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Forestry Solutions

A SELECTION PROCEDURE FOR OPERATORS OF THE WARATAH 234 HARVESTING MACHINE

Project Report 91
2000

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PROJECT REPORT

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EXECUTIVE SUMMARY

The need for improved approaches to mechanised harvester operator selection has been well documented in New Zealand (Byers 1995, Kirk, Byers, Parker & Sullman 1997, Cummins 1998, Smith & O'Rorke 1999 and Drummond 1999), and overseas (Cottell, Barth, Nelson, McMorland and Scott 1976, Wilson 1978 and Garland 1986). The large cost associated with modern harvesting equipment, the loss of productivity that occurs from unskilled operation and the increasingly complex nature of the job means that the most skilled operators need to be identified from the outset.

This report describes research that has been done on the selection of operators for the mechanised harvesting task. The objective of the research was to develop a procedure for the selection of operators with the necessary aptitudes to become successful harvester operators. A brief introduction to the concept of personnel selection and the benefits that are associated with conducting the process in ways recommended by research in the area are outlined. These include; increased and improved productivity, decreased turnover and absenteeism, decreased accident rates, decreased machine and equipment damage and increased levels of team cohesion. An example of a utility analysis procedure is also presented which indicates that significant performance improvements can be expected if the improvements to operator selection are implemented.

The first stage in the process of developing a selection procedure for a position, is to conduct a job analysis. This has been done for the mechanised harvesting task (Smith & O'Rorke 1999b). A summary of the job analysis findings is presented and a review of the possible alternative selection methods that could have been chosen is outlined.

Based on the job analysis findings and the research literature in the area of personnel selection, six methods were initially chosen for the harvesting task. These included a structured employment interview, a personality test, a general mental ability test, a technical test battery which included a spatial reasoning test and a mechanical reasoning test and an application form. Best practice guidelines are also provided on how to conduct a work sample test and the reference checking process. A copy of

both the structured employment interview and the application form are included in the appendix as well as a performance assessment form designed to assess the performance of mechanised harvester operators.

A face validity study was conducted to assess the perceived relevance of the psychometric testing methods by people in the forestry industry. Results indicate that all of the testing methods, except the spatial reasoning test will be viewed positively by industry people, if they are included in the selection procedure for the mechanised harvesting task. Preliminary findings from the concurrent validation studies are also presented. More data will need to be collected over the next year to further assess the effectiveness of the methodologies, but initial results are encouraging. More specifically, the nine operators included in the study were able to perform relatively well on the mechanical reasoning test indicating that the test is pitched at a reasonable level for industry purposes. The possibility of establishing a benchmark level of performance on the test is discussed. From the personality test results obtained from the study, an ideal operator profile was developed. In future, this profile may provide a useful source of reference against which prospective operators can be compared. However, the validity of the profile does need to be further assessed.

A range of possible barriers to the implementation of the recommended methods within the forestry industry are discussed. These include; a small recruitment base, industry held beliefs about the effectiveness of the methods, the time and cost associated with the methods, a lack of knowledge and awareness of the methods, a reluctance to adjust the current selection processes that are used and a lack of management support of the methods. The need for industry personnel to take a more critical approach to performance assessment is also discussed as is the need for commitment from industry personnel, to the development of industry test norms. Until these factors are addressed the benefits associated with improved approaches to operator selection can not be fully realised.

The next stage of the research will involve the continued assessment of the validity of the recommended methods. This will require the collection of more data on the psychometric testing methods. The usefulness of the structured employment interview will also be examined. An alternative source of performance information to the one

used in the current study will also need to be identified and utilised.

INTRODUCTION

The forestry industry in New Zealand is at a critical point in its development. Drummond (1999) has asserted that if mechanisation and processing levels were to remain constant, New Zealand would have to increase its forestry workforce from 2500 to 16500 by the year 2010. Similar claims have been made by Rooney (1998), who has also asserted that as much as 10+ billion dollars is invested in forestry in this country.

Unfortunately, investments in the most important assets that this industry has- its workers, is far less impressive. A general lack of awareness has been demonstrated when it comes to managing the forestry worker. Human resource initiatives such as training, selection and performance assessment have been largely ignored by the forestry industry in general. No other business sector would risk such a large capital investment into the hands of unskilled employees. Drummond (1999) goes onto argue that the selection of employees is one of the top five major issues facing the forestry industry today. As such, the recommendations associated with the area of employee selection can no longer be ignored.

It has been demonstrated on a number of occasions that the quality of the machine operator can have a significant influence on the quality and speed of processing. Evanson and McConchie (1992) have observed a 23% difference in speed in a mechanised thinning operation between a more skilled operator and a less skilled operator with trees that are well formed, and a 27% difference in speed with poorly formed trees. Johansson (1990) has also argued that the most important factor to take into consideration when assessing production is the quality of the machine operator. He has suggested that differences of as much as 50% between operators are not uncommon. These figures demonstrate the importance of identifying skilled operators from the outset.

Before a standardised approach to employee selection can be developed, the requirements of the position in question need to be established. This is done through

the application of structured job analysis techniques. Once the exact qualities of successful harvester operators have been established, a selection procedure can be designed in which operators holding the characteristics required to be successful can be identified. The job analysis for the mechanised harvesting task has recently been completed (Smith & O'Rorke 1999).

Introduction to employee selection

There are a number of ways that an organisation could attempt to improve the performance of their workers. They could follow an ergonomic approach in which the work environment is adjusted to facilitate the workers opportunity to perform their tasks well. Another way is to implement employee training. This is where present employees are taught information that is likely to enhance their performance on the job tasks. Another way to improve organisational performance is to endeavour to select from the outset those individuals who are more suited to the job in question and as such are most likely to become successful workers.

Personnel selection is the process in which those people who have the attributes needed to do a job successfully are matched with the job requirements. Selection is an area of major importance in industrial and organisational psychology, human resource management, commerce and business. The modern era of selection began in the 1930s when a relationship was found between performance in testing situations and subsequent job performance (Munsterberg 1913). The practice progressed and developed through both of the world wars and now plays a very important role in maximising the efficiency of industry and organisations.

Two central philosophies lie at the foundation of employee selection. The first is that individuals differ in their abilities, personalities, knowledge and skills. The second is that different jobs require certain qualities of the individuals who are going to perform them. It follows therefore, that some individuals are going to be more capable of, or more likely to perform a job better, or more successfully than others. This being the case, it would be a very worthwhile process if we were able to identify, distinguish or select those individuals who are more likely to succeed or perform to a higher level

from those who are less likely to do so. Such is the purpose of an employee selection procedure.

There are in fact very good ways to select workers and very poor ways to select workers. At the most basic level, a well designed selection process should help us to distinguish between those people who will be successful in the position in question from those who will not be. There are a number of benefits that are associated with conducting the selection process in a good way. A good quality employee selection process can produce the following desired effects:

- Increased productivity / output levels.
- Increased quality of output.
- Improved job satisfaction.
- Decreased absenteeism, turnover.
- Decreased accident rates.
- Decreased machine and equipment damage.
- Higher levels of team cohesion.
- Increased fairness in the selection process.
- Individual biases are minimised.
- Helps to identify the strengths and weaknesses of individual workers.

Utility analysis

In addition to this, very large financial benefits have been found to be directly associated with improving employee selection (Raju & Burke 1986). The productivity and eventual financial benefits that can be expected from a quality selection procedure can be assessed through a process known as utility analysis. The following model is often applied to estimate the gains that can be expected from the introduction of an appropriate method. The actual figures used in the example are speculative.

S = The average level of performance of people selected on the basis of an appropriate selection procedure.

U = The average level of performance of people selected in some other manner.

Example

A Rotorua based company needs to recruit and select 10 machine operators from a possible 50 applicants. Because the company wants to maximise productivity, the key measure to determine job performance is monthly productivity level. Prior to selecting the successful 10 staff, all applicants are assessed through a range of cognitive ability tests.

A sample of 10 candidates are selected at random and labelled Group U. From the remaining 50 applicants, the 10 top performers on the cognitive tests are selected and labelled Group S.

- Group S monthly productivity figures average: $4000
- Group U monthly productivity figures average: $3000

The productivity gain in using the cognitive tests can be expressed in terms of the

proportional improvement: (S-U) over the existing method (U);

Productivity gain = S-U / U = \$4000-\$3000 / \$3000 =1/3
= 33%

This gain can also be expressed in dollar terms. Over a 12 month period of time, the expected financial gain would be:

Using traditional method: 10 x \$3000 x 12 months = \$360,000

Using the testing method: 10 x \$4000 x 12 months = \$480,000

Deduct the cost of testing: 10 x \$30 = \$300

Increased productivity: = \$119,700

Although the above example is incomplete in terms of the technical steps required in gaining the information required for the utility analysis process, it provides a useful example of the type of financial gains that can be obtained from implementing an appropriate selection method. In relation to the mechanised harvesting position, significant reductions in costs could also be expected from decreased machine damage, increased production quality and quantity, and improved team or crew cohesion.

Validity and reliability

There are two very important concepts that cannot be overlooked when discussing employee selection. These are the concepts of validity and reliability.

Validity

The validity of an assessment refers to what the assessment measures and how well it does so (Anastasi 1968). Basically, all measures of validity are concerned with the relationship between performance on the assessment and performance on the job or some aspect of the job. There are however a number of different types of validity, each of which are important.

Content validity

Content validity refers to how well the assessment exercises relate to the behaviours that are under investigation. If for example, a position involves dealing with a lot of mathematical equations and numbers, the assessment should attempt to assess this ability. A numerical reasoning test for example would be more useful then a spatial reasoning test.

Criterion related validity

Criterion related validity relates to how well the assessment predicts an individual's behaviour in a specific situation. There are two ways that this can be assessed. The first is referred to as predictive validity. The assessment is usually conducted and then after some specified time interval, a measure is taken of the behaviour for which the assessment was supposed to predict. The relationship between the assessment scores and the criterion scores is calculated. The other way criterion related validity can be assessed is with concurrent validity. Here the assessment is conducted at the same time as the performance assessment information is obtained. Again, the relationship between the assessment scores and the criterion scores is calculated.

Face validity

This refers to how relevant the assessment appears to be to those that are being assessed, i.e. the job applicants. Although not really important from a technical perspective, the face validity of an assessment is important for how the assessment process is perceived and received.

Reliability

Reliability refers to how consistent the applicants assessment score is over time and on different occasions. An assessment is reliable if the same individual gets similar scores on the same assessment under different conditions. That is why standardisation during the selection process is vitally important. Standardisation reduces the chance of external factors influencing the performance on the task, and helps to ensure that the only factor that can account for the differences is the applicant's ability. Not extraneous factors such as the timing, the assessor, the instructions provided or the environment in which the assessment has taken place.

FLOW CHART OF STEPS INVOLVED IN THE DEVELOPMENT OF A SELECTION PROCEDURE

A successful selection procedure depends on the following four things (Holdsworth 1972).

1. A correct definition of the job requirements.
2. A sufficient supply of job applicants.
3. An accurate assessment of candidates abilities.
4. The efficient matching of attributes and job requirements.

Steps 1, 2, and 4 will be met in the current selection project. Step 2 is more problematic, and may in fact be subject to some of the larger issues that are facing the forestry industry today. This will however be addressed during the discussion.

There are a number of steps or stages that any well designed selection program needs to progress through (see Figure 1). The usefulness of the selection procedure is very much dependent on how well each step in the procedure is carried out.

