attitude, and a failure to trust to assessors or analysts or investigators. Lack of trust will usually result in the gathering of inaccurate information. Moveover, it increases the difficulty of the information gathering process.

To demonstrate how critical organisational support is to the success of the needs assessment process, Goldstein (1993) has suggested the following model of needs assessment:

Figure 3. TNA Model

Organisational Support	Organisational Analysis	Requirement Analysis	Needs Assesment Component	Person Analysis	Input, Design, and Evaluation of Training Programme

(Source: Goldstein, 1993)

According to Goldstein, the process of needs assessment should start with an organisational analysis. Basically, Goldstein's organisational analysis refers to an

examination of the whole system of an organisation. More specifically, it is an examination of the organisation's goals or objectives. Goldstein argues that a training programme must not be in conflict with organisational goals or objectives because if this occurs, it will produce inappropriate outcomes. All training efforts need to be consistent with the organisation's goals or objectives.

Very often, however, organisational goals are far from clear. It is difficult to design or implement any training programme in such a situation. Goldstein (1993) cited the work of London (1991), emphasising that training programmes should not be in conflict with goals, concluded that it is important to specify organisational goals so that the training programme can be correctly designed and implemented in accordance with the goals and business trends of the organisation.

The second step of Goldstein's model of needs assessment programme is the analysis of task, knowledge, skills, and ability. Goldstein defines task analysis as a process for determining the instructional objectives. By analysing tasks, it is posssible to form a picture of a job and what sort of knowledge, skills and abilities are needed to perform such a job.

The last part of Goldstein's model is called a person analysis. This is concerned with the way an employee performs the tasks that comprise the job (McGehee & Thayer, 1961, as cited by Goldstein, 1993). In particular it examines how well the person demonstrates the knowledge, skills, and ability needed to carry out her or his job.

There has been much discussion in the literature about the importance of TNA in the entire training process and the fact that conducting a TNA will be beneficial to organisations. There has been, however, little theoretical development in TNA, especially in terms of integrating training to organisationally-valued results (Taylor, O'Driscoll & Binning, 1996). Having been concerned with this, Taylor, O'Driscoll and Binning, (1996) have proposed a conceptual model which links training to results in the process of TNA.

In their proposal, Taylor, O'Driscoll and Binning, (1996) try to integrate critical aspects of two existing framework of TNA: the organisation-task-person analysis framework (which they refer to as the O-T-P model) and the performance analysis approach. What Taylor, O'Driscoll and Binning call the O-T-P model is similar to Goldstein's (1993), model which has been discussed previously. Goldstein's model was an expansion of the work of Ostroff and Ford, (1989, cited in Goldstein, 1993) and McGehee and Thayer, (1961). The second

component, the performance analysis, is largely based on the Kaufman and English model (1979) and Stufflebeam, McCormick, Brinkerkoff & Nelson's, (1985) discrepancy view.
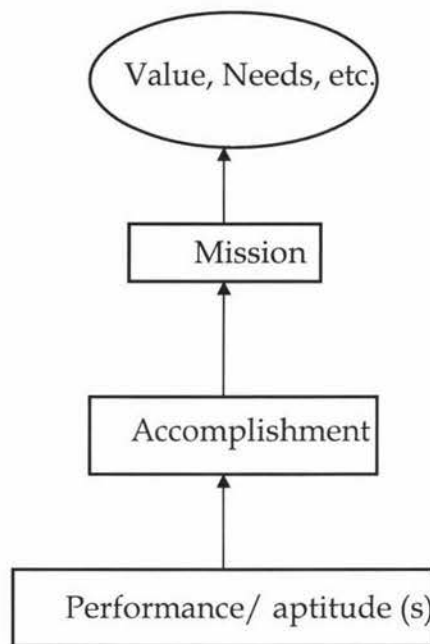
Taylor, O'Driscoll and Binning (1996) indicate that both the O-T-P model and performance analysis have limitations. The O-T-P approach is considered an overlap across the three categories of assessment (More & Dutton, 1978 as cited by Taylor, O'Driscoll & Binning, 1996). More than that, this approach is said to be able to provide little guidance to practitioners on how to choose from the infinite TNA methods and sources of information (Taylor, O'Driscoll & Binning, 1996).

Performance analysis, which focuses only on the existence of performance discrepancies, may exclude the need for training that will continuously improving performance "beyond expected levels" (Taylor, O'Driscoll & Binning, 1996, p.7). The second limitation is that this model always assumes that performance discrepancies are caused by either a lack of knowledge/skills or by work environment variables. It does not consider both variables, which is often the case in discrepancy problems. Furthermore they argue that performance analysis provides little guidance on how judgments about performance discrepancies and their causes are made, and who should make them.

Taylor, O'Driscoll and Binning (1996) believe that the identification of a training need does not always depend on the existence of gaps between desired and actual levels of results or outputs. According to them, results or outputs in Kaufman and English, (1979) terms, could be improved far beyond, or even in the absence of the discrepancies, so that the so called organisationally-valued results approach may identify not only the training needs but training opportunities (Appendice C).

According to Hunt (1984a; 1986), the purpose of a needs assessment programme is to identify the components and configuration which will enable an organisation to determine its goals or missions shared and valued by all levels of the organisation's members. Hunt (1984b) proposed a systems approach to curriculum development and instructional delivery model called Needs Based Education and Training (NEBEAT). This model, which is shown in Figure 4, has been widely used in needs assessment programme in several countries, including Singapore and India, to assess training needs (Hunt, 1984b).

