



The case for and basics of scientific selection—a line manager's perspective

by M.K. Pelsler*

Introduction

The purpose of this paper is not so much to provide a scientific study of the selection process for the perusal of other psychometrists or industrial psychologists—the purpose is to provide line management with a practical, relatively user-friendly guide to fair and scientific selection.

The main areas that are to be covered are:

- Why fair and scientific selection?
- Job analysis
- The job requirement—selection technique circle
- Assessment centres in the mining industry—the Tavistock Collieries Ltd experience.

Why fair and scientific selection?

Seen from a line manager's perspective, fair and scientific selection should be pursued for two main reasons:

- to remain within the ambits of the law
- to maximize the probability of selecting the potentially most productive and efficient candidate for the job.

Remaining within the ambits of the law

The Constitution of RSA 1996 in Chapter 3: Fundamental rights states:

8. (2) No person shall be unfairly discriminated against, directly or indirectly, and, without derogating from the generality of this provision, on one of the following grounds in particular: race, gender, sex, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture or language.

This section is further qualified by:

8. (3) (a) This section shall not preclude measures designed to achieve the adequate protection and advancement of persons or groups or categories of persons disadvantaged by unfair discrimination, in order to enable their full and equal enjoyment of all rights and freedoms.

and:

8. (4) Prima facie proof of discrimination on any of the grounds specified in subsection (2) shall be presumed to be sufficient proof of unfair discrimination as contemplated in that subsection until the contrary is established.

The essence of section 8.(2) and 8.(3)(a) are all also encompassed in the Labour Relations Act 66 of 1995, Transitional Arrangements, Part B—Unfair Labour practices. It, however, further qualifies the concept of unfair discrimination by the specification:

*2. (1) for the purposes of this item, an unfair labour practice means any unfair act or omission that arises between an employer and employee, involving—
(b) the unfair conduct of the employer relating to the promotion, demotion or training of an employee...*

In essence, for the line manager in the mining industry, this reduces to:

- It being essential that all techniques used to make a selection, promotion or training decision, is defensible, i.e. one has to be able to *prove* that the selection process was fair and that no person was unfairly discriminated against.
- Selection exercises designed to select affirmative action candidates are not seen to be discriminatory, since these measures are specifically excluded by 8.(3)(a) in the Constitution.
- The 'reversal of onus' concept, i.e. the assumption that management is guilty until proven innocent.
- What is of particular concern, is the fact that *prima facie* evidence alone is seen to be adequate proof that discrimination has, in fact, occurred.

To illustrate this concept, let us assume that one wants to select two Mining Supervisors/Shiftbosses. There are five black and five white applicants. On completion of your selection exercise, two white candidates are selected. The mere fact that the candidates who were selected were both white, is presumed to be sufficient proof that management is guilty of discrimination and the onus is thus on management to prove that the discrimination was not unfair.

Maximizing the probability of selecting the potentially most productive candidate for the job

Having focused on the law, the perception might, understandably, arise with line managers that fair and scientific selection is being enforced with yet another 'big stick'.

However, there are also decided benefits for management in using scientific selection techniques to maximize the probability of selecting the correct candidate for the job. We all agree that individuals differ in terms of their capabilities, competencies and interests. Because of these differences individuals have different probabilities of success in different positions. The aim of fair and scientific selection techniques is to identify from a pool of candidates, the candidate most

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The case for and basics of scientific selection—a line manager's perspective

probable to be effective in the job for which selection is being done—thus enhancing productivity.

Bearing in mind that productivity enhancement is probably the main objective of managers in the mining industry, it seems as though good scientific selection has the potential to make a valuable contribution towards the achievement of line management objectives and thus adding value.

Job analysis

Introduction

The logical starting point for any scientific selection procedure is a thorough and sound job analysis. It makes inherent sense that one cannot select a person for a job if one does not know what one would require from a successful job incumbent. It is necessary to establish what one wants this potential job incumbent to be able to *do*.

Job analysis techniques

In order to scientifically pinpoint these requirements, one would use a combination of job analysis techniques.

There are various job analysis techniques available, amongst others, the Position Analysis Questionnaire (useful for positions up to approximately Patterson C5), the Work Profile System (useful for managerial positions—approximately Patterson D1 and above), the Critical Incident Technique (useful to provide more qualitative information) and the Repertory Grid (useful to determine what the particular line manager who is wishing to select a candidate, finds important for the successful completion of the job—although not very defensible in the writer's opinion).