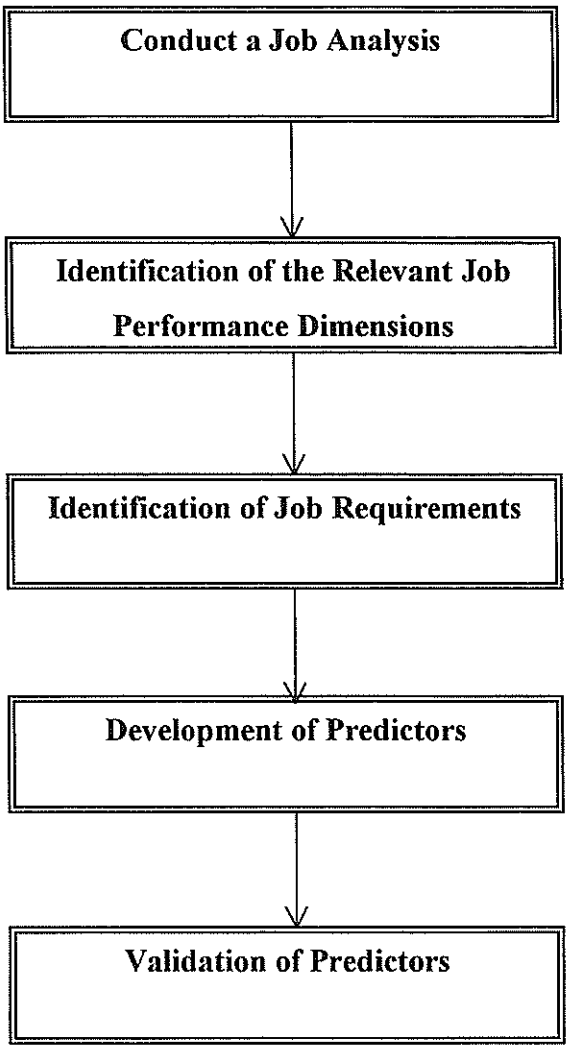


Figure 1- Steps involved in the development of a selection procedure

Conduct a job analysis

Before we can start to identify who will and who will not make a successful worker, we first need to understand what the job involves. To do this we need to conduct a job analysis in which the aptitudes characteristic of successful workers are identified. Through the analysis we identify the criteria or standards that need to be met and which can be assessed during the selection procedure. The job analysis of the harvesting task has already been conducted (Smith & O'Rorke 1999) and a summary of the results as they relate to this selection procedure, are included in this report.

Identification of the relevant job performance dimensions

From the information obtained from the job analysis, we need to identify the criteria of job success. In other words, we need to establish what constitutes successful performance. This too has already been done, and four relevant job performance dimensions were identified for the mechanised harvesting task.

Identification of the job requirements

The exact competencies required of successful job applicants then need to be identified. These are the characteristics that are expected to produce high performance on the relevant job performance dimensions. These job requirements have already been identified and are referred to as 'core competencies' in the job analysis report. Eight were identified for the mechanised harvesting task.

Development of predictors

The selection devices that are appropriate for the collecting of information from job applicants need to be identified and/or developed. There are a number of devices available to be used. A description of the more useful and common methodologies will be presented at a later stage in the report.

Validation of the selection procedure

The purpose of the validation procedure is to assess whether or not the information obtained from the predictors is related in any meaningful way to the subsequent job performance. Statistical data analysis of the correlation between predictor scores and job performance is conducted. This is a very important stage in the process because it helps us to evaluate whether or not the procedure is useful. If it is not, we then choose another predictor(s).

We also have to determine the utility of the predictors. This is how useful it will be in improving the workforce. Schmidt and Hunter (1998) have argued that the utility or value of any given selection procedure is influenced by the variability of employee performance and the selection ratio. If everybody that comes into the job performs to exactly the same level and there is no variability in employee performance then the value of a selection process will be zero. If the job is very easy, and everybody performs to the same level then there is no need to identify who is most likely to perform the best, because no such performance exists. If on the other hand, there is a large degree of variability in employee performance, then the value of a procedure would be very high. Similarly, if an organisation has to hire every person that applies (such is the case when there are very few job applicants) then again, the value of the selection process will be very small because the organisation does not have the liberty to be highly selective. As has already been discussed, the mechanised harvesting task is a job that has a potentially very large degree of performance variation associated with it (Johansson 1990, Evanson & McConchie 1992) so the potential utility from this perspective will be very high. There may however be some issues associated with the selection ratio within the forestry context and this will be discussed at a later stage in the report.

Review of the job analysis

The job analysis of the mechanised harvesting task was conducted in four ways. The methodology combined four thorough observation sessions and a review of materials relating to the position. The Position Analysis Questionnaire (McCormick, Jeanneret & Mecham 1972) and a more generalised job analysis interview provided the main sources of job related information. Eleven operators were involved in the interviewing phase of the analysis.

Review of the relevant job performance dimensions

Four key result areas were identified in the task. These were: producing the required amount of logs to the specified standards, fixing and maintaining the machine, inputting into crew functions and maintaining the safety of self and others. These key areas and the key tasks that are associated with them are presented in the following table.

Key Result Area	Key Tasks
Produce Required Amount of Logs to Specified Standards	• Plan processing location for most efficient operation • Ensure measuring devices are functional and reading accurately • Ensure piece size is within the machine's capacity • Input cutting specification into controller • Carry out pre-start visual inspection • Follow recognised start up and shut down procedures • Test all controls prior to operation • Ensure machine is positioned on stable, level ground (where applicable) • Exercise caution when extracting log from stockpile • Operate harvester using correct combination of control activations • Be aware of any tailswing of boom and /or logs • Avoid stem damage from too much knife or grapple pressure • Place oversized / out of spec trees to one side • Identify defects • Drive / manoeuvre machine base • Maintain steady, even rate of processing • Perform consistently in a methodical, efficient and safe manner. • Interact with other crew members
Fix and Maintain Machine	• Detect mechanical and hydraulic problems before they become too serious • Identify cause of problems and rectify • Perform regular maintenance activities such as oiling and lubricating • Know when to contact mechanic • Secure or replace loose screws, bolts and/or nuts • Regularly inspect oil and water levels • Regularly inspect structural components for stress fractures • Remove all debris from around hot components

	• Keep cab clear of all debris and loose equipment • Use correct tools to perform maintenance tasks • Keep all tools and ancillary equipment secure and safe • Perform regular inspections of hydraulic hoses • Keep all electrical components protected from moisture • Maintain sharpness of delimbing knives and cutting attachments • Make sure all electronic length measuring devices have clean lenses and unobstructed vision of logs
Input Into Crew Functions	• Maintain speed and efficiency for other crew members • Understand specified signals • Respond to all signals given • Be aware of other crew members • Ensure other workers are conscious of machine, boom and log movements • Issue clear, positive instructions where necessary
Maintain Safety of Self and Others	• Wear and maintain all personal safety equipment and protective clothing • Ensure that all machine safety features are functional • Ensure that all steps, grab handles, screens and guards are in place and functional • Test the emergency stop mechanism on a regular basis • Clean up any fuel or lubricant spillage • Recognise hazardous working situations and take appropriate defensive actions • Work within the machines capabilities • Consider the safety of others near the machine • Anticipate the movement of flying branches and/or debris • Check that the fire extinguisher has been serviced and is suited to the machine • Enter and leave the machine in the correct manner • Complete hazard identifications if required • Be aware of own mental and physical limitations • Maintain vigilance at all times

Table 1- Key result areas and key tasks associated with the mechanised harvesting position. Tasks taken from LFITB (1994).

Review of the job requirements

Eight core competencies were identified for the mechanised harvesting task which distinguish between successful / unsuccessful machine operators. A brief description of each of these is provided below.

Competency 1 – Log making ability

The primary function of the harvesting machine is to fell and de-limb trees and cut them into specified lengths or log make. This is the overall purpose of the position and constitutes the major responsibility of the task. Encapsulated within this competency are two major divisions of responsibility. These are production total and production quality. The speed and quality of output are two factors that often counter-act one another. A fine balance between the two factors is required. To ensure quality log making, harvester operators need to be able to identify a variety of stem features and defects. Previous experience with manual logmaking on the skid is often an invaluable experience for machine operators to have.

Competency 2 – Mechanical ability

It is imperative that harvester operators be mechanically minded or posses highly competent mechanical abilities. Two separate features of the position combine to emphasise the importance of this competency. These are the need to maintain the machine for general everyday functioning, and the need to conduct mechanical repairs in the event of inevitable breakdowns or machine problems.

The operators included in the analysis indicated that general maintenance responsibilities in the form of greasing, oiling, sharpening blades, and general mechanical activities are an integral part of the position requiring anywhere from between 30 minutes to an hour a day. Generally the more competent mechanically an operator is the better.

The quality of the machine operator can have a direct effect on the amount and severity of the mechanical problems that occur. Quality operators are defined as those

who produce the required amount of in specification logs and who know how to look after their machines. Poor quality operators are those who rush their work and push the machine beyond it's limits. Operators also need to have a good understanding of hydraulics.

Competency 3 – Computer knowledge

All of the operators included in the analysis utilised the Waratah group of harvesting machines. The Waratah contains a computer-based interface and as such leads to the importance of the present competency. Operators asserted that it is desirable or useful to have had some previous experience with computers due to the increasing reliance on computers in forestry machines. Operators with less experience with computers and more advanced technologies are likely to be less confident and take longer to familiarise themselves with the task (Henderson, Smith & Henderson 1992).

Competency 4 – Positioning machine and logs

It is also important that operators adequately position themselves and the machine within the working environment. Poor positioning will lead to reach and space problems, balance problems and will ultimately negatively impact on production levels and production quality.

Competency 5 – Drive machine base

In order to fulfil the requirements of dimension four and the task in general, operators need to be able to drive the base of the harvesting machine. The majority of harvester heads are fitted to excavator bases (Cummins 1998). As such they need to be competent at re-positioning and moving the machine to predetermined locations.

Competency 6 – Awareness of safety

It is imperative that harvester operators be fully aware of the issues surrounding the safety of themselves and those working around them. This involves having knowledge of and complying to standard operating procedures, hazard identification processes,

Occupational Safety and Health guidelines and being vigilant and alert to what is occurring in the work environment at all times. In addition to this operators need to be conscious of the limitations of themselves and the machine.

Competency 7 – Personality characteristics

The operators involved in the analysis identified a number of personality based features that they believed are important for an operator to possess. These included being easy going, reliable, attentive to detail and determined to accomplish the goals set for the day. In addition to this it is important that harvester operators possess the following:

- Initiative

Can work without supervision.
Is a self-starter, can accurately diagnose problems and solve them.

- Flexibility

Demonstrates an openness to new tasks, techniques and technologies.
Can adapt to change in work schedules and deadlines.

- Pressure/Stress Tolerance

Ability to handle stressful situations and displays composure over own feelings.
Can maintain good working relationships during stressful periods.

Competency 8 – Participate as part of a team

Mechanised harvesters are a central component of any contracted work group. In many situations they are the hub of the entire harvesting process and if they are not working to a high standard then the entire crew is frustrated. As such, it is important that Waratah operators be able to work as part of a team.

- Team Work and Co-operation

-Keeps others informed of actions and works inside parameters.

-Works well with others sharing accountabilities and outputs.
-Participates and contributes constructively to the operation of the group.

Based on this information we are now able to build up a picture of the ideal mechanised harvester operator. This picture provides us with the characteristics of successful operators and allow us to develop a set of criteria against which we can compare individuals against.

The ideal mechanised harvester operator

Based on the job analysis information a profile of the ideal harvester operator can be developed. This person will have excellent log making ability. This will be exhibited in both the speed of processing and the quality of processing. Previous logmaking experience in the form of manual logmaking experience of between one and three years is ideal. They will be able to identify a range of log defects and be able to quickly and accurately assess the optimal solution to the log making problem. In addition to this, they will possess highly competent mechanical abilities. Previous experience with operating machinery is desirable. They will be able to maintain the machine for everyday functioning and will also need to remedy mechanical and even hydraulic problems when and where they arise. Previous familiarity with computers is also a desirable trait for operators to possess.