Figure 4: NEBEAT Model

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        ╭─────────────────╮
        │ Value, Needs, etc.│
        ╰─────────▲───────╯
                  │
         ┌────────┴────────┐
         │     Mission     │
         └────────▲────────┘
                  │
         ┌────────┴────────┐
         │  Accomplishment │
         └────────▲────────┘
                  │
    ┌─────────────┴──────────────┐
    │  Performance/ aptitude (s)  │
    └────────────────────────────┘
```

(Source: Hunt, 1984a, p. 5)

Hunt developed the NEBEAT model into an instrument for instructional development in adult education which has been used in a variety of areas such as the identification of competencies of health professionals (Lockett-Kay, 1992), and Flight Instruction for airlines. His model is shown in the following figure.

30

Figure 5. NEBEAT Curriculum Development Model

NEBEAT CURRICULUM DEVELOPMENT
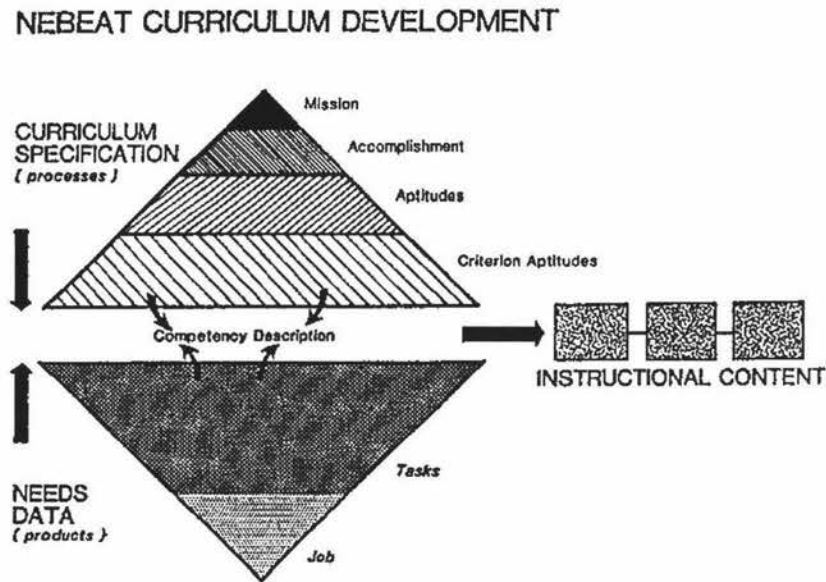
It was mentioned previously that not all performance problems are associated with training. Once a performance problem is identified, however, and training appears to be the only solution, Oboh (1990) suggests that it would be important for training professionals to consider the following:

1. What content should be taught;

2. Who are the audiences;

3. How the training relates to the effectiveness and efficiency of the organisation.

In a similar way, Taylor, O'Driscoll and Binning, (1996), highlighted the relevance of Gagne's (1964, cited in Taylor, O'Driscoll & Binning, 1996) work, which stated that training needs identification should focus more on the content of the training programme than on the method employed in the programme. One advantage of focusing a needs assessment on content is that it will identify and examine in some detail the topics about which target group members need better knowledge, skills, or performance abilities (Queeney, 1995).

2.4 The Use of TNA

Not all performance problems in an organisation are training related, and it is here that needs assessment is most valuable. Training needs assessment separates training problems from other organisational problems such as work environment, motivation or reward systems (Oboh, 1990). By conducting a training needs assessment, an organisation will be able to identify the underlying reasons for performance shortcomings (Oboh, 1990).

TNA can be used in both educational and industrial settings, and the literature indicates that the use of TNA is beneficial to both organisations and society in general. In practice, however, not all organisations use TNA. Oboh (1990) in his study summised that 26.5% of the organisations did not use TNA despite the potential benefits to be derived from conducting it. A survey conducted in

32

Australian organisations indicated the lower figure of 16% as not conducting some type of systematic needs assessment (Nankervis, Compton & McCarthy, 1993). In the work of Oboh (1990), the reasons mostly given were "lack of sufficient resources", "no time", and "management skepticism" (pp. 53-54).

Oboh (1990) concluded that most organisations which conducted TNA, did so as the need arose. Interpreting this as a reactive response, Oboh (1990) suggested that this should not be encouraged. It is recommended that training practitioners should anticipate the future needs or to be proactive.

Taylor, O'Driscoll and Binning, (1996) indicated that practitioners do not optimally apply research results from the use of TNA. They argue that the gap is caused by the lack of a TNA conceptual framework which is able to give guidance to practitioners. To close the gap they propose the conceptual framework shown in Appendix C.

2.5 The assessment methods and procedures

The training needs of organisations can range over many content areas and levels, the needs of particular groups may vary over time, changes of direction occur in organisations, and the fluctuation of resource availability all present problems when a TNA is conducted. It is essential that TNA be tailored to fit the

organisation in which it will be conducted and to fit the characteristics of specific problems to be studied (Oboh, 1990). The uniqueness of every organisation and situation in which TNA is conducted requires training specialists to be familiar with numerous data gathering and analysis techniques.

The following discussion focuses on a variety of TNA techniques. Figure 6 shows the results of a study conducted in Australian organisations on the variety of techniques used. The diagram presents the comparison of percentage of methods or procedures used in the process of the identification of training needs in the respondent organisations.

Figure 6: Techniques used for Identifying Training Needs in Australia

Training Needs Identification procedures	1991 %	1986 %
Development plans arising from performance appraisal	71	58
Career counselling interview	40	38
Promotion/transfer decision	45	44
Needs assessment survey	43	39
Needs assessment interview	30	25
Critical incidents	32	35
Quality control information systems	15	11
Individual's performance review in each unit/department	30	33
work-force planning	40	35
Corporate/strategic planning	48	35

(Source: Collins & Hackman, 1991 cited in Nankervis, Comption & McCarthy,1993)

A similar study in the United States produced a more extensive list of methods (see figure 7).

Figure 7: Techniques used for Identifying Training Needs in the United States

Methods: Current use	Rank (means)	Methods: Desired use
Management Request	1	Consideration chng. in business
Interview	2	Analysis of job requirements
Consideration chng. In business	3	Interview
Intuition of training personnel	4	Management Request
Customer comments	5	Customer comments
Employee request	6	Performance standard
Analysis of job requirements	7	Skill/personal inventory
Performance standard	8	On-site observations
Custom design svy./quest.	9	Employee request
Skill/personal inventory	10	Custom design svy./quest.
Task analysis	11	Task analysis
Staff conference	12	Training committees
On-site observations	13	Intuition of training personnel
MBO	14	Staff conference
Training committees	15	Critical incidents
Standard survey/ questionn.	16	MBO
Critical incidents	17	Work sample analysis
Work sample analysis	18	Standard survey/ questionn.
Nominal group techniques	19	Safety record analysis
Safety record analysis	20	Assessment centre
Review of annual report	21	Nominal group techniques
Delphi Technique	22	Delphi Technique
Standard tests	23	Standard tests
Assessment centre	24	Review of annual report

(Source: Oboh, 1990.)

One of the reasons given for some techniques being unpopular among respondents were, not that the techniques were not useful, but because the respondents thought they were complicated or did not know about such techniques (Oboh, 1990). The various extant methods are often confusing to use as none of them are described as clearly as they should be (Oboh, 1990). The criteria for use should be on the match of the method to the characteristics of the organisation rather than accessibility and ease of use.

2.6 Critical Incident Technique

Another technique, the critical incident technique, is recommended by Taylor, O'Driscoll and Binning, (1996) for the training specialist to determine whether training or other solutions would be the most effective means of increasing the level of knowledge, skills, and abilities (Taylor, O'Driscoll & Binning, 1996). The critical incident technique has been primarily used for obtaining specific descriptions of work based activities. It has four characteristics which are useful for getting essential information. The four characteristics are as follows:

- It provides specific data about people's work behaviour

- It focuses on observable work behaviour

- It provides descriptions of the context of work behaviour

- It identifies the consequences of that behaviour (Hanson, Hedge, Logan, Bruskiewitcz, & Borman, 1995).

37

By nature the critical incident technique is an open-ended exploratory technique, and as such, complements the more structured format of a needs assessment model such as NEBEAT. As a qualitative research technique it allows the respondent maximum freedom to express their perceptions and realities. Given the lack of previous research into "non-western" human factors training, the critical incident technique provides the opportunity to unearth new perspectives without imposing predetermined cultural assumptions.

The critical incident technique which assesses employees' perceptions of their jobs, workplace, and their relation with others is based on the technique developed by Flanagan (1954). It consists of a "set of procedures for collecting direct observation of human behaviour in such a way as to facilitate their potential usefulness in solving practical problem (Flanagan, 1954, p. 324).

The critical incident technique, however, does not consist of a rigid set of rules governing data collection. It should be thought of as a "flexible set of principles which must be modified and adapted to the situation at hand" (Flanagan, 1954, p. 335). The aim of the technique is to increase the value of the data while parting with as little as possible of the comprehensiveness, specificity, and validity. The three tasks involved in the process are:

- selecting the general frame of reference that will be most advantageous for describing the incidents;

- inductively developing a set of major area and sub-area headings;

- selecting one or more levels along the specificity- generality continuum to use in the analysis of the incidents (Flanagan, 1954, p. 345).

The previous six sections have outlined issues concerning training needs assessment. The following section focuses on human factors and CRM.

2.7 Human Factors in Aviation

This section presents the review of the human factors literature. The concepts of human factors and human error are discussed to provide a foundation for the concept of Crew Resource Management (CRM). In the last subsection the development of CRM is described.

Hawkins, (1987, p.18) defines human factors as being "... about people. It is about people in their working and living environment". Human Factors is about people's relationships with machine, with procedures, with environment surrounding them. It is also about their relationships with others (Hawkins, 1987). Human factors is "concerned to optimise the relationships between people and their activities by the systematic application of human sciences,

Diagram 1. SHELL model

S = Software (procedures, symbology, etc.
H = Hardware
E = Environtment
L = Liveware (human)

In this model the match or mismatch of the blocks (interface) is just as important as the characteristics of the blocks themselves. A mismatch can be a source of human error.

The SHEL model as modified by Hawkins

Liveware, in the SHELL model, is the central component. Although generally considered as the most critical and the most flexible component in the model, the human is also considered to be most variable in their performance. They suffer many limitations as well (Hawkins, 1987). This central component possesses several characteristics which require a sound understanding. Examples of

41

characteristics adapted from Hawkins (1987) and ICAO Human Factors Digest (1989) are described below.

Physical size and shape. In designing workplace and equipment, body measurement and body movement are among the factors to be considered. This may vary across ethnicity, gender and age (Hawkins, 1987; ICAO, 1989). American pilots, for example, need a greater oxygen intake than Peruvian pilots who are able to fly in comfort at more than 10,000 feet (Meshkati, 1996). Table 1 presents examples of such variability. To achieve the best result, the human factors inputs should be provided in the early stages of the design process (ICAO, 1989). Data for these inputs are available from anthropometry (the study of human body dimensions) and biomechanics.

Table 1: Examples of Racial and Gender Variability

	Males		Females
Dimensions (mm)	Asian	European	European
Stature	1660	1750	1640
Seated eye-height	770	800	750
Buttock-knee length	540	605	570

(Source: Edward & Edwards, 1990)

It can be seen from table 1 that men are larger than women and European males are larger than Asian males. The typical Asian shape is such that the body is comparatively long while the limbs are short.

Physical Needs (called Fuel Requirement by Hawkins (1987)). Human energy is produced by the oxidation of elements derived from food. The quality and quantity of diet and the availability of oxygen are variables that must be considered. A person in a restful sitting position requires approximately 0.35 litre per minute of oxygen. The requirement of flight and cabin crew during performance of their tasks can be two or three times this value (Edwards & Edwards, 1990). Information of human's needs for food, oxygen, and water in order them to be able to function properly, is available from physiology and biology.

Input characteristics. Human has been provided with various sensory systems namely sight, touch, hearing, smell, and taste, for collecting information from their surroundings that enable them to respond to events and to perform their required task. In addition, human also possesses other channels concerned with the sensation of pain, temperature, pressure, orientation, and motion that each of them plays an important role in her/his interactions with their surroundings.

Information processing. Edwards & Edwards (1990) have described human information processing as a 'single channel' process in which items are handled one at a time. In a situation where a person must receive simultaneous inputs, a problem arises. In addition, the influence of her or his mind-set such as expectations, fears, wishes, prejudice, when handling incoming information can also influence perception of the incoming information. Many human errors occur in information processing when conflicts of the above factors are ignored. The existence of short term and long term memory facilitate the information processing. Unfortunately, these functions are subject to quality degradation that should be taken into consideration (Hawkins, 1987).

Output characteristics. Outputs here can be described in terms of human's information content. In the production of speech, complicated muscular activity is involved. Very large amounts of information are processed and transmitted to the muscles which control the movement of different parts of body to produce a wide range of sounds or responses.

Environment tolerance. This is the final item of human characteristics. It consists of description of the ways in which human performance and well-being may be affected by ambient conditions such as noise, pressure, light, darkness, humidity, and smoke. For example, the failure to separate smokers from those