The focus of a job analysis exercise should be to obtain both quantitative and qualitative data on the requirements of the job. In this way one can employ selection techniques that are based on *bona fide* job competencies and thus will be defensible.

Job analysis and defensibility—an example

Using a relatively simplistic example to illustrate the concept:

A very petite woman applies for a Mine Stores Assistant vacancy together with four other women and one man. She is not interviewed for the position and a male is appointed. The mere fact that a male is appointed constitutes *prima facie*, and thus sufficient, evidence that she was unfairly discriminated against and the onus is on the management of the company advertising the vacancy, to prove that the discrimination was not unfair.

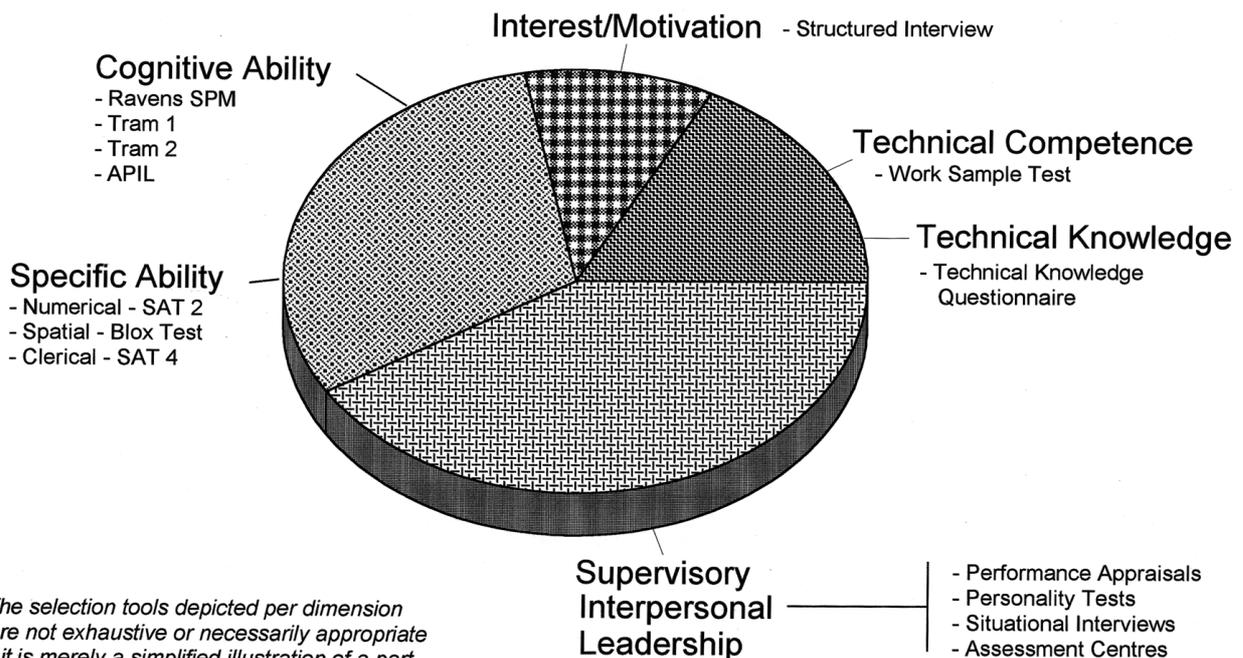
Scenario 1:

No job analysis was done. It will be very difficult for management to prove that they were not guilty of unfair discrimination.

Scenario 2:

The Position Analysis Questionnaire was administered on the job before the selection for this position was undertaken.

Dimensions that were weighted high, amongst others, were explosive strength (ability to lift heavy objects) and fatiguability (stamina). Qualitative job observation indicated that these dimensions were rated as important job competencies due to the fact that the incumbent is required to lift boxes weighing 25–30 kilograms onto shelves at shoulder level on a regular basis. (Bear in mind that this is a simplistic example, i.e. the non-existence of equipment such as forklifts is assumed.)



Note: The selection tools depicted per dimension are not exhaustive or necessarily appropriate - it is merely a simplified illustration of a part of the selection process.

Figure 2—The Job-Requirement Selection Technique circle

The case for and basics of scientific selection—a line manager's perspective

Therefore, the company designed a work sample test as the first screening test of their selection process. The test required candidates to lift three 25 kg boxes in succession onto a shelf at shoulder level. Due to the fact that the lady was not capable of lifting any of the boxes to the required height, she was not considered for the interview.