In addition to these things, the operator will have to be competent at both driving an excavator base and know how to position themselves and the machine adequately within the working environment to ensure no balance, reach or space problems are encountered. Operators will also need to have a thorough awareness of the issues surrounding the safety of themselves and those working around them. This will involve knowing and complying with standard operating procedures and legal regulations. They should also be well aware of their own limitations and the limitations of the machine.

Operators will ideally possess a number of specific personality characteristics

including being able to take the initiative, exhibit flexibility and an ability to tolerate stressful and highly pressured situations. They will also be highly reliable and able to work independently while at the same time be a team player who works well with others and participates constructively to the operation of the group.

Where to now?

The question that we need to ask now is, 'what selection methods are most likely to provide us with the information that we want?'. We need to keep in mind the unique nature of the harvesting task and the restrains that are imposed by the context of the job. The methods that are chosen need to take into account the time frame that is available for their administration, and the nature of the people who will eventually be administering and making use of the methods.

DEVELOPMENT OF PREDICTORS

There are a wide variety of selection methods that are available for the selection of personnel. Some of these methods are more useful then others. The following section outlines some of the more common methods that can be used during the selection process.

The employment interview

Research conducted in New Zealand has consistently found that the selection interview is the most commonly used selection method (Harris 1991, Mills 1991, Taylor, Mills and O'Driscoll 1993, Keelty 1998, O'Rorke 2000). A straight forward definition of the interview refers to the face to face interaction between the employer and the job applicant (Landy 1989). There are a number of benefits associated with the interview that may explain its popularity. These include the opportunity for the organisation to sell itself to the applicant, an opportunity for the organisation to assess

the appropriateness of the applicant in more detail, its ease and its high face validity.

Not all interviews are created equal however, and some interview types are more useful then others. A number of early reviews of interview research have criticised the process as being unreliable and largely invalid (Arvey and Campion 1982). This may be due to the number of factors that can influence the decision making process during the interview. Schmitt (1976) suggests that rating errors, interviewer/interviewee primacy-recency effects, contrast, halo effects, interview design and non verbal behaviour can all influence the process. The interview cannot therefore be presumed to be a valid procedure unless it is conducted properly.

There are a number of ways in which the interview process can be improved. Campion, Palmer and Campion (1997) suggests that structuring the interview, basing questions on formal job analyses, training interviewers, taking detailed notes and using rating scales all improve the process. Situational and behavioural interview types where the applicants actual behaviour in situations is explored are also good. Recent research suggests that the structured selection interview can indeed be very useful if conducted properly. A recent meta-analysis of 85 years of selection research conducted by Schmidt and Hunter (1998) reported a validity coefficient of 0.51 for structured interview types and 0.38 for unstructured types.

Application forms

When applying for a position, applicants are usually required to complete an application form or application blank. This method is also extensively used in this country (Harris 1991, Mills 1991, Taylor, Mills and O'Driscoll 1993, Keelty 1998, O'Rorke 2000). An application form usually consists of a series of questions designed to provide information on the general suitability of applicants to jobs for which they are applying. These questions refer to demographic characteristics such as age, gender, and marital status, health, criminal convictions and also previous job experience, training and education. Smith and George (1987) suggest that an application form can play three major roles in the selection process.

- It acts as a screening device providing information to determine whether applicants meet minimum hiring requirements.

- It can provide a biographical picture that can supplement the interview.

- It can also be used for the prediction of performance.

Again, not all application forms are created equal. If done properly, research suggests that they can be very useful to include in the selection process (Hunter & Hunter 1984). Careful consideration should be given to the construction of the application blank. Before questions are included, they should be assessed with the following questions:

- Does it help to decide if the applicant is qualified?

- Is the question based on formal job analyses?

- Is it related to job success?

- Will the information be used? How?

- Can the information be obtained in another part of the process?

Reference checks

Again, reference checking is a very widely used method (Harris 1991, Mills 1991, Taylor, Mills and O'Driscoll 1993, Keelty 1998, O'Rorke 2000). This method involves an employer collecting information about prospective job applicants from people who have had contact with the applicants. Reference checking can be used for the following reasons:

- To verify the information that is given by job applicants.

- To predict job success.

- To uncover other information that may not have come through in other methods e.g. criminal record.

Information is usually sought on the applicant's work and education history and performance, appraisal of personality and character, and information on the likelihood of job success. Information can be obtained through a mail out questionnaire, in-person interview or telephone or e-mail interview.

Reference checking and testimonials have traditionally had a bad reputation in selection research. Pajo and Smith (1994) have suggested that this is because they can be prone to leniency, restriction of range, and low reliability. Again not all reference checks are created equal. Recent work has focussed on structuring the reference checking process. Structured types are conducted in a manner similar to a structured interview. This enhances the usefulness and chance of obtaining job related information and reduces the probability of getting irrelevant, trait based judgements from referees. Schmidt and Hunter (1998) report only 0.26 while Pajo and Smith (1994) report a validity coefficient as high as 0.46 for structured types of reference checks.

Assessment centres

The Task Force on Assessment Centre standards (1980) provided the following characteristics which define an assessment centre:

- Standardised evaluation with multiple methods.

- Multiple assessors are used.

- Judgements about behaviour are made on the basis of simulation exercises.

- Assessors combine ratings to produce a score for applicants.

Assessment centres combine a variety of different methods or exercises and applicants are assessed on aspects important to the job. A number of assessors are used and the process usually takes between one and three days to complete. Many of the exercises assess communication and interpersonal skills. Performance tests are also used which are types of simulations such as an in basket exercise and the leaderless group discussion. The method is unique in that it is group based, time consuming, uses a variety of methods and a variety of unique methods (Landy 1989).

A number of factors can influence the usefulness of the assessment centre. These include the characteristics of the assessors/assesses such as gender, age, and experience. The devices used and generally how well the centre is designed also affect the usefulness of assessment centres. Generally research suggests that assessment centres are a useful method with Gaugler, Rosenthal, Thornton and Benson (1987) reporting a validity coefficient of 0.37 and more recently Schmidt and Hunter (1998) reported the same level of relationship.

Work Sample Tests

Work sample testing involves measuring a job applicant's performance on a task or tasks that are important on the job they will be doing. The test is done under realistic job like conditions. An example of this would be to assess applicants for a log making position ability to produce logs to the specified cutting standard. There are a number of advantages associated with work sample testing (Landy 1989).

- Provides an indication of applicants ability under realistic job like conditions.

- Assess their present ability.

- Can compare applicants on a normative basis.

- Provides a standardised assessment.

- Helps eliminate minority biases.

Despite these benefits and the excellent validity levels reported in the literature (0.54 Schmidt & Hunter 1998), there are a number of disadvantages associated with the method. These include;

- The tests reflect what an individual can do, but not necessarily what they will do.

- The applicants may 'show off'.

- They are expensive and time consuming to develop and administer.

- New work sample tests need to be developed for different positions.

- They are difficult to design well.

- They are only useful for applicants who already have the skills required for the position.

Motor work sample tests which assess an applicant's physical ability are very good indicators of job performance (Asher & Sciarrino 1974). These include: carving dexterity tests, rudder control tests for pilots, map reading tests and programming tests for computer programmers. Asking applicants to cut a tree into pre-determined log lengths is a forestry example.

Trainability assessments

A similar selection method to the work sample test is the trainability assessment. These assess a job applicant's ability to pick up the skills that will be needed on the job. Smith and Downs (1975) describe it as a practical interview which involves a trained tester demonstrating what needs to be done and than assessing the applicants performance on what has been demonstrated. The learning performance is then compared to people who are considered to be good or poor performers on the task.

Trainability assessments have a number of advantages. These include:

- They are job related and have high face validity.
- Unique design for industry needs.
- The teacher is involved in the selection process.
- They are suitable for untrained applicants.

They are however difficult to design and administer well, time consuming, and only as good as the instructor who gives them. They also suffer from poor generalisability, which means that new assessments need to be developed for each and every position.

Psychological Testing

Psychological testing provides us with information that no other selection method can. There are a number of essential properties that characterise psychological testing.

- All job applicants are assessed in the same, standardised way. Same instructions, same time restraints, same materials etc.

- The applicants' performance can be compared against an objective yardstick.

- The test score is useful only in relation to a group of other scores or norm group. It is meaningless on its own.

- They have proven reliability and validity levels.

There are many different types of psychological tests and questionnaires. Holdsworth (1972) outlines six different test types. Attainment tests, intelligence tests, tests of physical characteristics, aptitude tests, interest tests and personality tests. Holdsworth also outlines a number of benefits associated with using psychological testing in the selection process.

- Financial benefits from improved employee and organisational performance.

- Improved quality of selection.

- Monitoring and maintenance of standards.

- Attract better quality applicants.

- Encourages self-selection.

A summary of the more commonly used types of psychological tests follows. Examples of some of the test items included in the tests are also provided.

Intelligence testing

As the name suggests, these tests attempt to assess the applicant's intelligence level. Other names for these types of tests is IQ or mental ability tests. Although there are many definitions of intelligence, most of these types of tests assess reasoning and problem solving ability. They usually assess numerical reasoning, verbal reasoning or

abstract reasoning or some combination of the three. Most are timed and are multiple choice type tests. Intelligence testing is consistently found to be the strongest predictor of job performance across job types and situations. Schmidt and Hunter (1998) report a validity coefficient of 0.51. The following is an example of the types of questions included in a general mental ability test.

Example of a verbal reasoning question;

Which one of the following words is slightly different from the others?

a) Car
b) Plane
c) Train
d) Skateboard
e) Motor bike

Example of a numerical reasoning question;

What number comes next in the following pattern?; 2, 5, 11, 23, 47,

a) 94
b) 90
c) 96
d) 70
e) 95

Personality questionnaires

There has traditionally been a very large interest in personality testing for industry purposes. Much of this is due to the desire to gain insight into the 'inner workings' of job applicants. Unfortunately this is not an easy task.

Personality tests are not really tests at all because there are no right or wrong answers. They are more accurately described as 'questionnaires'. They ask applicants to report on their own values, opinions, interests, motives, beliefs etc. They usually involve presenting applicants with a statement and asking them to indicate the degree to which they agree or disagree with it. They are all self report and are usually untimed. The many different tests attempt to measure a degree of personality based dimensions. Examples of these include: extroversion, introversion, adaptability, conscientiousness and emotional stability.

Traditionally, these tests have only received moderate support in validation research (Ghiselli 1973). More recently however, research in the area of integrity and conscientiousness (dimensions believed to represent personality) has revived the interest in personality type assessment as they have been found to predict performance well (Schmidt & Hunter 1998).

Example of a personality type question

To what extent do you agree with the following statement?

'I like to read books about philosophy'

a) Agree
b) Unsure
c) Disagree

Aptitude tests

Aptitude tests assess applicant's ability to perform certain kinds of tasks. They are more specific tests then general intelligence tests and focus on a particular type of task or ability. These tests attempt to measure an aspect of mental ability that are independent of other abilities. The more common examples of aptitude tests are:

- Verbal aptitude.
- Numerical aptitude.
- Spatial aptitude.
- Mechanical aptitude.
- Manual dexterity.
- Clerical aptitude.

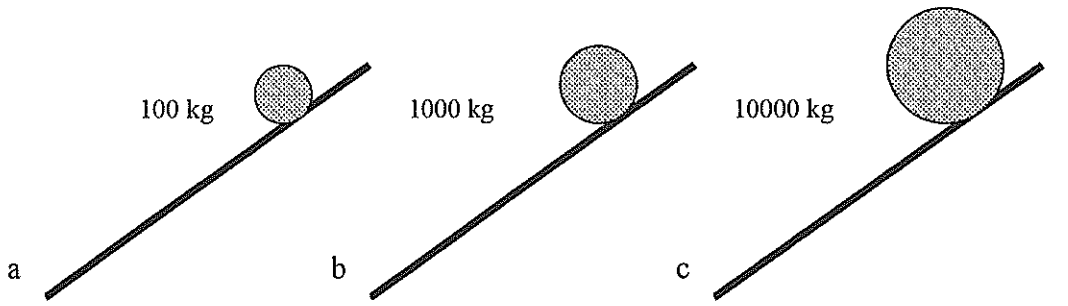
Mechanical aptitude tests

A particularly interesting aptitude in terms of the current position is mechanical aptitude. This can be assessed through the use of a mechanical reasoning test. These tests assess applicant's ability to comprehend the principles of movement and look to measure the ability to perform practical tasks of a mechanical nature. Such tests have been found to be very useful in predicting performance on tasks that require skilled, mechanical ability (Schmidt & Hunter 1977).