who prefer a smoke-free environment can be the source of discomfort and conflict between the two groups that may also affect performance and comfort (Edwards & Edwards, 1990). Today many workplaces recognise this and have smoking and non-smoking areas.
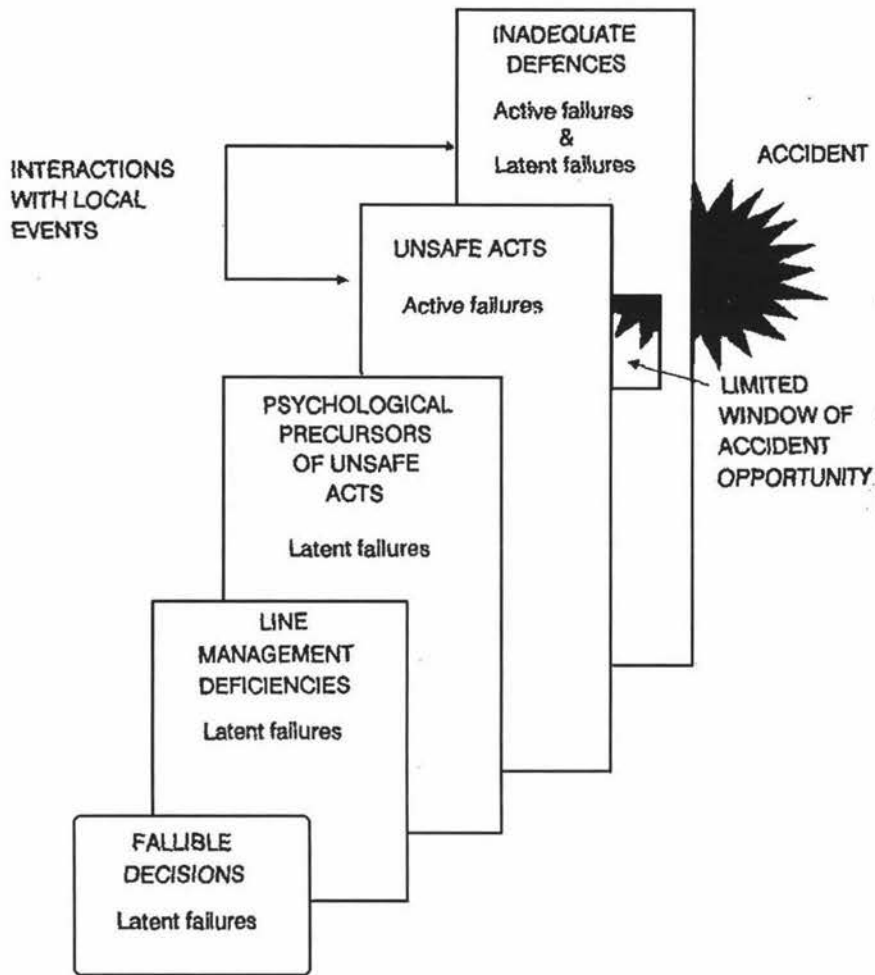
From the discussion of human characteristics above, it can be concluded that humans are have individual differences. These differences must be taken into consideration in the interaction between humans and other components in the SHELL system. In short, other components should be adapted and matched to the central component. Most disasters which occur are caused not by catastrophic failure of single components, but rather by the mismatch at interfaces of the components (ICAO, 1989; Edwards & Edwards, 1990). Errors and accidents, for example, can arise from an instrument misreading (L-H interface), or the failure to understand a procedure (L-S interface), or a breakdown in communication (L-L interface).

2. 7. 2 Reason's Accident Causation Model

In order to understand how human limitations and differences, described in the previous sections, can impact an aviation safety, Reason (1991) proposed a model of accidents' causation (see figure 8). The aviation industry is viewed as a complex productive system consists of five elements. One of the basic element of

45

the system is the decision makers that include top management, the company's corporate and the regulatory body. Line management is makes up a second key element of the system. Line management consists of those who implement the decisions made by top and upper management. *Preconditions* is the next element that enables the decisions and actions to result in effective and productive activities by employees. *Defenses* are the final element of the complex system. This element is in place to prevent foreseeable consequences. In his model, Reason shows that accidents may result not from a single error such as the front-liner's error, rather, they are caused by a series of failures in the system. These failures can all be traced back to human failures.

Figure 8. Reason's model

INADEQUATE
DEFENCES

Active failures
&
Latent failures

ACCIDENT

INTERACTIONS
WITH LOCAL
EVENTS

UNSAFE ACTS

Active failures

LIMITED
WINDOW OF
ACCIDENT
OPPORTUNITY

PSYCHOLOGICAL
PRECURSORS
OF UNSAFE
ACTS

Latent failures

LINE
MANAGEMENT
DEFICIENCIES

Latent failures

FALLIBLE
DECISIONS

Latent failures

(Source: Reason, 1991 P.202)

What is different about Reason's model is the recognition that human errors can
be made at any level of the organisation, not just at the operational level. Such a
conclusion strongly supports the argument for corporate human factors training.

Reason, proposing a model for aircraft accidents, has argued that air accidents arise, for most part, as the result of complex interactions between several causal factors that include:

- active failures committed by those at the very end. These failures have immediate impact upon the integrity of the aircraft,

- local triggering factors namely task, situation or environment factors that affect task performance and can trigger the occurrence of violation or error,

- latent failures, whose consequences are not immediate but remain suspended for a long period of time. These failures usually originate at the top levels of an organisation.

Reason's model of *organisational accidents* (Reason, 1991), presented in the next figure, was used by the Bureau of Air Safety Investigation (BASI) Australia in its investigation of the accident of Monarch Airlines Flight OB301. The report included the analyses of active failures, local factors, and organisational deficiencies in its attempt to provide thorough information of the accident and the causal factors of the accident (BASI, 1995).

Figure 9: Organisational accidents

Organisation	Task/environment	Individuals	Defences
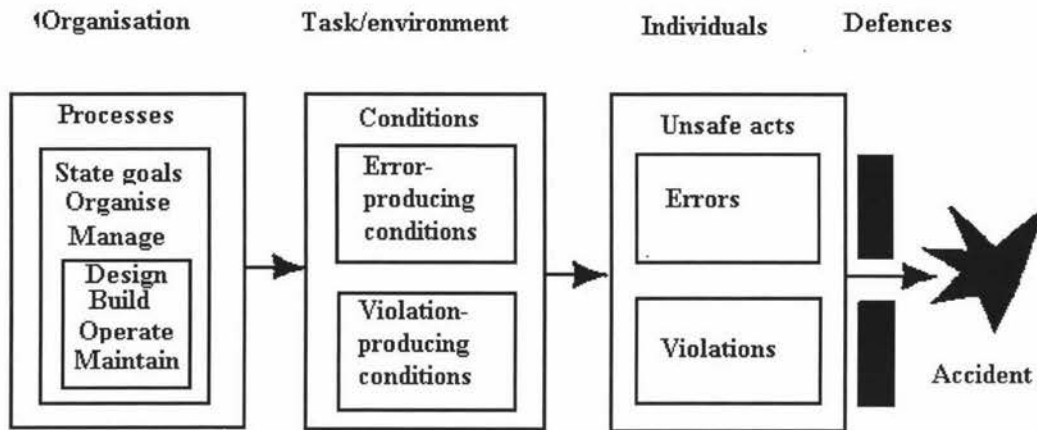
The elements of an organisational accident

The study of human error in aviation began long before the concept of Crew Resource Management emerged. The research efforts, however, only focused on the interaction between humans and machines. Along with the advancement of technology that has introduced more reliable air transport, the research on human factors in aviation needs to be broadened beyond merely focusing on the human interface with equipment.

The presence of more reliable air transports is believed to have reduced air accidents (Helmreich & Foushee, 1993). As engine failures were no longer the main causes of air accidents, attention was paid to factors other than just

engines. The picture drawn by the statistics indicate that from 1959 to 1989 more than 70% of all aviation accidents can be attributed to flight crew actions (Helmreich & Foushee, 1993; Nurden, 1996). In many cases, accidents were caused by crew interpersonal communications.

Realising that the scope of aviation human factors investigation has not been broad enough, researchers at NASA-Ames research center initiated an exploration of other issues in aviation operations. For example, they attempted to analyse the causes of jet transport accidents. Their findings indicated that human error in incidents and accidents was a reflection of failure in communication and coordination rather than individual's technical proficiency (Helmreich , Merritt, Sherman, Gregorich & Weiner, 1993).

Other scientific studies regarding aviation human factors have successfully revealed that crew performance has a positive correlation to an individual's ability to manage available resources, master internal and external communications, and set priorities (Pariès, 1996).

A milestone of CRM was reached at the international conference held in 1979 when operational and theoretical concerns of aviation human factors come together. It was when the term Cockpit Resource Management was used for the

first time by a NASA researcher and a member of the National Transportation

Safety Board (NTSB), John K. Lauber (Weiner, Kanki, & Helmreich, 1993).

2. 7. 3 The Development of CRM

The concept of Crew Resource Management gained currency in the United

States in the late 1970's as an application of human factors in aviation. Offered as

supplementary training, CRM was limited to particular aspects of crew

performance such as attitudes and communication. The first formal human

factors training, however, was conducted in KLM. It was initiated by Hawkins

(Helmreich & Foushee, 1993) using Edwards' SHEL model in 1984. KLM has

long been known as the pioneer of human factors training in Europe.

The first and the second generation of aviation human factors training (known

as CRM programme), that developed in the 1980s were driven by accidents that

occurred at the time. United Airlines, for example, began its CRM training which

was called Command/Leadership/Resource (C/L/R) after one of its freighters,

a DC-8 ran out of fuel and then crashed near Portland, Oregon in 1981 (Wiley,

1996). It was noted that the Captain of the freighter was found to repeatedly

ignore other crew's concerns about the low state of fuel. They concluded that the

accident was the result of human factors problems and a four-day human

factors training programme was developed. United Airlines was the first

organisation to develop an integrated CRM - LOFT (Line Oriented Flight Training) training programme which was proven to demonstrate a commitment to group process factors instead of individual process factors (Helmreich & Foushee, 1993).

Delta Air Lines was another example. This airline focused on human factors problems after two accidents occurred (Smith & Hayes, 1993). Finding that technically the flight crew was proficient, Delta Air decided to develop a CRM programme assuming that cockpit crew needed 'soft skills' besides technical proficiency.

Using lecture format, most of the courses of the first generation training programmes were personality-oriented (Pariès, 1996). There was some training that was derived directly from established group leadership management training as the goal of the training programme was mainly to change crew's attitudes concerning appropriate flight deck management (Helmreich & Foushee, 1993; Pariès, 1996). In Helmreich words, the first generation of human factors training programmes "were adaptations of generic management training programme" (as cited in Bovier, 1993, p. 4). Moreover, with the assumption that accidents still happened because pilots perform poorly due to poor personality

and crew interaction, participants were trained to recognise this deficiency. They were also informed about which attitudes were considered desirable.

Overwhelmed by academics and theoretical material, the training participants of the first generation of CRM programme reacted unfavourably. A fear that the captain's authority was being undermined was another reason for such reactions (Pariès, 1996).

Justinic of Delta Air Lines, representing training developers, describes the situation of early courses as the following:

"we had all the *touchy feely* and we psycho-babbled

them (participants) to death for six days. Some left with

a little, some left with nothing and some left the classes

worse than before".

This was because

"we tried to do too much too quickly.

We had succeeded in confusing many

and alienating others" (Wiley, 1996).

Notwithstanding the limitations of the first generation of aviation human factors training programme, it was spreading rapidly all over the world. In the US, Pan

American World Airways, Continental Airlines implemented CRM along with United Airlines and Delta Air Lines. In Asia, Garuda Indonesia and Japan Air Lines were among others reported to include CRM in their training programmes (Helmreich & Fouchee, 1993). The TWA's CRM programme was one of those developed in response to this trend (Wiley, 1996).

The second generation was more modular and focused more on cockpit issues rather than management, in reaction to the previous generation's disappointments (Helmreich & Fouchee, 1993; Pariès, 1996; Wiley, 1996). Personality-focused topics were abandoned. The concept of human error was introduced in this generation. The inclusion of recurrent classroom training and LOFT in the programme was initiated by Pan American World Airways and Delta Airlines (Helmreich & Fouchee, 1993). The content of the training programme of the second generation included an emphasis on crew synergy and crew behaviour. The discussion of command and leadership was in the context of the roles of each crew member.

Although the second generation of CRM programmes was more comprehensive and more acceptable to crews than before, its development was not as striking as the first one. It was noted that not many organisations implemented the integrated CRM/LOFT even though research findings confirmed that crews

54

overall rated LOFT as greater than 6 (on a scale 1= completely useless to 7= extremely useful) (Wilhelm, 1991 cited in Butler, 1993). Reasons for airlines not implementing integrated CRM/LOFT programmes included financial and operational considerations (Chidester, 1993). The fact that there was inadequate empirical evidence concerning the increase in air transport safety as a result of CRM training was also another reason for the unfavourable reaction (Helmreich & Fouchee, 1993).

Although retaining some issues such as integrating CRM/LOFT, the emergence of another generation of human factors training programmes in the 1990s brought several changes to the CRM programme. These developments included the reintroduction of the relationship between flight crew and aircraft which was untouched in early CRM programme (Pariès, 1996), and the use of a systems approach to organisational factors, group and individual factors (Helmreich Fouchee, 1993).

Another hallmark of this generation was the emergence of the idea to "remove the separation between CRM and technical training" (Mangold & Neumeister, 1995, p. 556).

In its development, besides using the integrated CRM/LOFT approach, Delta uses a thematic approach in its effort to avoid boredom and to ensure that CRM achieves its designed goals. At every training occasion, only one CRM topic is used as a central point, while other issues are revisited. In 1994, Delta used workload management, looked at decision making in the following year, and crew coordination in 1996. In 1997, situation awareness will be the central theme of Delta's CRM programme (Wiley, 1996).

The latest CRM programme (Pariès, (1996) suggests it as the fourth generation of CRM) emerged at almost the same time of the third. This programme is no longer focused on just the cockpit; CRM goes beyond the cockpit. The areas of concerns of fourth generation CRM include communication and interaction among the flight, cabin, and ground crew (Pariès, 1996). Garuda Indonesia has included flight dispatchers in its CRM programme as it recognised the need for both flight crew and dispatcher to speak a common language in the performance of their tasks. CRM programmes for maintenance staff have been developed (Continental and Pan American, for example) and research on it has been conducted (e.g. Taylor, 1995; Hobbs & Williamson, 1995). Edwards & Edwards, (1990) in their effort to bring together all the materials and concepts concerning human factors of the cabin crew, have produced a comprehensive work of human factors training (Edwards & Edwards 1990).

This study is embedded in the philosophy of the 4th generation of human factors training, which states that such training must extend beyond the cockpit to be of maximum benefit to the organisation. It is not enough for the cockpit crew, or even cockpit and cabin crew, to work as a team. The nature of the interrelationships between teams and the potential for latent errors to be created by any human component in the system demands a thorough granding in human factors by everyone in the organisation.

This chapter has outlines two bodies of literature. One concerned training needs assessment, and the other concerned the aviation human factors training. The next chapter will focus on the methodology used in this study.

Chapter Three

Methodology

This chapter presents the methodology used in this study. The participants of the research are also introduced. This chapter includes a description of the method of data collection followed by an account of the research instruments employed. A description of the questionnaire's pilot test is presented followed by a brief description of the treatment of data in the last section

3.1 Subjects

Subjects were obtained with the consent of the Vice President - Training of PT. Garuda Indonesia, who also arranged access to employees for the researchers. Employees across departments were invited to participate in the study and those who agreed to participate were given the opportunity to complete the questionnaire during working hours. The information provided in Table 2 represents the distribution of a final sample of 200 participants. More detailed information about demographic characteristics of the subjects is provided in Chapter Four: Results.