Although the scenario is oversimplified, the company should hypothetically be able to defend itself, due to the fact that sound job analysis was done and the selection technique applied, was based on a *bona fide* job competency and thus was fair. The selection process did not unfairly discriminate against the applicant on the basis of her gender, since there are many women who *can* lift three 25 kg boxes in succession to shoulder height. It discriminated fairly based on a *bona fide* job competency.

Quoting from the Labour Relations Act 66 of 1995, Transitional Arrangements, Part B—Unfair Labour Practices:

2.2.(2)(c) Any discrimination based on an inherent requirement of the particular job does not constitute unfair discrimination.

The job requirement—selection technique circle

Once a job analysis has been done, it is probable that the core capabilities and competencies required of the successful incumbent of the job would have been identified. The next question is: How is one going to measure these competencies and capabilities in order to determine which applicant is most likely to be successful in the position for which selection is being done?

In order to simplify the process, it can be assumed that any job can be divided into quadrants of varying sizes (see Figure 1).

These are:

- a) cognitive or specific ability
- b) technical competence
- c) interest/motivation
- d) supervisory/leadership/interpersonal skills.

Cognitive and specific ability

What are we attempting to measure?

Cognitive and specific ability refer to the capability of a candidate to learn and be successful at a particular job. These would involve, amongst others, aspects such as: learning potential (i.e. ability to acquire new knowledge and skills), spatial ability, clerical ability and numerical ability. It is essential that these abilities can be defended as *bona fide* job requirements and are supported by sound job analysis.

How could we measure it?

These abilities are relatively easy to assess using relevant psychometric tests such as the APIL Learning Potential Battery, TRAM 1 and 2 Learning Potential Battery, Ravens Standard Progressive Matrices, Blox Test and so forth. The technical details of the implementation of these tests and the potential pitfalls (and there are many) in terms of administration, scoring, the use of norm tables, the integration of scores, culture fairness and so forth, will not be covered in this paper.

Technical competence/knowledge

What are we attempting to measure?

The technical knowledge and competence sphere is the sphere which traditionally (and quite rightly so) has been the greatest concern of line managers. It is also the sphere that needs most line management input.

By way of example one would assume that a Drill and Blast Overseer on an opencast mine would want to select a Blaster who knows how to connect a blasting field according to the blasting procedure and knows how to treat misfires.

Similarly, a Plant Foreman would want to select a Shift Foreman who knows how to do simple calculations such as 'clean coal yield' and 'discard yield' and furthermore knows what to check for on the magnetite separator when magnetite consumption is high.

It is probable that the technical knowledge/competence required will vary by company/area of responsibility.

It will, for example, be more important for the Drill and Blast Overseer to know the details of cast blasting at Arthur Taylor Colliery Opencast Mine than it would be for the Mine Overseer at South Witbank Coal Mine.

Likewise, detailed cast blasting knowledge will doubtlessly be more important for the Drill and Blast Overseer than for the Coaling Overseer position.

How could we measure technical knowledge/competence ?

This sphere is essentially assessed in two ways:

For *technical knowledge* a questionnaire is drawn up by line management and administered in either written or oral format. Due to the technical nature of the questions, line input is also required in the evaluation of these questionnaires.

For *technical competence* a work sample test is usually developed and administered. For a potential Personnel Officer (IR) who is required to take minutes on a regular basis, this might involve the taking of minutes of a videotaped meeting. For the selection of a potential Dozer Operator this might involve the demonstration of slotdozing on a training dozer.

Interest/Motivation

What are we attempting to measure?

This is the most fuzzy and subjective sphere to assess and is thus also usually given the lowest weighting in terms of overall integration of scores.

In essence, within the Engineering department, for example, this sphere might yield data on whether or not an artisan is interested in becoming a foreman—some artisans enjoy the trade *per se* (with the bonus accompanying it!) and are not interested in becoming Engineering Supervisors / Foremen.

It would also yield information on specialization fields, i.e. a potential apprentice might only be interested in becoming an Electrician (a common phenomenon) and not be interested to be trained in any other trade.

How could we measure interest/motivation?

This sphere is usually assessed by the use of a structured interview. An interview is *structured* in as far as the questions are standardized before the interview and applied

The case for and basics of scientific selection—a line manager's perspective

to every candidate in the same format.

Supervision/leadership/interpersonal skills

What are we attempting to measure?