Mechanical reasoning tests appear to be more dependent on the applicants past experience with mechanical objects then are abstract spatial or perceptual type tests (Anastasi 1968). Most tests also assess an aspect of spatial aptitude which refers to the ability to visualise and manipulate objects in space.

Example of a mechanical reasoning test item

Which of the following balls would reach the bottom of the slope first (if no difference then d)?



Motor dexterity tests

A type of selection method that has traditionally been applied to industrial and military situations involves the assessment of motor or manual dexterity. The tests attempt to assess job applicant's speed, co-ordination, accuracy and control on manual tasks. The majority of these tests involve the use of apparatus and equipment. Anastasi (1968) has outlined a number of the major factors that are assessed in manual dexterity tests. These include;

- Control precision- Ability to make fine, controlled movement of control with hand, arm and foot movements.
- Reaction time- Speed of response to a stimulus.
- Speed of arm movement- speed with which arm can be moved.
- Manual dexterity- Ability to make skilled arm hand movements in manipulating large objects.
- Finger dexterity- Ability to make skilled manipulations of small objects.

- Arm-hand steadiness- Ability to make precise arm-hand positioning movements.

- Multi-Limb Co-ordination- Ability to simultaneously use more then one limb.

The usefulness of these tests is determined by the degree of complexity associated with the position. They have been found to predict well for routine assembly and machine operating jobs (Holdsworth 1972), but for more complex jobs, intellectual aspects become more important. A well designed work sample or trainability assessment would often incorporate aspects of manual dexterity testing.

STATE OF OPERATOR SELECTION IN THE FORESTRY INDUSTRY

In order to gain some insight in to the state of machine operator selection in this country, five contractors were surveyed about their operator selection practices. The interview was conducted over the telephone and took about ten minutes to work through. The contractors were contacted at their home in the evening and the purpose of the survey was explained. If they were willing to participate, they were asked a collection of nine questions relating to the way that they selected their machine operators. The responses to the survey are presented.

1. How many operators do you have working for you?

Responses to this question ranged from two operators through to ten. Two contractors reported having two operators, one had four one had five and one contractor reported having ten mechanised harvester operators.

2. How did you choose or select your operators? What were you looking for in an operator?

The contractors provided a range of responses to this question. A common basis for selection for the mechanised harvesting position was the identification of those workers who have mechanical aptitude, knowledge or a history of working with machinery. Three contractors reported that previous log making experience in the form of manual log making is also an important thing to look for. All of the contractors reported taking into account personality type characteristics when selecting their operators. This included identifying a willingness to learn, 'common sense', an easy going disposition and a preparedness to work long hours. One contractor reported being particularly interested in 'scruffy' individuals. He believed a scruffy untidy appearance was a sure sign of a person who is interested in machinery. Another contractor stated that a background in farming is a very useful thing to look for when selecting an operator.

3. Do you ever interview workers or conduct reference checks?

Four of the contractors reported always conducting an interview when employing new staff, particularly in relation to key roles such as the mechanised harvesting position. One contractor asserted that he had conducted an interview once before and did not find the process to be effective so he has refrained from using the method since. Three of the contractors reported reference checking new operators. All five contractors also asserted that word of mouth is an important aspect of the selection process. They reported that the quality and reputation of a machine operator usually proceeds the operator. Three of the contractors also reported conducting a job tryout procedure in which the new employees are given two weeks or so to prove their abilities.

4. Would you ever consider using psychological testing to select an operator? If not why not?

The contractors provided a range of responses to this question. One asserted that he

had tried the use of psychometric tests before and had not found the procedure very useful. He did concede however that the method may still be useful. One operator was opposed to the use of tests as he believed they would provide him with no information that he could not have obtained through an interview and job tryout procedure. The other three contractors reported that they had not given it any consideration but that it may be useful to include, particularly for critical positions such as the mechanised harvesting position.

5. Have you ever advertised in the newspaper for a new operator?

Three contractors reported advertising in the local newspapers for new machine operators. The other two asserted that they rely on word of mouth.

6. Are you happy with the way you select your harvester operators?

All five of the contractors reported being reasonably happy with the way that they select their machine operators. Two did however concede that the process could perhaps be conducted better.

Discussion of the interview findings

The telephone interview has outlined a number of points in relation to the way contractors select their harvester operators in this country. Firstly, there appears to be a lack of understanding in relation to both the principles of selection and the methods and techniques that are available. Use of the employment and interview reference checking appear to be relatively widespread, although it appears as if some contractors neglect even these fundamental practices. There appears to be a serious lack of understanding of psychometric testing methods within the forestry industry. There also appears to be a heavy reliance on word of mouth, sometimes without an effort being made to determine whether or not the information obtained through this

medium is reliable. Perhaps the most interesting part of this exercise was the widespread display of contentment in relation to the way that the selection process is conducted in forestry. By and large there appears to be a limited understanding of the importance of a quality selection procedure and the benefits that it can yield.

PREDICTORS CHOSEN FOR THE MECHANISED HARVESTING POSITION

A collection of five initial predictors were chosen to be included in the selection procedure for the mechanised harvesting position. The methods were chosen primarily for their high degree of relationship to the requirements of the harvesting task. The quality of the methods as indicated in the literature associated with personnel selection was also taken into account. The ease of use in terms of the time and energy required for their administration and scoring also made them the most appropriate for the current position.

The methods that were initially selected for inclusion in the selection procedure were as follows:

1. General mental ability test (GRT)- Although intellectual ability was not identified as being of central importance to the mechanised harvesting position, the relative importance of this measure cannot be ignored. It is consistently found to be the strongest predictor of job performance (Schmidt & Hunter 1998). In addition to this, general mental ability is related to learning ability, problem solving ability and speed and efficiency of thinking. The job analysis also indicated that an intelligence test would provide very useful information for selection purposes (Smith & O'Rorke 1999)

2. Technical test battery- This Technical battery consists of two separate tests. The Mechanical Reasoning Test (MRT) and the Spatial Reasoning Test (SRT). Both of these aptitudes were identified as being highly important in the mechanised harvesting task through the job analysis that was conducted (Smith & O'Rorke

1999). A number of the aptitude factors that were identified as important to the position by the Position Analysis Questionnaire (McCormick, Jeanneret & Mecham 1972) can also be assessed by this test. These include perceptual speed, spatial visualisation, spatial orientation and visual form perception.

3. Occupational personality profile (OPP)- This test was selected to assess the broad range of personality based characteristics that are important in the harvesting task such as the ability to work independently, remain calm and participate as part of a team. The test includes measures of nine primary personality constructs (accommodating, detail-conscious, cynical, emotional, reserved, genuine, composed, optimistic, abstract), and five other constructs (neuroticism, extraversion, openness to ideas, agreeableness, conformity).

4. Structured employment interview (SEI)- The structured employment interview was developed on the basis of the information derived from the job analysis. Best practice guidelines in terms of structured interview design were also adhered to.

5. Application form (AF)- An application form was also developed to aid in the processing of job applications. Again, best practice guidelines were adhered to.

In addition to these, best practice guidelines are also included on how to conduct a work sample test. A number of contractors appear to be making use of this method in an informal manner as they attempt to identify who out of their crew will be the best operator. In light of this we believed that it would be useful to provide some guidelines on how to conduct this procedure as best as possible. Best practice guidelines are also provided on how to conduct reference checking. Again, a number of contractors appear to be doing this and the guidelines are intended to help them gather the most useful information.

SELECTION PROCEDURE FOR THE MECHANISED HARVESTING TASK

The following table (Table 2) outlines how each of the selection methods assess each of the competencies identified through the job analysis as being characteristic of successful operators.

Measure	*Log Making Ability*	*Mechanical Ability*	*Computer Knowledge*	*Positioning Machine & Logs*	*Drive Machine Base*	*Awareness of Safety*	*Personality Character.*	*Participate as Part of a Team*
GRT	✔	✔	✔	✔	✔			
MRT		✔		✔				
SRT	✔	✔		✔	✔			
OPP							✔	✔
SEI	✔	✔	✔	✔	✔	✔	✔	✔
AF	✔	✔	✔	✔	✔	✔		
RC	✔	✔	✔	✔	✔	✔	✔	✔

Table 2- Competencies assessed by the recommended selection methods.

STRUCTURED EMPLOYMENT INTERVIEW

It is important that the selection procedure that is employed includes a structured employment interview. Schmidt and Hunter (1998) assert that a 24% increase in validity can be obtained when the structured employment interview is combined with a general mental ability test in the selection process. In addition to this, the majority of contractors reported using the interview when selecting their machine operators. There are a number of ways that a selection interview can be developed so that it yields the most useful information from which a selection decision can be made. Campion, Palmer and Campion (1997) have outlined a number of components that can enhance either the content or the process of the interview. These have been included when and where appropriate in the design of the current interview for the mechanised harvesting task. They also appear in the guidelines for how to conduct the interview.

Components to include in the interview

1. Base the interview questions on a formal job analysis

This recommendation helps to ensure that the interview questions are directly related to the job in question, in this case the mechanised harvesting task.

2. Ask the exact same questions of each candidate

It is important that the same questions are asked in the same order for each candidate. This helps ensure that the interview is a standardised procedure and that all candidates have the same opportunities to perform equally well in the process.

3. Limit the prompting, follow-up questioning and elaboration on questions

Many interviewers believe that it is important to involve themselves in an active conversation with the job candidate. This can however be detrimental to the interview process and one should try and limit the amount of prompting that is provided as it may bias the interview ratings.

4. Use well designed interview questions

The design of interview questions is a complex procedure. There are a number of different types of question that can be asked, that enhance the information that is produced by the interview process. One such type of questions are what are known as situational type questions. These questions present the candidate with a hypothetical situation that is related to the job and then asks them to describe how they would respond to the situation. Another good type of interview questioning involves the use of behavioural type questions. These questions focus on the behaviours that the candidate has actually exhibited in the past. They ask the candidate how 'did' you respond in such and such a situation rather then how 'would' you respond. Background experience questions are also important to include in the interview and help to identify the candidates past experience.

The following table (Table 3) provides an example of the same question that is asked in each of the different ways just mentioned. The first is a situational question, the second a behavioural type question and the third a background experience question.

They are all however trying to obtain the same information from the candidate.

Type	*Question*
Situational	Suppose that you are operating a mechanical harvester and you hear a grinding sound coming from the harvester head. How would you respond?
Behavioural	Based on your past experience, could you please describe a time when you have encountered a mechanical or hydraulic problem in the harvester head and tell me how you responded.
Background	What previous experience have you had with fixing and maintaining mechanical and/or hydraulic equipment?

Table 3- Example of different types of interview questions.

The interview that has been developed for the harvesting task (Appendix A) contains a combination of each of these types of questions. It is however important that the interviewer adjust the questions if they are inappropriate for any particular interview. An example of this would be asking behavioural questions of a candidate who has not yet had any direct experience with the harvesting task. In this situation the interviewer could ask situational or background type questions.