Table 2.   Distribution of Subjects

	Ground Staff	Cabin Attendant	Cockpit Crew	Technical Staff	Total
Frequency	82	38	35	45	200

3.2 Data Collection Method

Managers released their employees on the scheduled times to attend the survey sessions. At each session, the researchers provided the background and purpose of the study. The employees were informed that their responses would remain confidential. Furthermore, instructions were given on the procedure for completing the questionnaire. It was made clear that there were no right or wrong answers. It was also explained that participants might ask questions during the session. The average completion time was 27 minutes, ranging from 20 to 60 minutes. Questionnaires were administered at P.T. Garuda Indonesiain May 1997.

3.3 Research Instruments

This section presents the research instruments used for the collection of data: A needs assessment questionnaire and a Critical Incident Technique (CIT) questionnaire. The pilot test of the questionnaire and the results are also discussed.

3.3.1 Needs Assessment Questionnaire

The needs assessment questionnaire used in the study was based on Hunt's NEBEAT model (1984b) which has been successfully used in several countries such as Singapore and India to provide generic training needs and in a variety of areas such as the identification of competencies of health professional (Lockett-Kay, 1992). The NEBEAT model provided the researchers with a useful

framework. The complex, hierarchical structure of the model, however, was likely to make unreasonable demands on the respondents for whom English was a foreign language. Consequently, the researchers simplified and flattened the structure bearing in mind that:

- Subjects were non-English speakers although English is widely used in the working environment.

- Their educational background (as can be seen in table 4) demanded a simpler format.

- The nature of their job would not allow them to spend much time in filling in a long complicated questionnaire.

- The design of the questionnaire to be used as a data collection instrument is important (Bailey, 1987).

> *"In general, the chief goal of questionnaire construction is to construct an instrument that will not only minimise non-response, but will also ensure that information collected is complete, valid and reliable. The best questionnaire for accomplishing this goal is generally relevant, not ambiguous and has clear answer categories that are easy to respond to".*
>
> (Bailey, 1987).

A structured questionnaire was used to take advantage of the following benefits:

- The responses were standard and therefore are comparative. This provvided uniformity of information from one individual to another.

- Time was saved because the answers were easier to code.

- The large numbers of standardised responses lent themselves to statistical analysis.

In a needs assessment, validity results from being able to relate the identified skills back to a valued goal or purpose (Hunt, 1986). In the NEBEAT model, validity is achieved by first determining the corporate mission. Using this rationale, the needs assessment questionnaire consisted of two sections: (1) Questions oabout the company's goals or missions and (2) Questions about Human Factors skills.

In order to obtain data on the company's goals, nine goal statements were listed. These goals statements were identified from analysing Garuda strategic plans. The listed goals comprised both present and future-projected orientations. The first goal, for instance, was an existing goal of the organisation. It asked how important it was for the organisation to be the national flag carrier. The second statement concerned the responsibility of the organisation to serve the country. The third goal focused on the promotion of safety which has become the company's obsession[4], while the fourth emphasised the organisation's concern with customers' safety and comfort. The fifth goal was concerned with the well being of the employees and the following goal was about the size of the organisation. The respondents then were asked to rate the importance of the company's goals using a 5 point

Likert-type scale. The detailed questions of the first part of the needs assessment questionnaire are to be found in Appendix A.

The second part of the needs assessment questionnaire consisted of 40 questions about the human factors skills needed by employees to do their job so that the company's goal could be achieved. The range of human factors skills was identified by analysing a wide range of human factors programmes, from those used in University programmes, to the more specific programmes of airlines. The resulting list of skills appeared comprehensive and included contributions from Massey University School of Aviation's Human Factors courses, Air New Zealand's TeAM training programme, Garuda's CHIME programme, Swiss Air's CRM programme, Helmreich, Merrit, Gregorich and Weiner's (1993) questionnaire, the Federal Aviation Administration (FAA, 1992) and the International Civil Aviation Organization (ICAO, 1989; 1991) .

Given that the subjects' language is not English, the language used in asking questions was kept simple. To reduce ambiguity and difficulty, examples were provided in each item. The questionnaire was not translated into *Bahasa Indonesia* on the assumption that Garuda Indonesia employees used English in their working place. English is the language used in all Garuda manuals.

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[4] 1994, as expressed by Capt. Dharmadi, Executive Vice President - Operations for Garuda in his speech to the employees of Garuda Aviation Training.

In the needs assessment questionnaire, participants were asked to rank the level of importance of each item. They were given the opportunity to add skills that the researchers may have missed. These were also rated on importance.

3.3.2 Critical Incident Technique

The second instrument used for data collection was a Critical Incident questionnaire. In the final questionnaire, this measure followed questions on human factors skills and was headed "Work Problems".

This section elicited qualitative descriptive responses from participants. The purpose of this section was to capture a more complete picture of employees' human factors working environment, the problems they face, and the consequences of the problems. This section was intended to explore further any human factors skills which the researchers may have missed in the needs assessment measure and to provide more specific information about the needs of the different groups within the organisation. The following points were included in the questionnaire for participants to describe:

- A specific human factors problem or incident that they had had to deal with at work.
- When the incident took place.
- How heavy the workload was at the time of the incident.
- What task they were engaged in at the time of the incident.
- Situations that caused the incident.

- Consequences of the incident.

- The feelings they had after the incident.

- Additional human factors training they believed may have helped to deal with the incident.

The questionnaire was semi-structured in order to minimise difficulty. Some structure helped the respondents to give all the information the researchers needed. At the same time, it gave the respondents a great deal of freedom in how they expressed their responses. Examples were provided to reduce ambiguity and uncertainty. The instrument provided writing space for the incident's descriptions. Choices were provided for some questions to facilitate the respondents' recall process. It was made clear in the instructions that participants were allowed to describe their work problems (incidents) in *Bahasa Indonesia* (Indonesian). This section was developed using Flanagan's (1954) concept and Tjosvold's model (1990[5]).

Questions requesting biographical data were located in the final section. This section includes age, gender, education, length of service in the organisation and profession. In addition, questions about human factors training that participants may have already had are included. This section was taken from Lockett-Kay's (1992) model which used Hunt and Kinross' (1988) as its source. Questions of profession and status of flight operations employees were based

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[5] Model presented is an up-dated version conveyed by personal correspondence in early 1997

on Helmreich, Merritt, Sherman, Gregorich and Weiner (1993) questionnaire and Garuda Employee's Guide (Garuda Indonesia, 1990). The complete questionnaire is located in Appendix A.

3.4 The Pilot Questionnaire

In order to determine the feasibility of the instrument, a pilot study was conducted to assess the following issues:

- the length of time required to complete the instrument;

- the overall difficulty of the instrument;

- if subjects were unable to understand the questions;

- the way subjects felt as they were completing the instrument;

- how the instrument could be improved.

The purpose of the pilot test was to determine the effectiveness of the instrument: whether information acquired could be retrieved within its format, and whether it was culturally acceptable.

The pilot version of the questionnaire was administered to three Indonesian students of Massey University and five Indonesian Flight Instructors who were undertaking a course at Massey University School of Aviation. All subjects were Indonesians and were studying aviation which is a similar context to the

65

group of subjects in the research site to which the instrument would be administered.

Results of the evaluation of the test indicated that subjects took approximately twenty minutes, on average, to complete the instrument. This suggested that it was suitable for use in the research site, given that an airline employee does not have a long period of time to complete a survey instrument.

An analysis of the pilot study and the discussions with the subjects revealed some important issues. Although the instrument was rated as not difficult, some respondents made suggestions to clarify several points. Several terms in section 1 needed to be elaborated and the Indonesian terms included to clarify the meaning. For example, one goal statement *To serve the country* was found to be unclear. The researchers decided to include explanations in *Bahasa Indonesia* in items considered difficult and unclear. From the discussion, it was indicated that examples provided in each item did clarify the item.

It was suggested by one of the pilot respondents that Section Three, the critical incident questionnaire, all be changed to multiple choice or yes/no response format. It was argued that this would accomodate people's antipathy for responding in essay format. The researchers minimised the essay format into two areas: One asked the participants to describe the cause of their work problem and the second asked them to describe the problem itself. In addition,

problem and the second asked them to describe the problem itself. In addition, the researchers also provided examples for each point, to facilitate participants in recalling work problems they had encountered.

The instrument was not considered to be difficult. Some respondents said that questions were so aviation specific that people from non aviation background might find it difficult to understand. There were no questions, however, that the subjects were unable to understand.

The size of the pilot group was too small to provide reliability statistics for the instrument.

3.5 Treatment of Data

The statistical package, SPSS/PC for windows (1996) was used to examine and analyse data. The critical incidents data were content analysed before they were treated as quantitative data. Detailed information of the analysis and the results are to be found in the chapter on results.

In the five sections of this chapter the method and measures used in the present study have been described. The following chapter addresses the analysis, the results, and the sample description of the study.

Chapter Four

Results

The results from the analysis of the questionnaire are reported in this chapter. The statistical package SPSS for windows (Francis, 1996) was used to examine data and relationships among observed variables. First, the analysis of organisation's goals was undertaken. The organisation's goals were analysed by calculating their means and standard deviation. Secondly, principal component analysis was undertaken on the human factor skills to group skills that were conceptually-related so that a small number of factors or categories of human factors skills could be identified. Content analysis was used for the critical incidents, and a demographic summary is also presented in this chapter.

4.1 Needs Assessment

This section is divided into two subsections. The first describes the results from the organisation's goals analyses. In the second subsection results from the principal component analyses are described.

4.1.1 Company's Goals

The calculation of the mean score of each company's goal was intended to determine which goals the respondents believed should be included in the company's mission. The statistical method used was descriptive. The following

list contains the means and standard deviations for the nine organisation's goals, given in ranked order of importance.

Table 3. Mean Score of Organisation's Goals in Ranked order

Goals	Mean Score	Standard Deviation
To look after the well being of the company's employees.	3.80	.43
To look after passengers so they are safe and comfortable.	3.70	.51
To promote safety	3.68	.60
To grow larger and stronger by expanding the fleet and upgrading the skills, knowledge and qualifications of the employees.	3.63	.54
To achieve quality in all aspects of the company's activities.	3.60	.59
To be highly efficient in air transportation.	3.52	.56
To have world class in-flight service	3.50	.58
To be the national flag carrier	3.37	.82
To serve the country	3.20	.81

The score shows that the goal which ranked the highest average, (3. 80), is *to look after the well being of the company's employees.* Hence, a high proportion of respondents concurred that this goal was the most important for the company.

Item 2: *To serve the country* has the lowest score which means that this goal is considered to be the least important of all the company's goals.

Fifty respondents added goals which they believed had not been listed in the questionnaire. These goal statements were analysed for content in order to get a better understanding of those statements. These goals were grouped by looking