As most line managers in the mining industry will be able to tell you—this is probably the most critical sphere in the production environment for any employee who has subordinates reporting to him/her.

The Position Analysis Questionnaire highlighted a dimension score of .99 for the Shiftboss/Mining Supervisor position; .98 for the Engineering Foreman/Supervisor position; and .99 for the Plant/Shift Foreman (out of a potential score of 1.0).

Due to the fact that the company did not have an instrument to measure this sphere in the early days of implementing scientific selection techniques at Tavistock Collieries Ltd, a critical error was made in terms of the omission of the measurement of this sphere in our battery designed to identify Affirmative Action candidates for a one-year development programme designed to equip them to become Metallurgical Shift Foremen. A candidate who had demonstrated excellent cognitive ability as well as technical competence, proved not to have the supervisory/interpersonal skills to cope with the position and had to be reassigned to his original occupation following his probation period.

Due to the fact that JCI had committed itself to the implementation of Affirmative Action and that these positions, i.e. Shift Foreman (Metallurgy), Shiftboss and Engineering Foreman, were ultimate target positions for Affirmative Action appointments, it was essential to find an assessment technique that had face validity, was defensible, was culturally fair, would enjoy line management support, would supply the potentially most competent supervisors and identify training needs for all candidates assessed.

How could we measure supervision/leadership/interpersonal skills?

Before June 1994, there were four options that could be pursued to assess this sphere at Tavistock Collieries Ltd.

- ▶ Performance appraisals, which are highly subjective and subject to rater error.
- ▶ Personality questionnaires, which tend to be very culturally biased and contentious in terms of their capacity to make consistent and valid predictions in terms of supervisory/leadership/interpersonal ability.
- ▶ Situational interviews, which are more scientific, but are time and labour intensive, since a specific, extensive interview has to be developed by the line manager in conjunction with a human resource practitioner with extensive expertise in the selection sphere, for every position.
- ▶ Assessment Centres, which comprise of a series of exercises (e.g. in basket, leaderless group, roleplays, business games) specially developed to reveal important management/supervisory and interpersonal behaviours, which are assessed by a panel of assessors.

The Assessment Centre route was ultimately pursued.

THE TAVISTOCK EXPERIENCE

Introduction

After extensive research by the Organizational Development Department, it was ultimately decided to use Dr Eric Charoux from 'The Leadership Concept' as consultant for the development of a Mining Industry-specific Assessment Centre, due to the fact that he has extensive experience (approximately 13 years) of Assessment Centres in the South African context and is extremely well-versed in the theoretical processes, practical problems, validity and fairness issues involved in identifying supervisory potential in cross-cultural contexts. He was at the time one of the only consultants who had developed and empirically validated Assessment Centres for the identification of black and white supervisory potential at both the C/D and B/C Patterson Band interfaces. All of the above would obviously contribute to the defensibility of the selection process, were it to come under legal scrutiny.

The focus of this section will be the centrality of line management in the entire Assessment Centre implementation process—probably one of the main reasons for the successful implementation of the process at Tavistock Collieries Ltd.

Preparing for implementation

'The Leadership Concept' consultants during the job analysis stage liaised with line management and actual job incumbents on-the-job (this included underground job observations) to determine what the critical performance areas in the target positions were and to identify the typical tasks, problems, and crises that job incumbents would typically face.

Exercises for the various levels of supervision, were developed, e.g.

- ▶ the B4—C1 interface (i.e. the move from Underground Teamleader to Miner)
- ▶ the B4—C2 interface (i.e. the move from Senior Plant Teamleader to Shift Foreman)
- ▶ the C1—C5 interface (i.e. the move from Miner or Artisan to Shiftboss or Engineering Foreman/Supervisor respectively)
- ▶ the C5—D2 interface (i.e. the move from Shiftboss or Engineering Foreman/Supervisor to Engineering Overseer or Mine Overseer).



Figure 1—Assessment Centre candidates preparing for the group exercise

The case for and basics of scientific selection—a line manager's perspective

Throughout, face validity was seen to be important i.e. the exercises were developed to approximate typical events in a hypothetical mining context.

These exercises were then presented to a target group of line managers to reaffirm face validity and correctness of the exercises. Line management also decided on the weightings of the various dimensions (amongst others analytical/problem solving ability, assertiveness, persuasiveness and initiative) in order to determine the overall assessment rating.