5. Interview length

Interview length is an important aspect to bear in mind. The interview can not be too long that the candidate and the interviewer become fatigued and at the same time it is important that the interview produces all the information that is necessary to help in the selection decision. The majority of interviews that are reported in the literature are between thirty and sixty minutes and contain between 15 and 20 interview questions (Campion, Palmer & Campion 1997). An interview of about thirty minutes and with about 16 questions should be appropriate for the mechanised harvesting task. This equates to about two questions for each competency identified in the job analysis.

6. Control ancillary information

Be aware that the information obtained from the application form, curriculum vitae or testing exercises does not bias your decision making during the selection interview.

7. Do not allow the candidate to ask questions until after the interview

The candidate will probably have a lot of questions that they want to ask of the interviewer. It is important however that these questions are kept until after the structured questions have been asked as they can detract from the structure and standardisation of the interview.

8. Rate each answer given by the candidate

It is important that you apply a rating to each answer that the candidate provides. This helps the reliability of the interview and also makes it easier to apply an overall rating rather then just providing one at the end where you would to try and process a lot of information. Ratings should be based on the following things:

- Number of examples provided by applicant.
- Relevance of examples provided by applicant.
- Quality of performance presented in the example.

9. Use anchored rating scales

An evaluative rating scale has been developed for the interview. It is a likert scale with five scale points. A rating of '1' reflects a poor answer, '2' a poor to acceptable answer, '3' and acceptable answer, '4' an acceptable to excellent answer and a rating of '5', an excellent answer.

1	**2**	**3**	**4**	**5**
Poor Answer	Poor-Acceptable Answer	Acceptable Answer	Acceptable-Excellent Answer	Excellent Answer

10. Take detailed notes

It is important that during the interview the interviewer take detailed notes. This can help when it comes to applying a scale rating to the candidate and it can also help the interviewer gather their own thoughts. The information can also be drawn upon at a later stage in the selection process if it is needed such as during the reference checking.

11. Use the same interviewer across all candidates

It is important that the same person be used to interview all of the candidates. This helps to reduce the many biases that exist in the interview process. It also ensures that the same ratings and the same questions are being asked in the same way to all candidates.

A copy of the structured employment interview that was developed for the mechanised harvesting task is presented in Appendix A. This interview has attempted to incorporate all of the aforementioned components and is based on the information obtained through the job analysis conducted on the mechanised harvesting task.

Guidelines on how to make the interview a success for all

There are five major sections in the standard employment interview (Landy 1989). These include:

1. The opening and introduction

- It is important to make the candidate feel comfortable and relaxed so give a nice warm, greeting. Remember to smile.
- Introduce yourself, stating your name. Refer to the candidate with their name.
- Break the ice with a casual question about how their day has been going or inquire about their hobbies or interests.
- Give a brief introduction to yourself, who you are, how long you have been in the

forestry industry, what your personal goals are.

- Introduce the purpose of the interview. Tell the candidate that you are looking to employ a mechanical harvester operator and that this is part of the process by which you can identify who is the best suited to the job.
- Instruct the candidate that you will be taking notes throughout the interview process.

2. Talk through the application form or curriculum vitae information

- If there was anything that stood out to you in the previous assessment stages then discuss them here. There may have been some particular work experience that you want to find out more about, why they left their last place of employment or any training that they may have had.
- Discuss how the candidate performed on the psychometric tests.

3. The structured interview questions

- This is the main part of the interview. Slowly and systematically work through each of the competency based questions that have been developed for the position.
- Be sure to take plenty of notes during the interview. Make them detailed enough so that you can rate the candidate's answers.
- Be sure to adhere to the guidelines mentioned previously about conducting the interview. These include limiting the prompting you provide for the candidate and asking them to save their questions until after the interview.

4. The job preview

- It is important that you provide the candidate with some information about what the job will be like. Be sure to outline what will be expected of them. What sort of hours they will work, whether there will be any overtime or on call hours. How far

they will have to travel, any things that are unique to your crew's way of doing things.

- Make sure you are honest and the preview is as realistic as possible. Don't try and make the job sound better then it really is or you may end up with an unhappy worker whose expectations were not met.

5. The applicant's questions

- When you have worked through each of the interview questions and are confident that you have enough information on which to make an evaluation of the candidate then ask them if them if they have any questions they want to ask you. Respond honestly and fully to the candidate's questions. They may also provide you with some more information at this point so be sure to take notes

6. The closing

- Thank the candidate for coming and tell them that the interview is ended.
- Tell them what the next stages will be in the selection process and when they can expect a final decision.

THE APPLICATION FORM FOR THE MECHANISED HARVESTING TASK

An analysis of the frequency with which forestry related positions were advertised in Rotorua's local newspaper 'The Daily Post' was conducted. It was hoped that this would provide some indication of the recruitment practices that some contractors utilise. Throughout the months of February and March, no less then 40 different forestry positions were advertised in the situations vacant column. Admittedly, only some of these were associated with the mechanised harvesting and related machinery positions, but nevertheless it did indicate that contractors did make use of the more

traditional advertising mediums. Of these 40, four indicated that an application form would need to be completed, three asked for curriculum vitaes, eight requested that applicants have completed relevant FIRS modules and ten indicated that previous experience was necessary. Such requests indicate that the inclusion of an application form for the mechanised harvesting task would be useful in the selection process.

In the current situation the application form would provide us with a summary of the applicants history. This is useful for processing the sorting of applications and can also give us useful information that we can use during the interview. A copy of the application form for the mechanised harvesting task is included in Appendix B. When people respond to your advertisements, send them out a copy of the application form. Instruct them to complete it, and send it back to you with their curriculum vitae.

PSYCHOMETRIC TESTING

Toplis, Dulewicz and Fletcher (1997) have provided some general guidelines to consider before choosing a particular selection test. The guidelines provide a set of criteria against which prospective psychometric test should be compared and assessed. All of the tests used in the validation studies are produced by Psytech International and are distributed by OPRA Ltd.

1. Be clear on why the test is needed and what it is going to measure

The tests that have been selected are needed to assess the competencies that were identified during the structured job analysis of the harvesting task. They are going to measure mechanical reasoning ability, spatial reasoning ability, general reasoning ability and several personality characteristics.

2. Look for evidence of reliability (0.70 or greater)

All of the tests included have proven reliability levels of 0.70 or greater (Psytech Technical Manuals- GRT2, SRT, MRT, OPP).

3. Look for evidence of validity (0.30 or greater)

All of the tests included have proven validity levels of 0.30 or greater (Psytech Technical Manuals- GRT2, SRT, MRT, OPP).

4. Expect to see a manual giving all of the above data, plus developmental back ground and administration instructions.

All of the Psytech range of tests have technical manuals including an overview of the theoretical basis for the tests, information on the development of the tests and psychometric data in the form of reliability and validity information.

5. Confirm the availability of benchmark comparisons (normative data).

All of the tests have a variety of normative data groups to choose from, including New Zealand norms. In addition to this, the technical test battery, and the occupational personality profile have specific forestry related normative data. The forestry norm base does however need to be further developed and this will be discussed at a later stage in the report.

6. Ensure the test is not discriminatory in design or application.

All of the tests have been developed in line with equal employment opportunity guidelines and are not discriminatory in terms of gender, race or age.

7. Check availability of training and support.

Training and support on the administration, marking and general use of the tests are available from OPRA Ltd.

8. See whether the tests are used elsewhere.

The tests are currently being used extensively in New Zealand in both the public and private sectors. They are also been used throughout Europe and Australia.

In addition to these things, OPRA Ltd has developed a code of fair testing practice for use of psychometric tests in New Zealand. It is an attempt to provide a brief, non-technical outline of the principles of good testing practice. The code presents standards for test users in relation to five areas.

Code of fair testing practices

A. Developing and selecting appropriate tests
Test users should be committed to using only those tests that meet the purpose for which they are intended and are appropriate for the intended test-taking population(s). To this end users should:
1. First, define the purpose for testing and the population to be tested. Then, select a test for that purpose and population based on a thorough review of the available information. Where possible this should be based on independent test reviews.
2. Read the materials provided by test developers and avoid using tests which provide unclear or incomplete information.
3. Become familiar with how and when the test was developed and fully understand the technical data which supports the test.
4. Examine specimen sets and/or sample questionnaires and test instructions, answer sheets, manuals, and scored reports before selecting a test.

B. Interpreting scores
Test users should make every effort to ensure they interpret test scores correctly. To this end they should:
1. Obtain information about the test and fully understand the psychological characteristic(s) it measures.
2. Interpret scores taking into account any major differences between the norms or comparison groups and the actual test takers.
3. Only use tests which they are qualified to administer and interpret.
4. Respect the limited shelf life of most tests and treat test information in respect of when the results were obtained.
5. Take into account other relevant information about the test taker which could have a bearing on the characteristics being assessed.
6. Compile interpretative reports which are intelligible to the intended reader.

C. Striving for fairness
Test users should select and use tests in such a way as to promote equal opportunities. To this end they should:
1. Evaluate the procedures used by test developers to avoid potentially insensitive content or language.
2. Review the performance of test takers of different races, gender, and ethnic backgrounds when samples of sufficient size are available. Evaluate the extent to which performance differences may have been caused by inappropriate characteristics of the test.
3. When necessary and feasible, use appropriately modified forms of tests or administration procedures for test takers with disabilities. Interpret standard norms with care in light of the modifications that were made.

D. Informing test takers
Test users should obtain informed consent from test takers. To this end, test users should:
1. Provide the test taker with adequate information regarding the purpose, procedure, duration and likely outcome of the assessment process.
2. Offer guidance and support to test takers only in so far as it is consistent with the administration instructions and does not invalidate the assessment process.

E. Security of test information
Test users should:
1. Securely store all test booklets and software, restricting access to trained test users.
2. Respect the copyright on test materials and inform the developers of any infringements which come to light.
3. Ensure that all test data collected is kept secure, and is only used for the purpose for which informed consent was obtained. This should be consistent with data-protection and freedom of information legislation.
4. When leaving an organisation make adequate arrangements to secure both test materials and confidential test data.

Although the tests used during the validation study are distributed by OPRA Ltd, they were not intended to be the only test options that could be used. Alternative measures are also available on the New Zealand market. Validation studies should however be conducted on alternative tests before they are implemented. It is also important to remember that training in the administration of psychometric tests is needed if the tools are going to be implemented.

The tests

General reasoning test

The general reasoning test consists of three separate test components; numerical reasoning, verbal reasoning and abstract reasoning.

Verbal reasoning

The verbal reasoning test assesses a person's ability to use words in a logical way. Consisting of items which involve an understanding of vocabulary and the relationships between words, the test measures the ability to perceive and understand concepts and ideas expressed verbally. While this test is a measure of reasoning ability rather then educational achievement, it is nonetheless generally recognised that verbal reasoning scores are sensitive to educational factors. Thus significant discrepancies between verbal and abstract reasoning scores are often used to give an indication of the difference between a persons intellectual potential and their actual attainment.

Numerical reasoning

The numerical reasoning test assesses a person's ability to use numbers in a logical and rational way. The test only requires a basic level of education in order to successfully complete and is therefore measuring numerical ability rather then educational achievement. The test consists of items which assess the candidates understanding of such things as number series, numerical transformations, the

relationships between numbers and their ability to perform numerical computations.

Abstract reasoning

The abstract reasoning test assesses the ability to understand complex concepts and assimilate new information beyond previous experience. The test consists of items which require the recognition of patterns and similarities between shapes and figures. As a measure of reasoning, it is independent of attainment and can be used to provide an indication of intellectual potential. Assessing the ability to quickly understand and assimilate new information, it is likely to predict how responsive to training the person will be.

Advantages

The general reasoning test is quick to complete, taking 28 minutes (plus administration time), yet provides a comprehensive assessment of mental ability. The test can be administered on-screen or in pencil-and-paper format. In either case, the test results are scored and normed through the genesys software, immediately producing a profile against the desired norm group. Quick and cost effective, the general reasoning test is the ideal brief intellectual assessment tool.