at recurring regularities. The researchers developed goal labels and the additional goal statements then were coded in accordance with the content. Goal statements that represented or had the same notion as any of the nine statements listed in the questionnaire were compared in terms of their rating. Mostly similar goals were given similar ratings, therefore one of them was excluded. In the rare cases where the respondents wrote their own goal that was similar to one of those listed, but rated them differently, the written goal was excluded since it was impossible to understand how the respondent intended it to be different to the one listed.

The final analysis produced six additional goal statements. The following is the list of the goal statements the respondents believed to be important to be valued as part of the company's corporate mission.

1. To have employees who believe in God
2. To have a profit orientation
3. To have a high standard of professionalism consistent with corporate resource management
4. To have a strong market orientation
5. To have a clean (uncorrupt) company
6. To go public.

These had high means and low standard deviations because they were rated as important by the respondents who identified them. They were not included in the final results because too few respondents rated them to give meaningful data. However, it is recommended that these be included in future research of a similar nature.

4.1.2 Human Factors Skills

Principal component analysis was undertaken to reduce a large number of variables down to a smaller number of factors or components (Tabachnick & Fidell, 1989) and to summarise the pattern of relationships among human factor skills variables (Table 4).

Prior to the principal component analysis, data was evaluated for appropriateness for factor analyses. The presence of correlations greater than .30 in the computation of a correlation matrix for human factor skills variables reflected some underlying processes (Tabachnick & Fidell, 1989). The Kaiser-Meyer-Olkin measure of sampling adequacy = .89127 suggested that the data was appropriate for a factor analysis (Tabachnick & Fidell, 1989, suggest that values of $\geq$ .6 are required for a good factor analysis). The Bartlett's test of sphericity (3430.43; p= .0000) also indicated the appropriateness of the data for aprincipal component analysis.

71

A principal component analysis followed by a varimax rotation of the 40 items of human factors skills variables produced ten components with eigenvalues greater than 1.0 and accounted for 63.9% of the total variance.

The ten components then were labelled in accordance with the content of variables of each component. It was decided to retain variables with component loadings ≥.40 in order to avoid overspecification. Complex variables that cross-loaded were assumed to load on the component on which they had the highest loading. Although item 14 'being able to respect the roles of other team members' had a loading of .36, it was decided to retain it as it fitted sensibly into the component. Generally, one component correlated highly with each variable. Items 13, 34 and 36 also had high loadings on a second component. Item 13 loaded .52 on component VII and had a loading of .47 on component II. Item 34 which loaded mostly on component III also had a loading of .43 on component IV, while item 36 which loaded primarily on component II also loaded .42 on component IV.

The summary of the eight components which have been labelled is reported in Table 4.

Table 4   Principal Component Analyses of Human Factors Skills

Component I: *Decision-making*	I	II	III	IV	V	VI	VII	VIII	IX	X
Being able to recognise illusions	.71	.00	.09	-.11	.25	.14	.09	.11	.23	.23
Being able to change behaviour when your role changes	.69	.18	.11	.21	-.06	.10	-.01	.08	.12	.04
Being able to objectively evaluate a situation	.69	.07	.13	.22	.21	.14	.12	.16	-.04	.14
Understanding that other people have different attitudes and approaches to the way they work	.50	.39	.16	.02	.10	.05	.09	-.05	.08	.05
Being able to make good decisions or good judgements	.44	.32	.10	.28	.25	.10	.10	-.19	-.07	-.00
Component II: *Team participation*	I	II	III	IV	V	VI	VII	VIII	IX	X
Meditating	.08	.63	.13	-.00	.16	.14	.11	.38	.09	.01
Helping to build a team by motivating team members	.15	.57	.19	.33	.22	.29	.18	-.06	-.07	.04
Taking part in team activities	.12	.55	.19	-01	.10	.02	.25	.15	.23	.20
Listening to what the other person is saying	.24	.53	.28	.19	-.11	.28	.00	.06	.12	.29
Being able to contribute ideas and opinion to the team	.15	.47	.08	.02	.29	.17	.00	-.12	.34	.33
Co-operating with other team members	.17	.46	.38	.42	.13	.12	-.11	-.08	.15	-.07
Component III: *Teamwork*	I	II	III	IV	V	VI	VII	VIII	IX	X
Being a moral team member	.06	.14	.73	.07	.20	-.03	.16	.20	.18	.11
Helping other crew members to develop new skills	.26	.35	.64	.20	.13	-.11	.03	.11	.03	.08
Being a good follower	.19	.00	.56	-.02	.14	.42	.11	-.00	.21	.14
Managing a crisis	.32	.22	.51	.36	.15	.01	-.00	-.06	.12	.08
Sharing responsibility for the success of the team	.18	.25	.46	.43	.05	.09	.05	.12	.23	.02

Component IV: *Professionalism*	I	II	III	IV	V	VI	VII	VIII	IX	X
Being competent	.12	.12	.11	.76	.12	.12	.07	.08	-.02	-.09
Having a professional attitude	.09	-.05	.27	.64	.11	.27	.09	.03	.14	.09
At any specific time, being aware of all the aspects of a situation for your own responsibility	.21	.09	-.07	.54	.20	-.07	.11	.06	.26	.40
Component V: *Leadership*	I	II	III	IV	V	VI	VII	VIII	IX	X
Being able to manage workload	.10	.04	.17	.13	.68	.11	.17	.04	.18	-.04
Being a good leader	.05	.11	.47	.05	.56	.11	.02	.12	-.08	.27
Being able to work in co-ordination with other team members	.10	.13	.37	.20	.55	.13	.07	-.06	.03	.10
Being able to find a satisfactory solution whenever team members disagree about something	.35	.33	.05	.15	.52	.04	-.02	.19	.05	.04
Being able to respect the roles of other team members	.25	.13	-.06	.19	.36	.33	.18	.26	.29	.10
Component VI: *Feedback*	I	II	III	IV	V	VI	VII	VIII	IX	X
Giving feedback	.11	.26	-.01	.13	.12	.77	.12	.06	.01	.08
Taking feedback	.16	.14	.03	.15	.11	.75	.09	.23	.07	.14
Helping to build a team	.30	.01	.34	.25	.06	.44	.30	.17	.15	.04
Component VII: *Interacting with others*	I	II	III	IV	V	VI	VII	VIII	IX	X
Interacting with the other aviation workers	.29	.09	.07	-.00	.09	.20	.77	-.07	.12	.08
Interacting with the public	-.09	.10	.20	.13	.01	.11	.74	.31	.09	.03
Interacting with other people in Garuda	.06	.47	-.00	.11	.32	.12	.52	.25	.12	.07
Monitoring the situation	.15	.22	-.10	.25	.28	-.06	.41	-.25	.18	.31

Component VIII: *Communication skills*	I	II	III	IV	V	VI	VII	VIII	IX	X
Communicating by using body language	.00	.09	.14	-.06	.12	.13	.06	.65	.08	.22
Responding to other crew members	.32	.15	-.02	.29	.08	.15	.11	.56	.19	-.00
Being sensitive to different cultural values	.44	-.00	.27	.12	-.03	.10	.08	.53	.06	.33
Component IX: *Cross-checking*	I	II	III	IV	V	VI	VII	VIII	IX	X
Cross-checking	.14	.10	.08	.07	.15	.02	.18	-.03	.72	.07
Communicating (speaking)	-.04	.15	.02	.16	-.14	.04	.09	.32	.60	.05
Having awareness of any physical or psychological problems	.29	.09	.30	.02	.31	.19	-.02	.10	.54	.05
Component X: *Understanding other people's needs*	I	II	III	IV	V	VI	VII	VIII	IX	X
Being able to decide whether a job should be done individually or by the team	.06	.05	.08	.11	.22	.15	.05	.15	.19	.71
Communicating that is suitable to the culture	.08	.17	.21	-.10	-.08	.10	.09	.18	-.06	.66
Eigenvalues	12.33	2.18	1.78	1.65	1.52	1.43	1.33	1.18	1.09	104
% of variance	30.8	5.5	4.5	4.1	3.8	3.6	3.3	3.0	2.7	2.6
Reliability Coefficient	.77	.83	.79	.64	.74	.76	.74	.65	.60	.51

Decision-making. The first component to emerge was *decision-making* which consisted of five items: Being able to recognise illusions, being able to change behaviour when role changes, being able to objectively evaluate a situation, and understanding that people have different attitudes and approaches to the way they work. These five items loaded convincingly (from .44 to .71) in this component.

Team Participation. The second component, *team participation* was made up of six human factors skills which included 'listening to what the other person is saying' and 'taking part in team activities'. The six items of the component reflected individual's ability to contribute and participate in team activities. One item, 'co-operating with other team members also loaded on component four: *professionalism*. Component II has the highest reliability (r=.83) among other components.

Teamwork. The third component to emerge was *teamwork*. This component had five items. It was clearly defined by skills associated with working together as a team such as 'being a moral team member', 'helping other crew members to develop new skills'. These items loaded heavily on one component. One item 'sharing responsibility for the success of the team' also loaded on *professionalism*.

Professionalism. The fourth component, *professionalism*, consisted of three items which clearly reflected that professionalism is required by each individual in conducting his/her job. These items which had high loadings (from. 54 to .76) included: 'Being competent', 'having a professional attitude', and 'being aware of all aspects of a situation for your own responsibility'.

Leadership. The fifth component, which was called *leadership*, was made up of four items with .52 to .68 loadings, and one item loaded .37 ('being able to respect the roles of other team members'). Managing workload, and the ability to work in co-ordination were part of leadership skills. Also, an ability to 'find a satisfactory solution whenever team members disagree'.

Feedback. Component VI, *feedback*, was comprised of three items which clearly reflected the idea of feedback: 'Giving feedback', 'taking feedback', and 'helping to build a team'. These items loaded heavily on the component (from .44 to .77)

Interacting With Others. Consisting of four items, this component stressed abilities to relate and interact with other people in the organisation as well as those outside the organisation.

Communication Skills. Component VIII, *communication skills*, was made up of three items. One item reflected the importance of being sensitive to different

cultural values in communicating. 'Being sensitive to different cultural values' also loaded on component I.

Cross-checking. This component comprised three skills loaded convincingly on the component: cross-checking, communicating (speaking), and having awareness of any physical or psychological problems.

Understanding other people's conditions. The last component, *understanding others' conditions*, comprised only two items. This component has the lowest reliability coefficient (r=.51).

Alpha reliabilities for the ten components were: Decision-making, .77; Team Participation, .83; Teamwork, .79; Professionalism, .64; Leadership, .74; Feedback, .76; Interacting with others, .74; Communications Skills, .65; and Understanding other people's work conditions, 51.

As with the goal statements' section (Section One of the questionnaire), in Section Two the respondents were also asked to add human factors skills which they thought should be included in helping them achieve the company's mission. Sixty additional responses were read and reread in order to get an understanding of what had been written. Upon having a good understanding, the researchers looked at recurring regularities and grouped the responses

based on the similarities. The analysis yielded an additional 10 human factors skills which are listed below.

- Treating all company employees with respect

- Managing stress

- Negotiation skills

- Problem solving

- Emotional self control

- Open management styles

- Customer service

- Thinking globally but acting locally

- Trusting others

- Open mindedness

Again there were too few responses to include these in the statistical analysis but it is recommended that in future items to measure these be included.

This section has presented the results from the Needs Assessment. In the next section the results from critical incident technique analyses are reported.

4.2 Content Analysis of Critical Incidents

The critical incidents data were content analysed (Mostyn, 1985) using the following procedure:

- Grouping the critical incidents in accordance with the four occupational groups of the sample

- Read through all the critical incidents

- Code the critical incidents by looking at recurring regularities (Mostyn, 1985)

- Develop category headings (the types of incidents) based on the coded information

- Sort the critical incidents into developed categories.

There were 100 incidents reported. Some respondents reported more than one incident. There were respondents who reported a series of incidents rather than a single incident or work problem. Consequently, these respondents were not able to provide complete responses since they did not answer some questions such as 'how they felt' and 'the consequences of the incident' for all incidents reported. This was because the respondents tended to concentrate on one incident in answering questions. Accordingly, the incidents with incomplete responses were excluded from further analysis.

The final content analysis of the incidents or problems yielded 4 categories of problems or incidents: Co-ordination between teams, Professionalism, Ability to interpret or find published regulations and procedures, and Leadership. After labelling the categories, the data then were compared across groups of participants.

From the analysis across groups, the results show that these problems are applicable to all four groups of respondents. The problems were then tabulated. The following figure shows the frequency of the four categories of work problems.

Figure 10. Problems
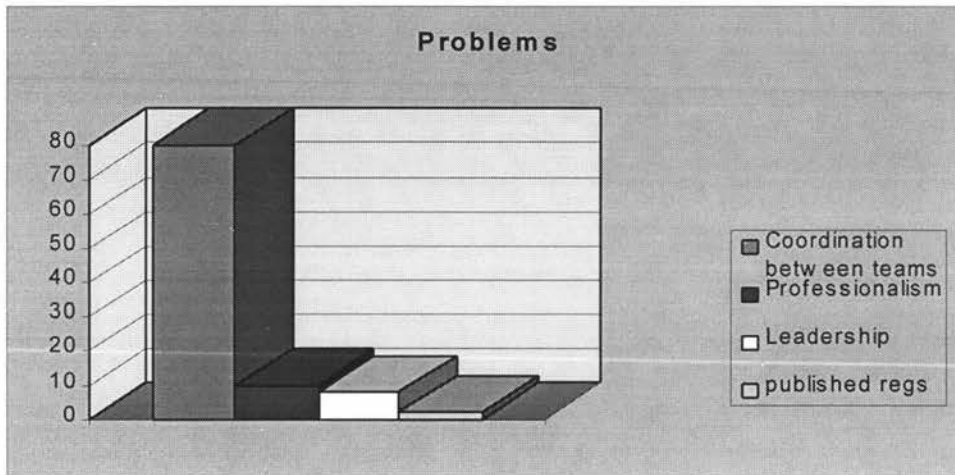
Eighty percent of respondents reported problems involving co-ordination between teams problems, ten percent faced professionalism problems, eight percent had leadership problems, and two percent faced difficulties in interpreting and accessing published regulations and procedures.

The leadership and professionalism problems supported the finding of *leadership* and *professionalism* as important human factor skills in the needs assessment. The results from the content analysis of the company's goals also indicated a strong concern about professionalism (section 4.1.1). The ability to interpret or find published regulations and procedures was completely new. It

was not, however, mentioned with any great frequency. This may be more of a human factors design or management issue than a training issue.