Time to complete

Verbal Component	8 minutes
Numerical Component	10 minutes
Abstract Component	10 minutes
Total Time	**28 minutes**

Table 4- Time investment required for general reasoning test.

Technical test battery

The technical test battery consists of three separate tests. One of them, the visual acuity test could not be used as it is designed for on-screen assessment. This was considered to be impractical given the nature of the industry.

Mechanical reasoning test

The mechanical reasoning test measures the ability to apply basic mechanical principles. It looks at the ability to grasp the common principles of physics which are evident in everyday life. This ability is tested over a number of different mechanical devices, e.g. gears, pulleys and levers. The mechanical reasoning test was constructed in such a way as to minimise any advantage from the possession of specialised mechanical knowledge. Thus the mechanical reasoning test investigates a persons ability to solve problems of a mechanical nature through the application of basic principles which most people could be expected to understand. People who do well on the mechanical reasoning test usually like to find out how things work. They often are better than average at learning how to construct, operate, or repair complicated equipment. People who perform poorly on the mechanical reasoning test may find the work rather hard or uninteresting in physical sciences and in shop floor mechanical work which demands thinking and planning, rather then just skill in using one's hands. Many types of work in the construction and manufacturing trades also require one to understand machinery and the use of physical forces as well as to possess manual skills.

Spatial Reasoning Test

The spatial reasoning test assesses a person's ability to manipulate and reason with shapes and spatial relationships. Unlike many spatial tests, the spatial reasoning test assesses the ability to work with three-dimensional relationships. It looks at how well a person can visualise, or form mental pictures of solid objects from looking at flat paper plans. In other words how well can a person think in three dimensions. The spatial reasoning test measures the ability to visualise, to imagine the shape and surfaces of a finished object before it is built, just by looking at the drawings that would be used to guide workers in building it. This ability makes some kinds of mathematics easier e.g. solid geometry. To a person who does poorly on the spatial reasoning test, an architect's plans for a house or an engineer's plans for a bridge or a machine might look like nothing but several flat drawings. A person who performs well on the spatial reasoning test looking at those same plans can 'see' the finished house, bridge or machine. He or she could probably 'walk around' the finished structure, looking at it from various angles. People who do well on the spatial

reasoning test should have an advantage in work such as draughting, architecture, mechanical engineering, building and construction.

Advantages

A comprehensive and broad ranging measure of technical reasoning, these tests are an invaluable tool for selecting staff for engineering apprenticeships, craft apprenticeships, mechanically related positions and technician training. The technical test battery will identify those people who can grasp mechanical concepts and put them into practical use. The tests can be administered on-screen or in a pencil and paper format

Time to complete

Mechanical Reasoning Test	15 minutes
Spatial Reasoning Test	15 minutes
Total Time	**30 minutes**

Table 5- Time investment required for technical test battery.

Occupational personality profile

The occupational personality profile provides a detailed assessment of interpersonal style, thinking style and patterns of coping with stress. The personality dimensions that are measured by the test items have been written specifically to minimise evaluative bias which, combined with the inclusion of two distortion scales, allows selectors to be confident that the test results provide an accurate reflection on the candidates personality. The test assesses fourteen different personality dimensions. The scales include; assertiveness, flexibility, trust, emotionalism, gregariousness, persuasiveness, composure, optimism, pragmatism, anxiety, extroversion, openness to new ideas, independence, and conformity.

Advantages

Quick to administer (only 15-20 minutes), the occupational personality profile is the ideal tool to assess how a person will typically think, feel and interact. The test

software is capable not only of administering, scoring and norming the test, but also produces a profile and an in-depth expert narrative report on interpersonal needs, thinking style and emotions. It predicts team role characteristics, preferred career themes, management and selling styles. Consequently, the occupational personality profile is not only a powerful selection tool, but is also useful for assessing strengths and weaknesses for promotion, career development and training. The profile is supported by extensive validation data and has been examined for gender and race bias.

Time to complete

Occupational Personality Profile	20 minutes
Total Time	**20 minutes**

Table 6- Time investment required for occupational personality profile.

Principle of test administration and scoring

The usefulness of a test depends very much on how it is administered and scored. As much as possible, a test should be administered and scored in the same way under the same conditions for each recipient. The instructions that are included with each test must be strictly adhered to. An appropriately administered test helps to ensure that the results are accurate. Prior to introducing the test, you should ensure that;

- There will be no interruptions.
- The room is well lit, quiet and well ventilated.
- The test recipient has plenty of space to work in.
- All of the necessary materials are available (test booklets, answer sheets, pencils and erasers).

A general procedure for test administration

1. Welcome the test taker and explain the purpose of the testing. Explain why the tests need to be conducted for the selection process.

2. Ensure that the participant completes any details prior to starting the test such as filling in their name and details.

3. Follow through the instructions presented in the test. Ensure that the participant is clear on what is required of them for each test.

4. Allow the participant to work through the example test items. Check that these have been completed accurately and answer any questions that the individual may have.

5. For the timed reasoning tests, the participant should be stopped precisely when their time is up. For the untimed personality test, the participant is allowed to work through at their own pace. If they appear to be taking too long then they should be encouraged to speed up.

6. Collect all of the test materials prior to the participant leaving. Check again that their name and details are on each of the answer sheets.

7. Thank the participant for completing the testing programme and inform them of the next stage in the selection procedure. Also inform them if, how and when they will receive feedback on their test results.

BEST PRACTICE GUIDELINES FOR WORK SAMPLE TESTING

During the course of the job analysis research and the contractor survey, it became apparent that a number of contractors were conducting what closely resembled a work sample test for the selection of machine operators. If supervisors or contractors intend on using a work sample type of approach to selecting a harvester operator, then they should adhere to the following recommendations. They should also be aware of the limitations that are associated with the procedure as outlined at the start of this report. What follows is a collection of best practice guidelines for conducting a work sample test.

1. Ensure that the process is conducted in a systematic, standardised manner. Give every person the same opportunity to prove themselves. This will mean ensuring that the terrain is the same, the quality of the logs is the same, the machinery is the same and weather conditions are the same as much as possible.

2. Take notes during the test to help in the evaluation process at the end.

3. Develop rating scales for the performance.

4. Select a number of tasks that need to be performed by the incumbent. Ensure that these tasks are important to performance on the mechanised harvesting task. Some of these might include;

    - Carrying out a mechanical assessment of the machine.
    - Driving / manoeuvring the machine base.
    - Operating the harvester head using the correct combination of control movements.
    - Identifying log defects.

5. Ensure that the test is conducted in a safe and supervised manner.

6. If the candidates have not had any previous work experience with a harvesting machine, then you may have to consider conducting a trainability assessment. Bear in mind however that the development and administration of such a procedure is complex and requires careful consideration.

BEST PRACTICE GUIDELINES FOR REFERENCE CHECKING

The majority of contractors contacted during the job analysis research and the contractor survey indicated they often conducted reference checks when they are selecting harvester operators. The following is a list of guidelines that can help ensure that the process is as useful as possible.

1. It is most useful to conduct the reference checking process in a structured, formalised manner. Much like a questionnaire or a structured interview.

2. Ask the same questions of each referee.

3. You should attempt to gather information that is job related. This should be done by referring to the information contained in this report and the job analysis report (Smith & O'Rorke 1999). You could also use the competencies as a framework for obtaining job related information.

4. Ask for ratings of the job candidates performance. This could perhaps be on a five point scale ranging from very poor to very good.

5. Check out any information that has come out during the interview or in other parts of the selection process. You should confirm the work history that the candidate has reported and any training that they have claimed to have under gone. It is important to assess things like punctuality and absenteeism which has been found

to be very high in the forestry industry (Wilson, Gaskin & Smith 1988).

6. There are a number of other questions that are good to ask during the reference checking process. These include asking what is the best way to manage and motivate the candidate, asking if they would hire them again and if not why not? Were they disappointed when the candidate left? Why did they leave? Were they fired?

7. It is also important to ensure the referee that the process is confidential and that their comments will be treated with care.

VALIDATION OF THE PREDICTORS

An initial concurrent validation study was conducted with two of the five measures. These were the technical test battery which involves the mechanical reasoning test and the spatial reasoning test and the occupational personality profile. It was not possible to evaluate the predictive validity of the other three measures (the general reasoning test, the structured employment interview and reference checking process) at this stage due to practical reasons, but their predictive strength can be inferred from the research in the area (Schmidt & Hunter 1998). In addition to this, the methods would need to be included in the selection process for the mechanised harvesting position anyway. The validity of these methods will however also be assessed over the next two years research.

Validation study 1- Face validity

Face validity is an important concept that needs to be assessed in relation to a selection procedure. It is important because it provides us with an indication of how the procedure or parts of the procedure are going to be received by the intended users and recipients of the procedure. It can also help us to assess whether or not the

process is going to be viewed positively or otherwise. Face validity can have a large influence on how much potential there is that the methods will be actually be utilised during the selection process.

A face validity study was conducted on the mechanical reasoning test, the spatial reasoning test, the general reasoning test, and the occupational personality profile. Participants included harvester operators, contractors and industry research personnel.

Method

A total of twelve participants were presented with each of the tests to look through at their own discretion. A brief introduction to why the test has been selected was given and its relation to the job analysis findings made clear. Participants were then asked to indicate on a five-point scale ranging from 'definitely not relevant' to 'definitely relevant' whether or not they thought that the test was relevant to the harvesting position.

1	**2**	**3**	**4**	**5**
Definitely not Relevant	Not Relevant	No Comment	Relevant	Definitely Relevant

Results and discussion

The ratings in terms of the perceived relevance of each of the tests is presented in the following table (Table 7). The final ratings are based on the mean of the ratings provided by the study participants.

	MRT	*SRT*	*GRT2*	*OPP*
Final face validity rating	4.1	2.4	3.7	4.3

Table 7- Face validity ratings for psychometric tests.

The mechanical reasoning test appears to have a relatively high degree of face validity. Harvesting machine operators and people familiar with the harvesting task appear to view the test as being relevant to the harvesting task. The spatial reasoning

test on the other hand does not appear to have been viewed in such a positive manner. The rating reflects a perception of the test as being 'not relevant' to the harvesting task indicating that it may not be received favourably if applied in the selection procedure. The general reasoning test appears to be viewed reasonably positively with it receiving an almost 'relevant' rating. The occupational personality profile was rated most highly out of the four tests with it receiving a 'high relevance' rating. Based on this assessment, it appears as the mechanical reasoning test, the general reasoning test and the occupational personality profile would all be viewed as relevant to the harvesting task if included in the selection procedure, and as such received positively by the individuals who are required to administer the tests and those who are required to undergo the tests for selection purposes.

Validation study 2- Criterion / concurrent validity

Determining the level of criterion or concurrent validity of the methods was a difficult process. Obtaining access to the number or participants required for a large scale predictive validity study (200+) was not possible for this stage of the research given the nature of the task and the industry in question. In addition to this, the time investment required of the participants meant that the process could not be done during the working day and had to be conducted in the operators home at a time convenient to them. This immediately restricted the number of participants that could be involved in the study.

Obtaining suitable performance data was also very difficult, and it appears as if there is somewhat of a reluctance on the part of the forestry industry to conduct critical performance assessments. This became evident during the course of this research, as contractors appeared reluctant to rate their operators as anything other then outstanding. Five contractors were contacted in an attempt to gain performance data on their harvester operators. It was anticipated that the performance assessment form included in the appendix (Appendix C) would provide the basis of the dependent variable information used in the validation study. Unfortunately however, all of the contractors rated their operators as being in the 'occasionally exceeds expectations', to 'consistently exceeds expectations' category. It is possible that these high ratings

accurately reflect the quality of the operators included in the study, but more probably however it reflects either a high degree of loyalty on the part of the contractors to their operators or alternatively a lack of awareness of the dimensions of good operator performance. The former of the two alternatives is the more likely.

The large capital investment associated with mechanised harvesting equipment also meant that the performance data that was obtained had to be done so in an indirect manner. This placed a number of restraints on the type of dependent variable or criterion related information that could be obtained. Never the less a preliminary validation study was conducted on the mechanical reasoning test, spatial reasoning test and the occupational personality profile.

The benchmarking process

A key assumption was made during the process of the study. It was assumed that although the operators may vary in their performance on the mechanised harvesting task, all nine of the operators were considered to be capable, competent and well able to perform at the required level on the task. If this were not the case, the operators would have been removed from the position by their superiors. On the contrary however, all of the operators included in the study had been operating in excess of six months. As such, although the performance ratings were taken into consideration, we were not primarily interested in distinguishing between operators at this stage. We were however interested in assessing how well the operators performed on the reasoning tests and establishing a suitable 'cut-off' point that should be associated with the reasoning tests. It was anticipated that this would provide us with a benchmark level of performance in terms of raw score that prospective operators or job applicants need to achieve in order to be considered suitable for the mechanical harvesting task.

Method

A group of nine operators took part in the concurrent validation study. They were contacted by the researchers and informed of the purpose of the research. If they agreed to take part in the study, a time and location convenient to the operator was

decided upon. The majority of the tests were conducted in the evening between 6 PM and 8 PM. The testing process took between an hour and hour and a half depending on the ease of the administration. All operators who took part in the research went into the draw for a $50 dinner voucher. They were also provided feedback on their personality assessment. Feedback on their performance on the mechanical and spatial reasoning tests could not however be disclosed.

Performance appraisal / dependent variable data

Due to the aforementioned problems associated with obtaining performance data, performance ratings on seven of the operators that were tested had to be obtained from two of the field personnel from Waratah general engineering. These two individuals were sufficiently familiar with the operators' performance on the harvesting task to rate them in terms of their performance. Both personnel were asked to rate each of the operators from best to worst, with a ranking of 7 reflecting the best performer and 1 the worst. Both the individuals ranked each of the operators in exactly the same way. These rankings were then compared to the operators performance on the reasoning tests and their personality profiles.

Results and discussion

Mechanical reasoning test

The following table (Table 8) presents the performance ranking of each of the seven operators and their raw score in terms of the total number correct on the mechanical reasoning test.

Operator (ranked in terms of performance data obtained from Waratah personnel)	*MRT2 raw score (total number correct. 45 test items).*
7	24
6	21
5	27
4	13
3	23
2	25
1	28

Table 8- Mechanical Reasoning Test data. Note- two operators could not be assessed in terms of their performance rating and had to be excluded from this part of the analysis.

A spearman's correlation coefficient was then calculated to determine the degree of relationship between the performance rankings and the mechanical reasoning test raw scores. The outcome of this procedure is presented in Table 9.

	Performance rank	*MRT2 rank*
Performance rank	1.0000	-.2469
	(7)	(7)
	p=.	p=.297
MRT2 rank	-.2469	1.0000
	(7)	(7)
	p=.297	p=

Table 9- Spearman's correlation between MRT2 score and performance ranking.

The table indicates that there is a negative relationship between the score on the mechanical reasoning test and the performance data that we have obtained. There are a number of things to take into consideration when evaluating these results however. The first is that there was only a sample of seven operators included in the calculation. More test data will need to be collected and the relationship between test performance and performance criteria further assessed. The second is that the performance data included in the study may not be as accurate as initially anticipated. This problem is related to aforementioned issues associated with contractor ratings. Other forms of

performance data will need to be obtained and this requires a commitment on the part of the forestry industry to provide such information for the purposes of research such as this.

Above and beyond this however, the test results are encouraging as they indicate that the operators are able to perform reasonably well on the test and that the test was not too hard nor too easy for the operators to complete. In addition to this, nine out of the ten operators who participated in the study, including the two who were not included in the aforementioned correlation, obtained raw scores in excess of 20 correct out of the possible 45 test items on the mechanical reasoning test. This level of attainment provides us with a potential benchmark level of performance that prospective harvester operators should achieve to be considered suitable to the harvesting task. Such a possibility will be further assessed through the next stage of validation research.

Spatial Reasoning Test

The following table (Table 10) presents the performance ranking of each of the seven operators and their raw score in terms of the total number correct on the spatial reasoning test.

Operator rating (ranked in terms of performance data obtained from Waratah personnel)	*SRT raw score (total number correct. 30 test items).*
7	19
6	7
5	18
4	16
3	11
2	9
1	23

Table 10- Spatial Reasoning Test data. Note- two operators could not be assessed in terms of their performance rating and had to be excluded from this part of the analysis.

A spearman's correlation coefficient was then calculated to determine the degree of relationship between the performance rankings and the spatial reasoning test raw scores. The outcome of this procedure is presented in Table 11.

	Performance rank	*SRT raw score*
Performance rank	1.0000	.1187
	(7)	(7)
	p=.	p=.800
SRT raw score	.1187	1.0000
	(7)	(7)
	p=.800	p=

Table 11- Spearman's correlation between SRT score and performance rank.

The table indicates that there is very little relationship between the performance data and the operators' performance on the spatial reasoning test. In addition to this, some of the operators appeared to struggle with the performing well on the test. Three of the operators included in the table and one of the operators not included in the table scored below the midpoint of 15 on the test. This indicates that the test may be pitched at a slightly higher level then is necessary for the selection of harvester operators. As such it is difficult to establish a benchmark level of performance on the test, as some operators scored well below any possible benchmark level and yet still perform at an acceptable level on the harvesting task as has been explained. This difficulty associated with the spatial reasoning test combined with the poor face validity rating that the test received indicates that the test should not be included in the selection procedure for the harvesting task.

Occupational personality profile

The operators responses to the questions included in the occupational personality profile provide some interesting insight into the type of personality that is best suited to the mechanised harvesting task. The stanine/sten scores for each scale for each of the nine operators included in this part of the study are presented in the following

table (Table 12). From these results, an indication of the 'ideal personality profile' for the harvesting task could be obtained by calculating the median stanine score for each scale. A description of the ideal profile follows the table. Although the ideal profile provides us with a good indication of the type of personality that harvester operators appear to have, the profile will still need to be assessed on relation to performance data during the next stage of the criterion related research.

Scale	*Op 1*	*Op 2*	*Op 3*	*Op 4*	*Op 5*	*Op 6*	*Op 7*	*Op 8*	*Op 9*	***Median stanine / sten score***
Accommodating – Assertive	5	6	8	4	4	1	3	1	4	**4**
Detail conscious – Flexible	2	5	4	4	6	2	5	4	2	**4**
Cynical – Trusting	3	5	1	1	4	9	5	6	5	**5**
Emotional – Phlegmatic	3	5	5	3	3	1	6	3	5	**3**
Reserved – Gregarious	2	3	3	1	2	2	3	5	2	**2**
Genuine – Persuasive	4	5	5	4	6	3	3	3	5	**4**
Composed – Contesting	9	9	9	9	6	7	5	6	5	**7**
Optimistic – Pessimistic	7	3	7	5	4	7	7	7	5	**7**
Abstract – Pragmatic	8	8	9	9	6	8	6	8	7	**8**
Neuroticism	8	4	7	8	7	9	6	8	5	**7**
Extraversion	2	3	4	2	3	1	2	5	3	**3**
Openness to ideas	1	1	1	1	3	1	3	1	1	**1**
Agreeableness	1	2	1	1	4	8	5	7	5	**4**
Conformity	6	4	6	7	4	6	7	5	9	**6**

Table 12- Operator stanine / sten scores on the occupational personality profile dimensions.

The Ideal Profile

The above table indicates the type of personality that is best suited to the mechanised harvesting task. Generally, a balanced personality type is preferable. A balanced personality is one that is not at either end of the scale extremes (e.g. highly persuasive or highly genuine) but rather one that is located somewhere in between the two scale alternatives. Having said that, if an individual is going to be more inclined to one of the two alternatives, the table indicates which of two are preferable for the harvesting task. For the nine primary scale dimensions, a score of 5 indicates a balance between

the two alternatives. Anything less then a 5 indicates that the first of the two descriptions in the scale column is preferable. Anything greater then a 5 indicates that the second of the two is preferable. The preferred operator profile is described below.

The nine primary dimensions of the occupational personality profile

1. Accommodating – Assertive (median stanine score = 4)

Preferred: Accommodating

Description:

- Empathetic
- People orientated
- Accepting
- Sensitive to peoples feelings
- Avoids confrontation

2. Detail conscious – Flexible (median stanine score = 4)

Preferred: Detail conscious

Description:

- Deliberating
- Controlled
- Rigid
- Enjoys attending to detail
- Conscientious

3. Cynical – Trusting (median stanine score = 5)

Preferred: Balance between the two.

4. Emotional – Phlegmatic (median stanine score = 3)

Preferred: Emotional

Description:

- Inclined to be anxious in social settings

5. Reserved – Gregarious (median stanine score = 2)

Preferred: Reserved

Description:

- Cool and introspective
- Prefers to work alone
- Enjoys own company
- Aloof and detached

6. Genuine – Persuasive (median stanine score = 4)

Preferred: Genuine

Description:

- Forthright
- Honest and open
- Genuine and sincere

7. Composed – Contesting (median stanine score = 7)

Preferred: Contesting

Description:

- Ambitious and competitive
- May take on too much work
- Works long hours

8. Optimistic – Pessimistic (median stanine score = 7)

Preferred: Pessimistic

Description:

- Resigned
- Have little faith in their ability to determine events

9. Abstract – Pragmatic (median stanine score = 8)

Preferred: Pragmatic

Description:

- Down to earth and concrete
- Practical and realistic

- More concerned with 'how' then 'why'
- Bring a realistic, practical approach to problem solving

10. Neurotic (median sten score = 7)

Description: The operators included in the study appeared to be highly anxious and stressed. This high rating on the neurotic scale may reflect the highly stressful nature of the mechanised harvesting task. Smith & O'Rorke (1999) have already indicated that many of the job dimensions characteristic of stressful occupations as outlined by Shaw and Riskind (1983) are prevalent in the mechanised harvesting task. These include: performing controlled activities, exchanging job related information, being in a stressful, unpleasant working environment and being exposed to hazardous job situations. The high levels of mental work load associated with the task have also been indicated (Sullman and Kirk 1998) which is considered by many to be a strong indicator of stress in an occupation (Meshkati, Hancock & Mansour 1990). The contention that harvesting task is a stressful one again finds support in the current study.

11. Extroversion – Introversion (median sten score = 3)

Preferred: Introversion

Description: People favouring this end of the scale tend to feel uncomfortable in social situations and will withdraw from the social arena. They will not feel much need to exchange views with others and often are happiest engaged in solitary activities that do not involve constantly having to interact with people.

12. Open to ideas – Tough minded (median sten score = 1)

Preferred: Tough minded

Description: These people are generally realistic, practical and conservative in their attitudes. They are inclined to reject the abstract in favour of more concrete and tangible solutions to problems. They prefer 'tried and tested' solutions and are often better at implementing ideas then generating them.

13. Independent – Agreeable (median sten score = 4)

Preferred: Agreeable

Description: Deliberating, cautious, passive and accommodating.

14. Unconstrained – Conforming (median sten score = 6)

Preferred: Unconstrained

Description: Tolerant and open in their attitudes.

The preferred recommendations for each of the scales could potentially be used as a guide in assessing whether of not a job applicant or prospective operator is suited to the mechanised harvesting position. It is important to remember however that there may be exceptions to the ideal profile who still fulfil the requirements of making a successful operator. Further work will need to be conducted in order to further develop and refine the ideal profile and it is essential that the recommendations provided by the profile are compared to performance criteria.

SELECTION PROCEDURE OPTIONS

On the basis of the initial validation findings, a number of potential selection procedure options can be tentatively recommended for the selection of mechanised harvester operators. What follows are three different selection options. It is important to bear in mind that the quality of the procedure and the decision that it helps to produce is potentially weakened each time a method is excluded from the process.