The co-ordination between teams had been hinted in the needs assessment in the component called *interacting with others*. Its true nature, however, only clearly emerged with the critical incident technique. The dominance and prevalence of this problem in all four groups suggest that it is a significant issue, although further research is indicated.

Responses to the question "Were there any consequences from the problem (incident)?" were also grouped due to recurring similarity. Three groups of consequences emerged which included: Direct financial cost, damage to the Company's image, and an inability to perform effectively. The results show that direct financial cost was mentioned with a higher frequency than the other two (56%). Summary of this information is reported in figure 11.

Figure 11. Consequences
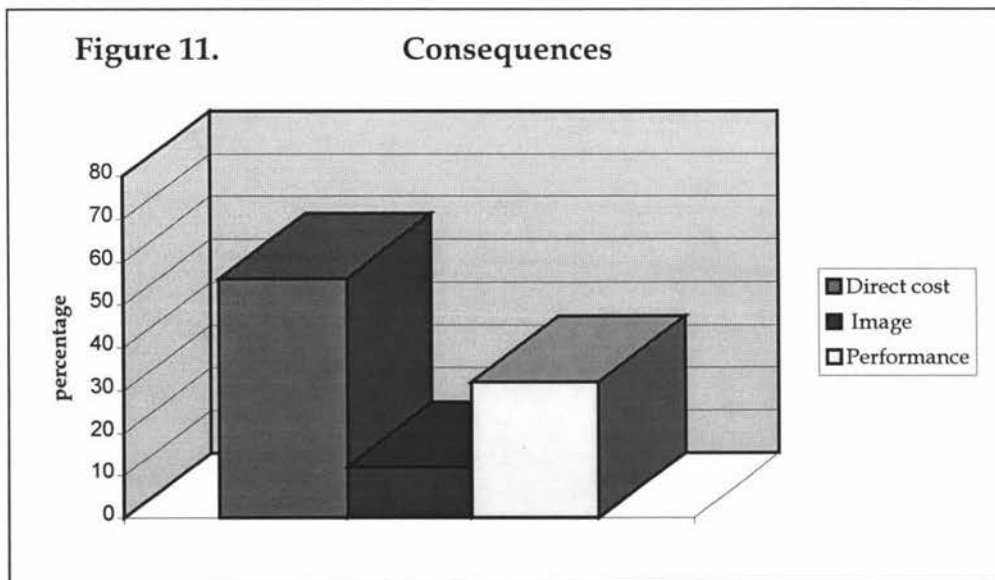
"Disappointed", "frustrated", and "upset" were the responses most often used by cockpit crew to express their feelings about the incidents they had described previously. Sixty six percent of the crew felt disappointed, frustrated, and upset about the incidents. "Disappointed" and "upset" were expressed by 60% of the cabin crew. Forty point one percent of ground personnel expressed their feeling as angry. Technical staff mentioned "disappointed" as the dominant feeling associated with the incidents (44.6%). Most of respondents expressed more than one feeling in their responses. Figure 12 shows the information.


Figure 12.   Feelings
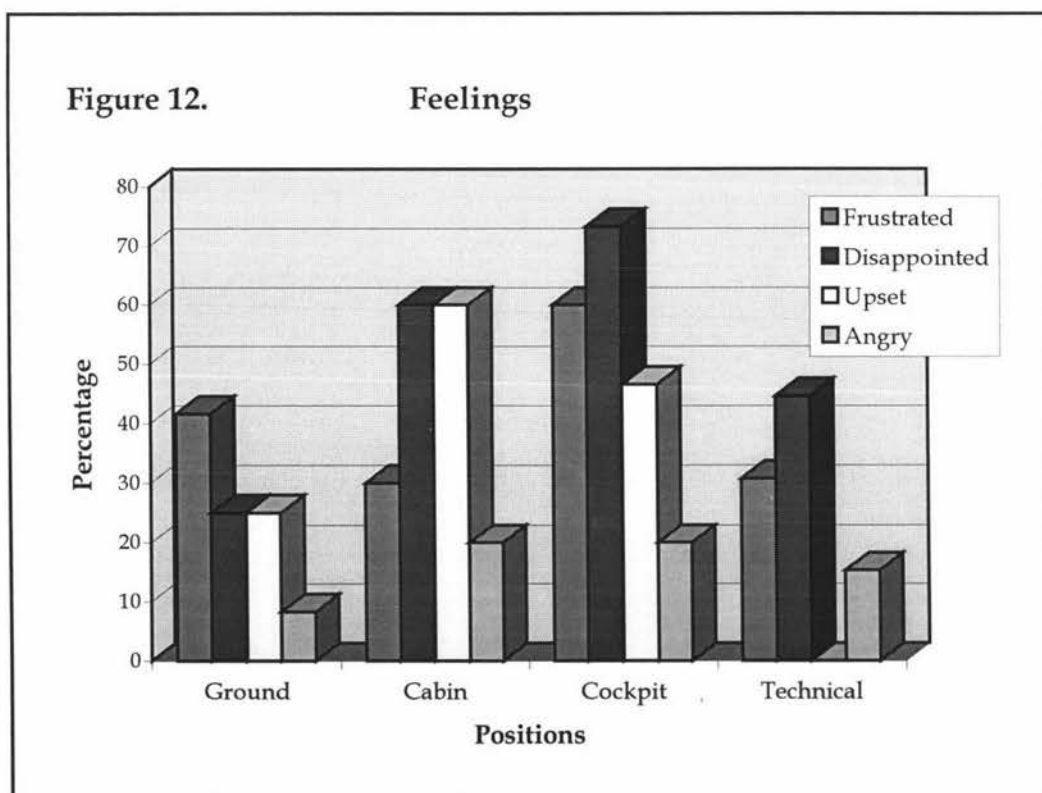
Responses on 'how heavy your workload was at the time of the problem' (50% average) indicated that problems happened not only when respondents had a heavy workload. Figure 13 shows the summary of the responses.

Figure 13   **Workload**

Light
4%

Heavy
46%

Average
50%
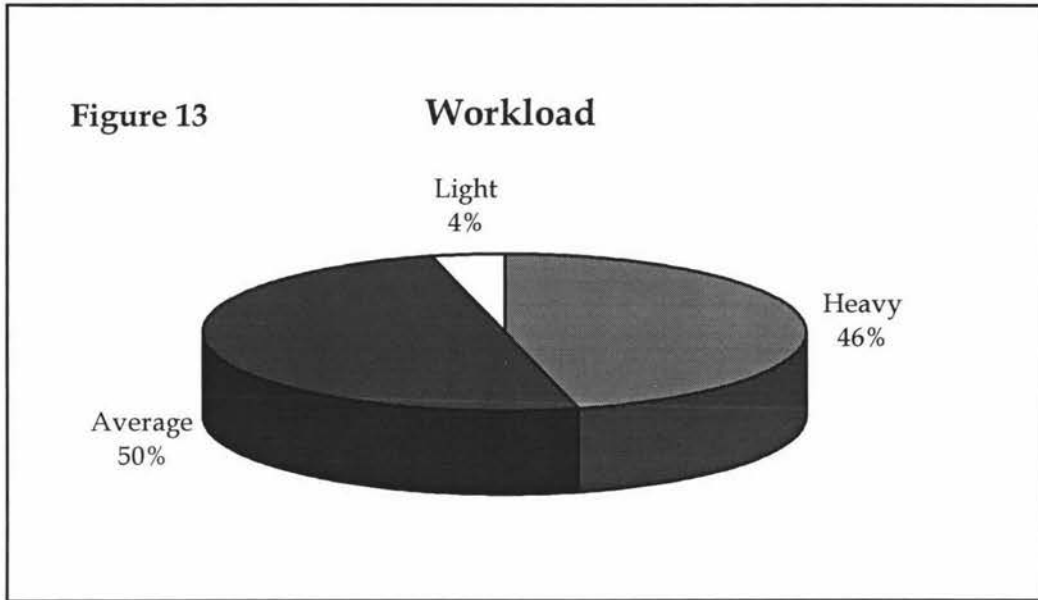
The critical incident questionnaire also yielded information on how much human factors training the respondents had had to deal with the incidents. This information is presented in figure 14.

Figure 14. Training
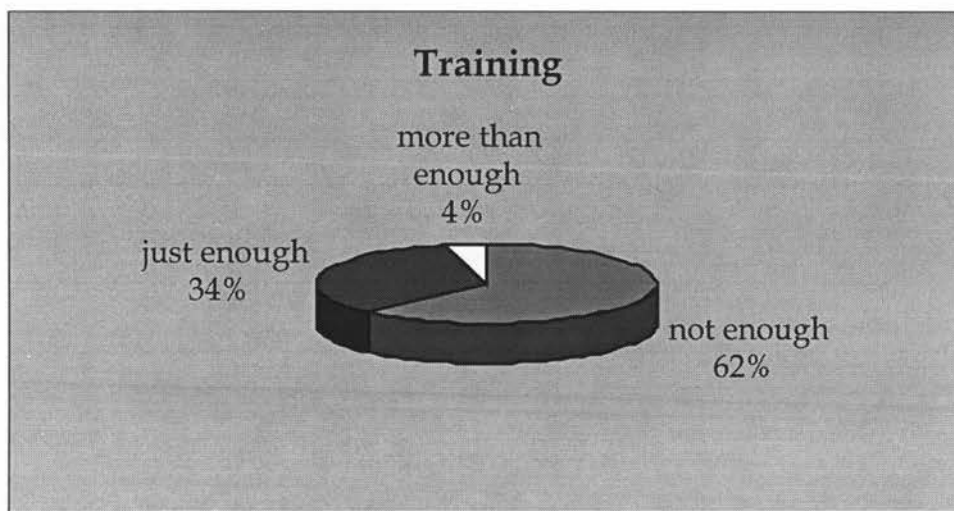
Sixty two percent of the respondents reported that they did not have enough human factors training to deal with the problems. Only four percent of them declared they had had more than enough training.

In this section the results from the critical incident content analyses have been presented. The following section describes the characteristics of the sample of the present study.

4.3 The Demographic Data: Characteristics of The Sample

This section describes the sample of the study. Current Garuda personnel statistics reported for comparison were provided by Garuda Indonesia. The statistics were current as of December, 1996.

The subjects in the sample were divided into four groups: Ground Staff (n=82), Cabin Attendants (n= 38), Cockpit Crew (n= 35), and Technical Staff (n= 45). Detailed responses to demographic items are provided in the following table.

Table 5: Summary of Biographical Data

	Number of Subjects	Percentage of Subjects
Gender		
Male	135	67.5
Female	65	32.5
Age (Years)		
20-29	61	30.5
30-39	84	42.0
40-49	48	24.0
50-59	5	2.5
≥ 60	2	1.0
Educational Qualification		
High school	71	35.5
Undergraduate University Diploma	60	30.0
Undergraduate Degree	58	29.0
Post Graduate Diploma	1	.5
Post Graduate Degree	10	5.0
Profession		
Ground Staff	82	41.0
Cabin Attendant	38	19.0
Cockpit Crew	35	17.5
Technical Staff	45	22.5
Length of employment with Garuda (years)		
≤ 1	8	4.0
2-4	51	25.5
5-9	64	32.0
10-14	23	11.5
15-19	22	11.0
20-24	27	13.5
≥ 25	5	2.5

The composition of the present sample (ground staff made up 41% the largest group) reflects the composition of Garuda's personnel with 49.14% of ground staff.

The majority of the subjects were relatively young, between 20 to 39 in age (72.5%). This is slightly lower than the percentage of personnel of 20-39 years of age (77.13%). Figure 15 shows the age distribution across groups.

Figure 15.   Age Distribution Across Groups
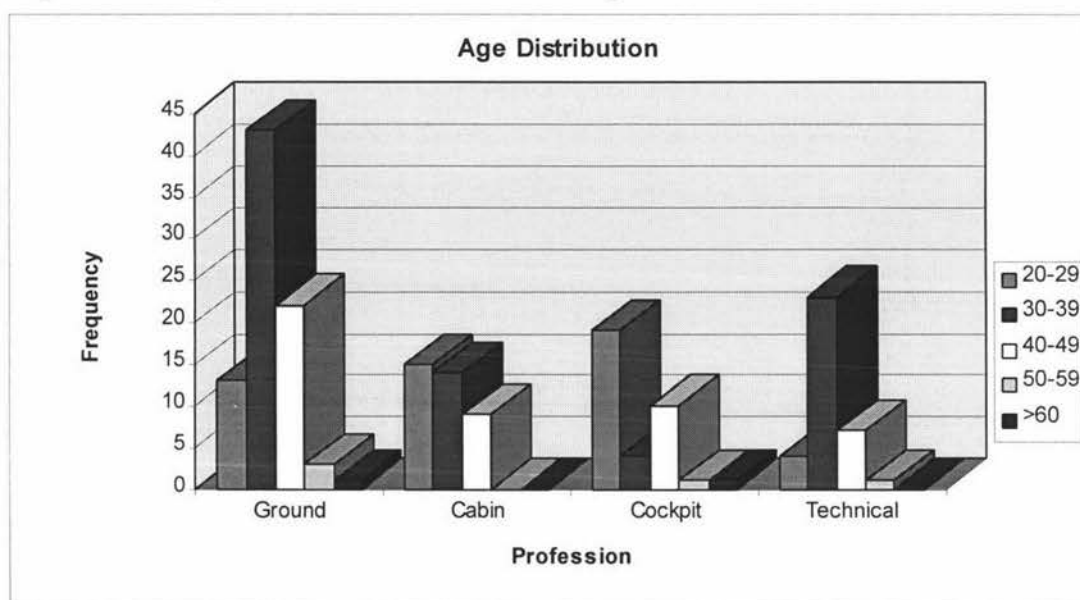
Sixty seven percent of the subjects are male. Sixty five point five percent of subjects possess at least an undergraduate diploma, while 35.5% of the respondents are high school graduates.

Sixty one percent of subjects have been with the organisation for nine years or less. This is slightly lower than the percentage of Garuda personnel who have been employed for ten years or less (67.90%). The following figure shows the distribution of respondents' length of service across groups.

Figure 16. Distribution of Respondents' Length of Service
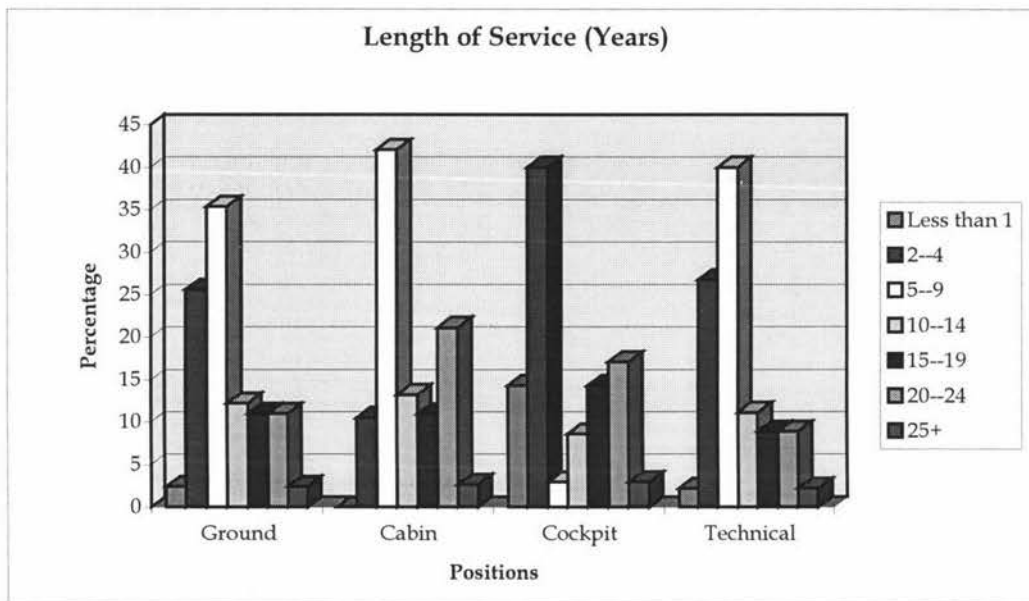
In this chapter the results of the study have been presented. These results are from the needs assessment and the critical incident technique. The sample of the present study has been described in this chapter following the results of the two analyses. The next chapter presents a discussion of the results that includes a discussion of the limitations of the study and suggestions for future research.

Chapter Five

Discussion

In this chapter, the findings are presented together with the implications of the study and recommendations for future research.

The purpose of the present study was to answer the questions 'what human factors skills were required by everyone, irrespective of the job?', and 'what were different skills needed by specific groups such as flight crew and cabin attendants?'. The answer to these questions indicated a needs analysis.

5.1 Needs assessment

Company's Goals

Respondents of the present study mostly agree that Garuda Indonesia should focus more attention on their internal issues. The results presented in subsection 4.1.1 suggested that the most important company goal to achieve was 'to look after the well being of the employees'. In the past, the company's mission was almost always related to the responsibility of Garuda Indonesia as the Flag Carrier - that is to serve the nation. Much company effort were concentrated on this mission. Such effort did not give enough emphasis to domestic issues even though this study suggests that these issues may enhance the company's mission. Rather, the company gave more attention to external issues. This does

not necessarily to mean that the company should give up its goal of being the flag carrier or to become an efficient world class airline. The results merely suggest that the company should consider including employees' interests in addition to other issues such as prestige and customer's satisfaction. From a broader perspective the well being of employees can also be considered a safety issue, and it is perhaps these safety concerns which respondents had in mind when they identified critical human factors skills.

Another important goal the respondents believed the company should achieve was the improvement of quality in all aspects of the company's activities. The respondents agreed that all parts of the company: training, marketing, operations, managers and all other employees must give quality service for the company to achieve a quality product. This of course relates to a secondary, but important, human factors issue; that of efficiency and effectiveness. Safety has certainly drawn the most attention in aviation human factors, but to return to the definition of human factors by Edwards (1985) and Hawkins (1987) on page 35, human factors is concerned with the totality of the workers' relationship with their work environment.

The respondents of this study also believed that that the company should grow larger and stronger. To enhance the growth, the company should expand the

fleet, catch up with technology, and upgrade the skills, knowledge and qualifications of the employees.

The additional company goals suggested by the respondents indicated a variety of concerns for the company to consider, such as a profit and market orientation. Another interesting issue was the respondents' concern for piety: *To have employees who believe in God.* This suggests that the organisation consider further the importance of religion in the work place.

Professionalism is another issue identified by the respondents. This issue appears to have two components: The professionalism of the organisation and the professionalism of the members of the organisation as expressed by one of the respondents.

> *To have a professional organisation and to have employees with a high standard of professionalism.*

To go public has become a major concern of the company in the last three years[5] and this view was expressed as a company goal. It is likely that the respondents of the present study have had the same concern as the management of Garuda Indonesia. Another important company goal captured in the study was the issue of having a clean (uncorrupt) company.

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[5] Captain Daryanto, personal communication, 1996.

92

The goals identified as being important show a strong cultural influence that would be either lacking or less important in a western organisation. The importance of the organisation's consideration of the employees well being, would be unusual in a Western organisation, however, it fits very neatly into an Eastern philosophy in which one's employer has a much more family-like relationship with its employees. Western organisations have progressively secularised their work places, but in most Eastern countries the role of religion is still a major influence and this is reflected in the suggested goal of "having employees who believe in God". It is important to remember that the identified goals are linked to the specific human factors skills that were rated as important.

Human Factors skills

The results from the principal component analyses yielded ten categories of human factors skills. All four groups of respondents - cockpit crew, flight attendants, ground staff, and technical staff agreed that these ten groups of human factors skills were critical in helping them to achieve the corporate goals. The ten human factors skill categories that emerged are: Decision-making, Team Participation, Teamwork, Professionalism, Leadership, Feedback, Interacting with others, Communication skills, Cross-checking, and

Understanding others' situations. The underlying constructs of these dimensions are discussed with respect to related study.

In aviation human factors training, *decision-making* is not new. ICAO (1989) proposed to include this skill category in human factors training for flight operations personnel. In Air New Zealand's TeAM Training programme, decision-making is discussed in terms of the group and the individual. Group decision-making is related to teamwork while individual decision-making is more likely to be linked with leadership and communications. Garuda's CHIME programme has also introduced the concept of decision-making into its sessions.

Decision making involves the conscious choice or selection of one alternative from among a group of two or more alternatives (Tannembaum & Massarik, 1996). In the decision making process the first step is to become aware of as many as possible of those alternatives which are relevant to the decision to be made. Secondly, to define each of the alternatives by determining as many consequences as possible related to each alternative under consideration. Thirdly, to exercise a choice between the alternatives; and to make a decision (Tannembaum & Massarik, 1996). In short, the first step is to recognise alternatives available, the second is to evaluate, and the third is to decide.

The second category of human factors skills is *team participation*. One item of this category- listening, is a skill proposed by ICAO (1989) to be included in human factors training. Taylor (1995) cited the work of Cole, Bacdayan, and White (1993) suggesting that people's participation for a clear purpose indicates more success than "flabby" participation where they are unclear about the relevance of their involvement. This indicates the importance of having a clear direction or goal in any activities involving employees. Individual participation in team activities will provide the team with relevant alternatives and additional information which in turn will facilitate the decision-making process discussed previously. Team participation will make a solid team because people become 'ego-involved' in all team activities including team decision making (Lye, 1994).

The third category, *teamwork*, has also been an important aspect of aviation human factors programmes. In most human factors training, teamwork is the heart of the programme (for example, the CHIME programme and the TeAM training). Air New Zealand's TeAM Training combines teamwork with decision-making into one subject heading while CHIME uses *teamwork* as the umbrella for all other subjects. Teamwork requires skills and abilities which include a variety of interpersonal and managerial skills such as setting objectives, influencing, and negotiating (Mendzela, 1997). Why is teamwork important? Teamwork can break down departmental barriers. People from

various departments of an organisation can work together as a team regardless of difference because they share and commit to a common purpose. Teamwork can provide developmental challenges for the members. Each member feels responsible for the development of other members. A team develops sound internal relationships and shares responsibility for the success of the team. In Mendzela's (1997) words, teamwork is like a salad: "Individually, each ingredient may be tasty and fresh, but they will certainly not add up to a gourmet experience. Put together in the right way, the ingredients enhance one another to produce startling results." (p. 62). The respondents of this study also believed that being a moral team member was an important component to the success of teamworking. Again this reflects a uniquely Eastern view.

Professionalism is the fourth category the respondents identified as an important human factors skill to be included. An understanding of the importance of being competent and professional in conducting a job is essential for a person to perform well. To see how a profession is related to professionalism, it is worthwhile to determine what a profession is. A "profession" is an occupation that requires extensive education. It often has formal requirements such as certification. "Professionalism" is an attitudinal and behavioural orientation that people possess toward their occupations (Lusch & O Brian, 1997). That is to say that professionalism, and being in a profession, do not necessarily go hand in hand. An individual could be in a profession but not have professional