Option 1: All of the recommended methods

The best option available for use by a contractor would be to use all of the recommended selection procedures. This would involve the following order of assessments:

Application Form > General Reasoning Test > Mechanical Reasoning Test > Occupational Personality Profile > Structured Employment Interview > Reference Check > Final selection decision.

Option 2: The second option excludes the mechanical reasoning test and the occupational personality profile.

Application Form > General Reasoning Test > Structured Employment Interview > Reference Check > Final selection decision.

Option 3: Application form, structured interview and reference check

The third option excludes all psychometric testing procedures and only includes the application form, the structured employment interview and the reference checking procedure.

Application Form > Structured Employment Interview > Reference Check > Final selection decision

DISCUSSION

Problems that there may be with using the recommended methods

Research conducted in New Zealand (Dakin & Armstrong 1989, Harris 1991, Mills 1991, Taylor, Mills & O'Drisscoll 1993, Keelty 1998) and overseas (Ahlburg 1992, Keenan 1995) has indicated that there is a large gap between what is recommended in the research associated with personnel selection and what is actually done in applied settings. Recent research conducted in this country has found that there are a number of explanations for this research – practice gap (O'Rorke 2000), and a number of these explanations are particularly relevant to the logging industry.

In the research, nine of the most useful selection methods as indicated in the literature

(Schmidt & Hunter 1998) were presented to practitioners who were asked to indicate how frequently they made use of each of them during the selection of personnel and also to indicate the four most important reasons for why they would not always make use of the methods. All of the methods that have been recommended to be used in relation to the mechanised harvesting task were amongst the nine included and as such the explanations associated with why they are not always used may help us to understand why the methods may not be utilised in forestry. The major explanations provided for why practitioners would not always make use of the methods during the selection procedure are presented in Table 13.

Selection Method	*Major explanation for not using*
Structured Employment Interview	• Insufficient time to implement the method. • The method is not relevant to the industry, organisation or position. • Reluctant to adjust the current selection process that is used.
General Mental Ability Testing	• The method is not relevant to the industry, organisation or position. • The cost of the method is too high for its potential value. • A lack of management/organisational support of the method. • Insufficient time to implement the method.
Job Knowledge Testing (mechanical reasoning test)	• The method is not relevant to the industry, organisation or position. • I am unaware of the method. • Insufficient time to implement the method. • I do not know enough about the method.
Reference Checking	• Insufficient time to implement the method. • A lack of management/organisational support of the method. • The method is not readily available to be used.
Personality Testing	• The cost of the method is too high for it's potential value. • The method is not relevant to the industry, organisation or position. • The method is not very effective. • A lack of management, organisational support of the method.

Table 13- major explanations for not using the recommended selection methods (from O'Rorke 2000).

As can be seen in the above table, some of the major reasons why people do not use the methods that are recommended in the research are because they believe that the methods are not relevant to the industry/organisation or position, developing the use of the methods is not a priority, there is a lack of management / organisational support of the methods, there is insufficient time to implement the methods, practitioners are uncertain of the usefulness of the methods, and a belief that the cost of the methods are too high for their potential value. Other explanations that are likely to be important within the forestry industry are 'I am not qualified to use the method' and 'the method is not readily available to be used'. The explanation of 'I am uncertain of the usefulness of the method' may also be an issue, but it is anticipated that this report and others like it will help to establish the fact that the methods are useful and should be utilised within the forestry industry.

The cost associated with the psychometric testing methods could also be an issue which undermines the likelihood of use. Preliminary work conducted by Performance Improvement Ltd, a consulting company for the forest industry, has found that contractors are unwilling to expend $400 on psychometric testing. This cost would however be recouped and is a problem in as much as contractors do not understand the value associated with the employee selection process and the unique role that testing plays in that process.

Another issue that is important in relation to the forestry industry is the lack of recruitment base or market associated with the industry in general and the harvesting position in particular. Birchfield (2000) argues that there is an essential element missing within the forestry industry on the East Coast – the manpower. He asserts that all of the forestry companies that were consulted in the area mentioned labour shortage problems. Until the number of people wanting work in the forestry industry increases, the utility of the procedure is not as high as it could be. The problems associated with the small recruitment base are related to much larger issues such as the public perception of the forestry industry. Research has found that there are serious issues associated with the way the industry is perceived, particularly in relation to remuneration (Gaskin, Smith, & Wilson 1989), safety (Smith 1992), and career opportunities (Gaskin, Smith & Wilson 1989).

A possible solution to this would be that Waratah engineering themselves take responsibility for selecting the individual that would be most successful out of a crew. This could be done when a contractor purchases a harvester. Waratah could assert that they are able to identify who out of their crew would make the best operator and conduct the selection procedure on behalf of the contractor. They could then provide recommendations about who they believe would be most suitable for the position.

Discussion about the recommended methods

Overall, the initial validation studies have provided very promising results. The general reasoning test, mechanical reasoning test and occupational personality profile all received good ratings by industry personnel during the face validity assessment. Although both the mechanical reasoning test and the spatial reasoning test do not appear to be correlated with the performance criteria that was used in the concurrent validity study, this is more likely attributable to the small sample size used and the quality of the performance ratings rather then the ability of the tests to discriminate between workers. In addition to this, all of the operators included in the assessment were able to perform at an acceptable level on the mechanical reasoning test in terms of their raw scores. The possibility of utilising a benchmark score on the test for selection purposes was discussed. It appeared as if the operators included in the study struggled with the spatial reasoning test. In addition to this, the test received a poor face validity rating and should not be used for the selection of mechanised harvester operators. The structured employment interview provided in the report will also be assessed during the next stage of research as will the use of the application form and reference checking procedure.

Encouraging results were also found in relation to the occupational personality profile. Industry people appeared to view the test in a very positive manner, which indicates that it would be received positively if used during the selection process. In addition to this, the ideal profile has provided some interesting insight into the type of person best suited to the harvesting task. The profile does however need to be further developed and compared against performance criteria.

More test data will need to be collected in order to further assess the relationship between the criterion and test performance. A sample of 30 will provide a useful basis upon which to assess the usefulness of the tools. In order to accomplish this, the forestry industry needs to commit to improving their approaches to forestry worker selection in general and machine operator selection in particular. In addition to this, some other form of performance data will be need to be obtained. Ideally this would involve some form of objective assessment such as the quality, independent log making audits that are provided by Interpine.

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APPENDIX A: STRUCTURED EMPLOYMENT INTERVIEW FOR THE MECHANISED HARVESTING TASK

Competency- Log making ability		
Interview Question	*Answer- Notes*	*Rating*
Can you please describe the type of experience that you have had with log making. Was this of a manual or mechanised nature?		
Could you please describe a situation in the past when you have had to produce a large amount of logs under a tight time frame. How did you respond to the situation?		
Imagine that you have been asked to give a lecture to a group of Japanese tourists on some of the factors that can slow down performance on the harvesting task. Describe as many of these as you can		

Competency- Mechanical Ability		
Interview Question	*Answer- Notes*	*Rating*
How much experience have you had in the past with operating mechanical equipment? Have you had any experience with operating a mechanised harvester?		
Describe to me a time when you have encountered a mechanical problem. How did you fix the problem?		
Imagine that you are just about to begin a days processing in a Waratah hydraulic harvester. What are some of the things that you would do before you started processing?		

Competency- Computer Knowledge		
Interview Question	*Answer- Notes*	*Rating*
In the mechanised harvesting position you may have to use a computer-based display. Describe to me some of the ways that you have made use of computers in the past.		
Imagine that you are operating the computer in a harvester and you encounter a problem that you are not sure about. What would you do to fix the problem		

Competency- Positioning Machine & Logs		
Interview Question	*Answer- Notes*	*Rating*
Tell me what work experience you have had with the positioning of a harvesting machine for the purposes of processing a bunch of felled trees.		
Imagine that you are supervising a new harvester operator who is just learning how to position the machine and logs for ease of processing. What advice and instructions would you give him to ensure that he had adequate reach and space available?		

Competency- Drive Machine Base		
Interview Question	*Answer- Notes*	*Rating*
Have you had any previous experience with driving an excavator base? If so in what way and how much have you had?		
Imagine that you have been asked to teach a new crew member how to drive an excavator base. What are some of the things that you would tell him?		

Competency- Awareness of Safety		
Interview Question	*Answer- Notes*	*Rating*
Can you please describe any type of safety training that you had in the past. Are you aware of any standard operating procedures for machine use, hazard identification procedures or OSH guidelines? If so what are they?		
Based on your own experience, can you tell me an example of when you exhibited safe working behaviours?		
Imagine that you are operating in a tight environment with skidders and manual loggers all working very closely with each other. What are some of the things that you would do to ensure your own safety and the safety of those around you in that situation.		

Competency- Personality Characteristics- Initiative, Flexibility, Stress tolerance		
Interview Question	*Answer- Notes*	*Rating*
Can you give me an example of how you have in the past taken the initiative and worked without supervision.		
Describe to me a situation where you have had to identify a problem by yourself and solve it.		
Can you tell me about a time when you have had to adapt to a change in work schedules and deadlines? How did you respond to the change?		
Can you tell me about a time in your past when you had to remain calm while everything around you was out of control and stressed?		
Imagine that you are working in a situation where there is a lot of stress. How would you manage the stress?		

Competency- Participate as Part of a Team		
Interview Question	*Answer- Notes*	*Rating*
How much experience have you had in the past with working or being a part of a team?		
Can you describe to me some of the times when you have had to work with others on a particular task.		
Describe to me a time when you contributed positively to the performance of a group.		

APPENDIX B: APPLICATION FORM FOR THE MECHANISED HARVESTING TASK

Instructions

Please complete all of the sections. Print your responses clearly.

Personal Details

Name:
Address:
City:
Phone:

Physical Fitness

Do you consider your health to be (please circle):

Very Poor **Poor** **OK** **Good** **Very Good**

Do you consider your eyesight to be:

Very Poor **Poor** **OK** **Good** **Very Good**

Do you wear glasses?

Yes **Sometimes** **No**

Did you have any trouble getting your drivers licence due to your vision?

Yes **No**

Training

Have you had any training that may be relevant to the mechanised harvesting position? (FIRS modules etc. Safety training is also relevant).

Employment History

Please describe your last four positions of employment:

Organisation/Contractor:	Period Employed:	Role:
Role Responsibilities:		
Outstanding Achievements:		
Reason for leaving		

Organisation/Contractor:	Period Employed:	Role:
Role Responsibilities:		
Outstanding Achievements:		
Reason for leaving		

Organisation/Contractor:	Period Employed:	Role:
Role Responsibilities:		
Outstanding Achievements:		
Reason for leaving		

Organisation/Contractor:	Period Employed:	Role:
Role Responsibilities:		
Outstanding Achievements:		
Reason for leaving		

APPENDIX C: PERFORMANCE APPRAISAL FORM

Produces required amount of logs to the specified standard

1	2	3	4	5
Consistently fails to meet expectations	*Occasionally fails to meet expectations*	*Meets expectations*	*Occasionally exceeds expectations*	*Consistently exceeds expectations*

Fixes and maintains the machine

1	2	3	4	5
Consistently fails to meet expectations	*Occasionally fails to meet expectations*	*Meets expectations*	*Occasionally exceeds expectations*	*Consistently exceeds expectations*

Inputs into crew functions

1	2	3	4	5
Consistently fails to meet expectations	*Occasionally fails to meet expectations*	*Meets expectations*	*Occasionally exceeds expectations*	*Consistently exceeds expectations*

Maintains the safety of self and others

1	2	3	4	5
Consistently fails to meet expectations	*Occasionally fails to meet expectations*	*Meets expectations*	*Occasionally exceeds expectations*	*Consistently exceeds expectations*