attitudes and behaviour. On the other hand, one could be characterised in one's attitudes and behaviour as being professional although not belonging to a profession. Lusch and O'Brian (1997) in their study on market research professionalism included Hall and Snizek's (1968; 1972) "autonomy" -- feel free to make decisions about work and free of external pressures that might influence the decisions or work behaviour of an individual -- as a dimension of professionalism which was expressed with great frequency by the respondents. Another factor of professionalism that the respondents of Lusch and O'Brian (1997) study agreed on was "belief in self-regulation", which is characterised by the belief that a good form of control for them is peer control rather than "outsiders'.

The fifth category of human factors skills to emerge is *leadership*. Clark and Clark (1992) in their summary of propositions on leadership concluded that the quality of leadership has significant effects on a number of problems such as profitability of cost centers, performance of work units, quality of work output, and reduction of stress (as cited by Pettitt & Dunlap, 1996). These days, the issue of followership has also been widely discussed together with leadership. It is argued that followership skills are as important as leadership skills for people to accomplish goals (Pettitt & Dunlap, 1996). Interestingly, in the present study the item of followership is not attached to the leadership category. Rather it is in the third category: *teamwork*. In some discussions of followership, the

notion of followership include the ability to manage oneself, the ability to deal with change and ambiguity, working effectively as team members (Pettitt & Dunlap, 1996). From the ideas described above, it is clear why followership was included by respondents as part of teamwork skills.

Another possible explanation is that, culturally, Indonesians' perspective of leadership is different from western perspective. It may be true that leadership and followership are seen as two different things that do not belong together. Leadership is for leaders not for ordinary people. Indonesians respect leaders, older people and teachers in a very specific way. These people represent power and authority and that's why they should not be questioned (Harris & Moran, 1991).

Feedback was the next category of human factors skills to emerge. In the Indonesian culture, feedback is not very well practised (Sasono & Mudigdo, 1996). In fact, people are afraid that their feedback may be taken as being offensive. Conversely, people are very defensive when receiving feedback because they have a mindset that feedback is a form of criticism. Consequently, people simply do not practise giving or receiving feedback so that they have little experience of these behaviours. Why then are feedback skills considered important? People may in practice, avoid giving or receiving feedback, however, they realise the need for these feedback skills in carrying out their

jobs so that they will be able to perform well. The present study has effectively captured the need for these feedback skills to enhance aviation human factor performance.

The seventh category of human factors skills is *interacting with others*. The results of the present study, particulary the critical incident results, strongly suggest that the ability to interact with people outside the group is as important as the ability to interact with people outside the group. It has been widely acknowledged, in Indonesia especially, that the relationships between some groups of airline workers such as ground staff and other aviation workers such as Air Traffic Controllers or airport authorities are somewhat poor due to their lack of understanding or poor communication (Sasono & Mudigdo, 1996). These sorts of relationships can cause problems that affect the efficient operation of the airline. An ability to create better relationships between the groups should help to rebuild the existing relationships. Better relationships can be built when each profession is able to respect other teams, understands the work needs and the constraints of the other team, and understands the consequences of such poor relationships.

Communication skills is the eighth category of human factors skills found to be critical for the respondents. Communication is about the transfer of information. Having communication skills should be a great advantage for

people to enhance relationships and understanding, to reduce misunderstandings, and to increase efficiency of performance. Human factors programmes include communication skills as the central component (Driskell & Adams, 1992). Research suggests that over 70% of reports on aviation incidents contained evidence of communication error (Billings & Reynard, 1981). Thirty seven percent of the reported incidents related to the failure to initiate communication. Another common communication problem analysed by Billings and Reynard (1981) was inaccurate, incomplete, ambiguous, or unclear messages. Other communication problems reported included the failure to transmit the message at the appropriate time due to misunderstanding or equipment failure.

Cross-checking is the next category. This category supplements communication skills. Foushee and Manos (1981) in their review of the Aviation Safety Reporting System (ASRS) data base indicated that the lack of cross-checking was a factor in crew communication problems. People who frequently cross-check information or inquiries tend to make fewer errors (Driskell & Adams, 1992).

The last category to emerge is *understanding others' situations* and needs. This category represents an ability to understand the needs of other people and the constraints that others may face. Garuda's employee backgrounds -

educational, ethnicity, social economy are varied. In a culturally complex environment such as Garuda, an ability to understand other people's situation is important.

From the results discussed above, a corporate human factors training framework for the employees of PT. Garuda Indonesia can be established. The additional human factors skills suggested by the respondents may be included as they colour the training programme with a particular local dimension. These include: Treating all company employees with respect, managing stress, negotiation skills, problem solving, emotional self control, open management styles, customer service, thinking globally but acting locally, trusting others, and open minded.

Summary of Critical Incident

The purpose of utilising the critical incidents technique in the study was to provide more specific information about the human factors skill needs of different groups within the organisation. The content analysis procedure utilised in the study produced four critical incidents categories which were applicable to all four groups of participants rather than unique to each group.

Those incidents categories are *professionalism, leadership, coordination between teams,* and *ability to interpret or find published regulations and procedures.*

The professionalism and leadership categories supported the findings of *leadership* and *professionalism* as important human factor skills in the needs assessment. The ability to interpret and access published regulations and procedures is new. Hobbs and Williamson (1995) in their preliminary study suggest that procedures and procedure conflict are among factors that caused anomalies in the quality of aviation maintenance. Although the study did not draw any conclusions about the significance of these problems, and in this study it was not mentioned with great frequency, the emergence of the issue in both studies indicates a need for further investigation. It may be that this problem is more a human factor design, or management issue rather than a situation that can be trained for.

The coordination between teams was mentioned with great frequency. The prevalence of this problem in all four groups of respondents suggests that it is a significant issue. This problem had been hinted at the needs assessment in the component called *interacting with others*. Its true nature, however, only clearly emerged with the critical incident technique.

In the past, human factors training has been focused on understanding individual limitations and within team performance (see ICAO, 1989; Helmreich & Foushee, 1993; CHIME programme; TeAM Training). From the

literature, there is not any significant reference to the nature of interactions between teams. Chute and Weiner (1996) in their exploration of cabin-cockpit communication and coordination suggested that these two teams face a communication problem in their professional interaction. Their work, however, did not explore any further the nature of the interaction between the two teams. The results of the present study, however, strongly suggest that there is a missing third dimension of human factors training: understanding how teams interface, and the impacts of that interaction on performance. The researchers have called these meta-team skills.

The critical incident technique identified three components to these skills: coordination skills between teams that interface with each other; understanding the work needs and the constraints of the other teams; and understanding the consequences for other teams and the company as a whole of poor coordination and cooperation.

Coordination skills were found to have four characteristics: timeliness; appropriate format for the other teams; professional treatment; and the provision of any additional support.

The old saying "time is money" is not enough for an organisation like Garuda Indonesia whose business is service. Time can also mean safety, a positive

image, and customer satisfaction. "On-time" consciousness is very important in conducting an interaction with other teams. Ground staff who are not able to provide a flight document on time, for example, will potentially degrade the efficiency of the whole operation. From a trivial problem like this, other teams can be affected. The passengers get annoyed, increasing the stress and workload of cabin attendants in dealing with this annoyance; the cockpit crew may become frustrated if the flight is delayed and they miss their take-off time slot - further delaying the flight. In turn, this impacts on connections passengers have with other flights. In this way the effects can ripple through the whole company.

In conveying technical information for other team, it should be in appropriate format for the other team to understand and use in a professional manner. In a flight situation, for instance, a cabin attendant who happens to see debris, fire, and smoke coming from the right engine no. 3 should be able to inform cockpit crew with correct phraseology: right engine no. 3. This will help cockpit crew use the information effectively to guide their action rather than have to interpret the inappropriate message. In a difficult time, a team in its interaction with another team should be able to provide any additional support where it is possible.

From the coordination interface problems, three types of consequences emerged:

- Direct financial consequences

- Damage to the company's image as a professional and competent airline

- Increased workload and decreased effectiveness of the affected team, which in turn caused stress, frustration, and anger of the affected team. This all lead to lower moral and motivation.

The first type of consequences was, unfortunately, mentioned with great frequency. Flight delays, delay or cancel of purchasing, and high operating costs resulting from human factor problems are some examples mentioned by respondents.

The delays, the unprofessional attitudes caused by another team's unprofessional performance in turn damage the image of the airline. In the working place, people experienced a number of unpleasant situations as a result of a failure of meta-team skills. Workload was increased, working hours extended, all of which lead to anger, frustration and stress. It is only natural that these people, sooner or later, become de-motivated which lead to lower work effectiveness.

A clear implication of the findings is that human factors training is less effective if only received by one of the teams in the company. A corporate culture of human factors is a prerequisite of maximum human resource efficiency and effectiveness.

5.3 Limitations of the Study

The limitations include the selection of measures, the low response rate of critical incident technique, and the generalisability of the findings to other population.

The low response rate of the critical incident technique in this study (50 % of the overall responses) is possibly caused by respondents' dislike of essay type questions. Some respondents discussed this issue openly while they were completing the questionnaire. These people preferred responding to yes/no or multiple choice types rather than writing paragraphs. Some respondents stated that they would rather express their ideas verbally than in writing.

It is possible that respondents were not willing to respond because they were not sure of the confidentiality of their responses although the researchers assured them that the responses would remain confidential. Some respondents expressed their concern candidly by asking the researchers what would happen

if their responses could be identified. The low response rate was not a problem just for this present study. Other questionnaires distributed to employees at Garuda Indonesia traditionally have had a low response rate.

The use of the English language in the present study raises the questions of generalisability of the results to other members of the organisation. Despite the fact that English is the language used in almost all manuals, still this language is not widely spoken among employees. The use of *Bahasa Indonesia* in future research is encouraged in order to enhance generalisability of research results.

One other concern of this study is the use of a simplified and flattened form of the NEBEAT needs assessment model. This instrument was developed for a specific group of the population - employees of Garuda Indonesia. This raises a question of whether the instrument is applicable to be used for other populations.

The ability of the respondents to recall *critical* incidents may be a limitation because they are likely to recall the most "available" incident rather than the most critical or typical (Tversky & Kahneman, 1974). This warrants a cautious interpretation and generalisation from the findings due to the selective recall bias.

5.4 Areas for Future Research

A research agenda for further exploring human factors training of the organisation might focus on the impact of the training on performance, both individual and organisational performance. Such research would address the issues of retention and transfer of training.

Another interesting area is the issue of culture: Which issues of organisational culture, group subculture, and national culture should be included in the training design. If the organisational culture is changing where members of the organisation must learn a new pattern of behaviour in order for the organisation to survive, it might be necessary to examine the effects of this change on corporate human factors training needs.

The co-ordination between teams problem may indicate further research. It might be worthwhile to examine the background of the problem and its effects on the performance of the company.

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113

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Appendix A: Questionnaire

Section 1

Company Goals

A company goal is an objective that everyone (managers, staff, instructors, pilots, cabin attendants, flight dispatchers, and others) in the company works together to achieve.

What do you think the company goals should be? Please rate the importance of each of the goals below by *circling* a number. If there are any goals missing, please add them at the end and rate their importance.

0 - don't know	3 - important
1 - not important	4 - very important
2 -some importance	

1. To be the national flag carrier.	0 1 2 3 4
2. To serve the country. (Not just running a business to make money, but to provide bridges to all parts of the country/*turut membantu menjembatani kesatuan dan persatuan bangsa*).	0 1 2 3 4
3. To promote safety	0 1 2 3 4
4. To look after passengers so that they are safe and comfortable.	0 1 2 3 4
5. To look after the well being (*kesejahteraan*) of the company's employees.	0 1 2 3 4
6. To grow larger and stronger by expanding the fleet and up-grading the skills, knowledge and qualifications of the employees.	0 1 2 3 4
7. To have world class in-flight service.	0 1 2 3 4
8. To be highly efficient in air transportation.	0 1 2 3 4
9. To achieve quality in all aspects of the company's	0 1 2 3 4

activities. Top quality in the final service can only be achieved when all parts of the company (training, marketing, operations, managers and all other employees) also give top quality.

Please add any other goals that you think are important.

	0 1 2 3 4
	0 1 2 3 4

Section 2

Human Factors Skills

In order to be able to contribute to the successful achievement of the aspects of the company goals, all employees need skills and knowledge (in this case, non-technical skills and knowledge). The following is a list of human factors skills and knowledge that may help you do your job.

Please indicate the level of importance of the items by *circling* a number. If there are other items you believe to be included, but they are not in the list, please write your own and rate the importance.

0 - don't know	3 - important
1 - not important	4 - very important
2 -some importance	

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1. communicating (speaking)   0 1 2 3 4

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2. communicating (using body languages such as gestures,   0 1 2 3 4
   facial expression, and so on.)

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3. communicating in a way that is suitable to the culture of   0 1 2 3 4
   the person you are speaking to. For example, not speaking
   too directly to a person from Java or understanding why a
   person communicates in a certain way. For example, a
   person from Sumatra is more open and direct than one
   from Java.

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4. being able to decide whether a job should be done by the   0 1 2 3 4
   team or by yourself.

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5. being able to contribute ideas and opinions to the team, in   0 1 2 3 4
   a positive way. For example, giving the captain important
   safety information confidently.

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6. taking part in team activities. For example, taking active   0 1 2 3 4
   part in team discussions.

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7. listening by paying careful attention to what the other   0 1 2 3 4
   person is saying and encouraging him/her to express

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his/her ideas. For example, giving all of your attention to the person speaking instead of thinking about what you want to say next.

8. giving feedback without criticising. For example, telling people how they are performing in their job without offending them.   0 1 2 3 4

9. taking feedback without feeling being criticised. For example, being able to receive information about your performance in your job without feeling offended.   0 1 2 3 4

10. mediating, that is being able to place yourself between two other people who cannot communicate or have a disagreement and help them to solve their problems.   0 1 2 3 4

11. interacting with the public such as passengers.   0 1 2 3 4

12. interacting with other aviation workers such as ATC   0 1 2 3 4

13. interacting with other people in GARUDA such as crew members, dispatchers, ground staff.   0 1 2 3 4

14. being able to respect the roles of other team members, for example that of the Captain or an older crew member, but not allowing this respect to become a barrier to good communication.   0 1 2 3 4

15. responding to other crew members. For example, a cabin attendant asks the Captain for help with a drunk passenger and (s)he is told to "deal with it yourself".   0 1 2 3 4

16. having empathy with other team members. For example, being supportive to a crew member who is worried about a very sick child.   0 1 2 3 4

17. at any specific time, being aware of all the aspects of a situation for your own responsibilities. For example, for cockpit crew having situational awareness, for cabin crew remembering to tell passengers to fasten their seat belts and to lock their trays in place, for managers remembering all their duties such as giving staff feedback or remembering appointments.   0 1 2 3 4

18. being able to manage your workload.   0 1 2 3 4

19. monitoring the situation. For example, cockpit crew scanning or monitoring flight instruments, cabin crew monitoring passenger needs; managers monitoring   0 1 2 3 4

progress on a programme.

20.cross-checking by working with another person to double check that a job has been correctly conducted. For example, locking the aircraft door.	0 1 2 3 4
21.having awareness of any physical or psychological problems that affect your ability to do your job. For example, effects of hypoxia.	0 1 2 3 4
22.being able to recognise illusions, including visual or sound illusions. For example, sometimes what we think we see or hear is not the same as what our eyes see or our ears really hear.	0 1 2 3 4
23.being able to objectively evaluate a situation. For example, not judging a person's ability just on age or appearance.	0 1 2 3 4
24.being able to make good decisions or good judgements, by monitoring and collecting information, sharing it, analysing it, choosing what action to take, taking that action and monitoring the action.	0 1 2 3 4
25.being able to find a satisfactory solution whenever team members disagree about what action to take on a work situation. For example, for cabin crew, a passenger is sick and two attendants disagree on who should clean it up; for cockpit crew, in some bad weather conditions, the Captain and first officer may disagree on whether to go around or attempt to land.	0 1 2 3 4
26.being able to work in coordination with other team members for better efficiency.	0 1 2 3 4
27.being a good leader	0 1 2 3 4
28.being a good follower by supporting and helping your leader to be a good leader.	0 1 2 3 4
29.helping to build a team by motivating team members.	0 1 2 3 4
30.helping to build a team by planning and coordinating crew activities, delegating responsibilities and duties and supervising crew members.	0 1 2 3 4
31.being sensitive to different cultural values.	0 1 2 3 4
32.being able to change your behaviour when your role changes. For example, if you are a Captain and have to	0 1 2 3 4

become a student.

33.having a professional attitude to work.	0 1 2 3 4
34.sharing responsibility for the success of the team.	0 1 2 3 4
35.being competent at your job.	0 1 2 3 4
36.cooperating with other team members	0 1 2 3 4
37.managing a crisis	0 1 2 3 4
38.helping other crew members to develop new skills.	0 1 2 3 4
39.being a moral team member	0 1 2 3 4
40.understanding that people have different attitudes and approaches to the way they work. For example, some people prefer to work in quiet, while others do not mind noise.	0 1 2 3 4

Please write any other skills that you believe should be included below, and rate their importance.

41.	0 1 2 3 4
42.	0 1 2 3 4
43.	0 1 2 3 4
44.	0 1 2 3 4
45.	0 1 2 3 4

Section 3

Work Problems

We would like you to concentrate on a specific problem that happened in your workplace. The problem you faced was so critical or important that you needed an effort to solve it. Please respond accordingly to the following questions. There is no right or wrong answer.

| Phase of flight

*Please **circle** the phase of flight in which the problem happened.*

(For managers, the problem might happen during office hours)	1. Pre-flight briefing 2. Boarding 3. Preparation for take-off 4. Take-off 5. In-flight 6. Landing 7. Disembarking 8. Other - please state when it happened _____
Workload

*Please **circle** how heavy your workload was at the time of the problem.* | 1. Light
2. Average
3. Heavy |
| **Start of the problem** | 1. What job were you doing? (For example, serving food)

_____

2. Who was involved? (For example, passengers, your colleagues, or government officers.)

_____

3. What happened to cause the problem? (For example, passengers coming from a connecting flight are late causing your flight to be delayed. This makes passengers and crew very angry and frustrated.)

_____
_____
_____
_____
_____ |

While the problem was happening. *Describe what happened. You may use* Bahasa Indonesia *if you wish.* *If you need more space please write on the back of this page.*	_____ _____ _____ _____ _____ _____ _____ _____

After the problem was over.	1. Were there any consequences from this problem? Please describe them. (For example, a passenger had to go to hospital, or your flight was delayed so some passengers missed their connecting flight when you arrived at the destination.).
	
	_____
	_____
	_____
	
	2. Please circle all of the words that describe how you felt **after the problem was over** (you may circle more than 1)
	    ■ upset
	    ■ disappointed
	    ■ confused
	    ■ frustrated
	    ■ relieved
	    ■ satisfied
	    ■ happy
	    ■ angry
	    ■ glad
	    ■ useless
	    ■ helpless
	    ■ pleased
	    ■ content
	
	3. Do you feel you had all of the human factors training necessary to deal with the problem? Circle the answer.
	    a. more than enough training
	    b. just enough training
	    c. not enough training

4. What extra human factors training would have helped you? Please **circle** the answer (you may circle more than 1).
   a. communication skills
   b. workload management
   c. situation awareness
   d. decision making
   e. problem solving
   f. interpersonal relationships
   g. human limitations
   h. team work
   i. other - please write any other training not listed above

   _____

   _____

   _____

Section 4

Biographical Data

Now, we would like some general background information about you. Circle the answer which is best for you, or give details in the spaces provided.

For office use only

How old are you?

☐

a. 20-29 years
b. 30-39 years
c. 40-49 years
d. 50-59 years
e. 60 years and over

What gender are you?

☐

a. Female
b. Male

What is your highest academic qualification?

☐

a. Highschool
b. Undergraduate University Diploma (DII, DIII)
c. Bachelor Degree (SI)
d. Post Graduate Diploma
e. Post Graduate Degree (S2, S3)
f. Other _____

State actual qualification(s) _____

☐

How long have you been employed in Garuda Indonesia?

☐

a. less than 1 year
b. 2-4 years
c. 5-9 years
d. 10-14 years
e. 15-19 years
f. 20-24 years
g. over 25 years

How long have you been employed in your division? □

a. less than 1 year
b. 2-4 years
c. 5-9 years
d. 10-14 years
e. 15-19 years
f. 20-24 years
g. over 25 years

What is your current position of employment? □

a. Flight crew
b. Cabin Attendant
c. Cargo Staff
d. Mechanic
e. Reservation staff
f. Other _____

How long have you been employed in your current position? □

a. less than 1 year
b. 2-4 years
c. 5-9 years
d. over 10 years

What is your status? □ □ □

a. Line crew
b. Instructor
c. Check Airman
d. Management

What human factors training (s) have you ever participated in? □

a. CHIME
b. CRM (Crew Resource Management) conducted by other airlines
(which airline? specify _____)
c. Service Excellence
d. Other _____
e. None

Do you think there will be any benefits or advantages if the following human factors trainings have refresher or recurrent programme? *Circle* **all skills you believe need to be recurrent (you may have more than 1 answers).**

    a. communication skills
    b. workload management
    c. situation awareness
    d. decision making
    e. problem solving
    f. interpersonal relationships
    g. human limitations
    h. team work
       other - please write any other training not listed above

         _____

         _____

         _____

         _____

Thank you for taking the time to complete the questionnaire. Your participation is appreciated.

APPENDIX B: INFORMATION SHEET

MASSEY UNIVERSITY

HUMAN ETHICS COMMITTEE

Human Factors Training Needs Assessment

Information Sheet

Dr. Lynn M. Hunt (Supervisor) and Dwinarni W. Astuti, from the School of Aviation, Massey University, are conducting research on the identification of human factors training needs of employees of PT. Garuda Indonesia. You are welcome to contact the researchers at any time if you have any queries about the research at:

Fax No: 64-6-3403200
Phone No: 3503212 (Dr. Lynn M. Hunt)
           3503225 (Dwinarni)

What is the study about?

The present study will assess the human factors training needs among Garuda employees across departments.

The study is a requirement for partial fulfilment of the postgraduate degree of Master of Aviation at Massey University, School of Aviation.

What will you be asked to do?

You will be asked to complete a questionnaire that will be used to identify the human factors training needs of employees of PT. Garuda Indonesia.

Your rights as a participant

All participants:

- have the right to contact the researchers at any time during the research to discuss any aspects of the study.

- have the right to refuse to answer any questions, or withdraw from the study at any time.

- provide information in the understanding that it is completely in confidence to the researchers, to be used only for the purposes of the research. it will not be possible to identify individuals in any reports of the results.

- have the right to receive information about the results of the study on its completion.
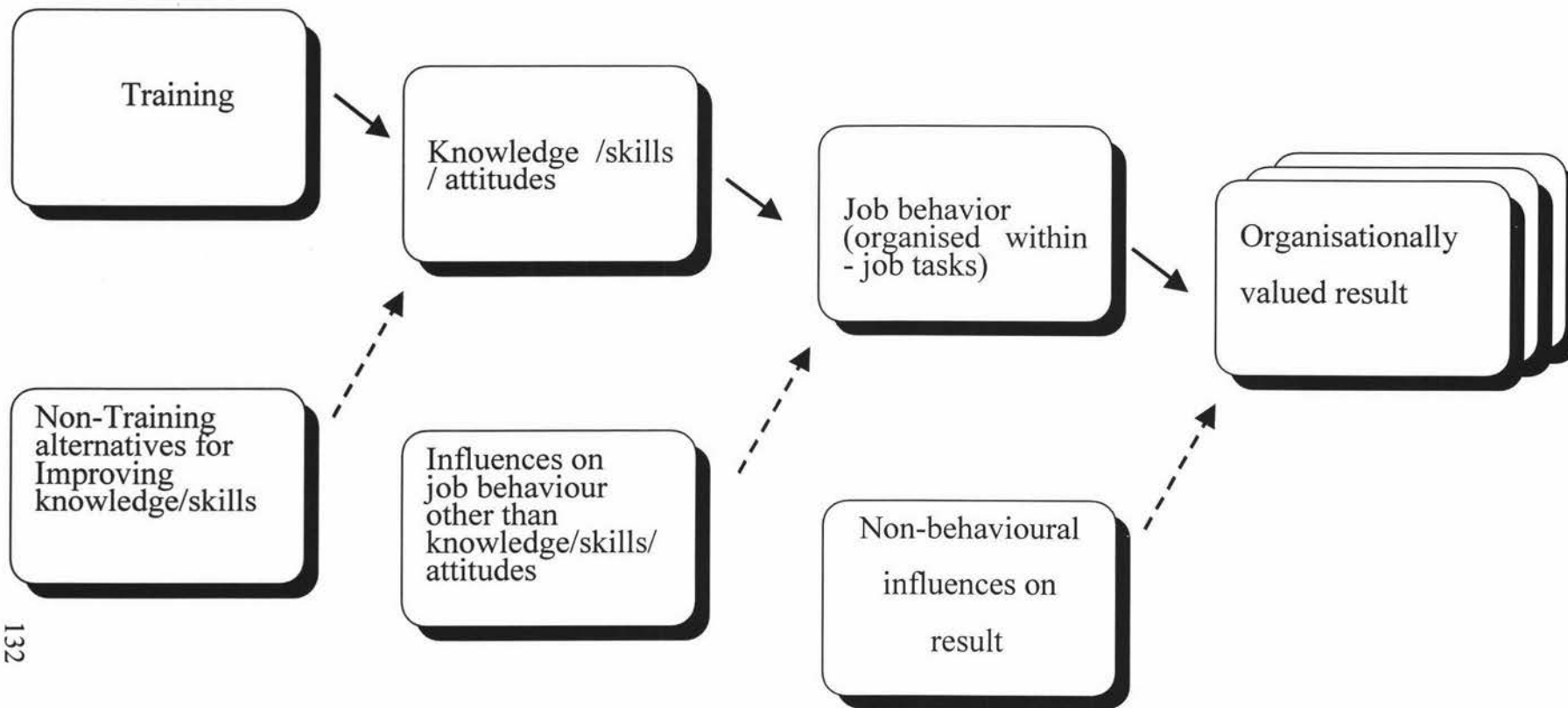
Linkages Between Training and Organisationally-Valued Results