Once the exercises had been finalised, assessors were selected for training. Again, the importance of the line manager in the process was acknowledged by the selection of six line assessors (D1 and above) selected cross-departmentally. After all, there is no-one better placed to make judgments about the behaviour of individuals in a mining context, than line managers in the same mining context. Two administrators from the Human Resources department were also trained.

The Assessment Centre process at Tavistock Collieries Limited

One Assessment Centre per month is scheduled, alternating amongst the Mining, Engineering and Metallurgy departments.

The typical programme for such an Assessment Centre would be

Assessment Centre—Day 1

- ▶ Candidates complete in-basket (for D2 Assessment Centre) or scheduling exercise. This is a written exercise.
- ▶ Candidates complete two different roleplays to assess counselling, disciplining and persuasive skills. These are taped on either video or cassette in order for assessors to assess the roleplays after the candidates have returned to work.
- ▶ At the end of day one, candidates complete a leaderless group exercise which the assessors can assess whilst the exercise is in progress or which could be videotaped for assessment once the candidates have returned to work.
- ▶ After closure with the candidates, three assessors start assessing the in-basket or scheduling exercise.

Assessment Centre—Day 2

- ▶ Assessors complete the assessment of the two roleplays.
- ▶ Scores are integrated to obtain an overall assessment rating.

Post Assessment Centre Activities

- ▶ Administrator completes computerised report per candidate (This encompasses the score achieved by the candidate on every dimension assessed; justifications for every score i.e. the citation examples of the strong or weak points demonstrated on particular exercises per dimension; and recommendations for improving those dimensions on which the candidate obtained average or weak scores.)
- ▶ Administrator organises feedback sessions. These feedback sessions involve the candidate, his or her supervisor and the administrator. The feedback session

facilitates transparency, serves as a starting point for development interventions and makes the supervisor involved in both the selection and development process.

Assessment Centres at Tavistock Collieries Ltd—an evaluation

The implementation of Assessment Centres at Tavistock Collieries Ltd has been very successful. It definitely enables us to make more accurate predictions of the potential success of candidates in supervisory positions. Its particular strength has been in the identification of candidates who had not had the opportunity of displaying their supervisory and interpersonal skills.

For example the Assessment Centre was part of a selection battery devised to select Affirmative Action candidates at Arthur Taylor Colliery Opencast Mine for a fast-track development programme in order to equip them to be effective Mining Supervisors within a two-year period. Amongst the top candidates was a 777 truck-operator who had never had the opportunity to do anything other than operate the 777 truck. In the Assessment Centre, he by far outperformed even those candidates who had had junior supervisory exposure. In his development year, he was sent to complete his N1 Surface Mining on a full-time basis and ultimately was awarded the 'Nordberg Best N-level Student Floating Trophée 1995' by the Institute of Quarrying South Africa.

In the writer's opinion, one of the main reasons for the success of the Assessment Centre process has been line management's buy-in, involvement with, and commitment to the process.

On the downside, although the Assessment Centre has proved to be an excellent tool for selection decisions, more particularly for the early identification of supervisory potential, it has been less successful as a development tool, due to the fact that the focus of an Assessment Centre is, by definition, assessment. Training recommendations made in the feedback session, tend not to be adequately addressed in this forum. Tavistock Collieries is in the process of looking at the possibility of implementing learning centres specifically for this purpose.

Conclusions

In this paper the focus has been on the reasons why fair and scientific selection should be employed and the methods that can be used to maximize the probability of selecting the correct person for the job, with particular focus on the role and frame of reference of the line manager.

It is, however, necessary for us to see scientific selection exercises in context. After having completed a fair and scientific selection exercise, we do not have a 100% guarantee that we have selected the most appropriate candidate for the job. The objective is to *maximize* the probability of selecting the most appropriate candidate.

A line manager who tells you that the best way to select a candidate for a position is to appoint him/her in that position, would be 100% correct—the best predictor of future job performance in a particular position is actual performance in the same or similar position.

Unfortunately in the real world, this is usually not possible. Most Production Managers would be very reluctant

The case for and basics of scientific selection—a line manager's perspective

to put an unknown applicant for a Dragline Operator position on the Dragline for a week to ascertain his/her competence.

Thus, in most real world mining situations, it would be necessary to use other techniques to ensure that the best candidate is selected—it is proposed that a fair and scientific selection process, based on *bona fide* job competencies, is seriously considered.

Acknowledgements

The contributions of the following JCI Ltd staff, more particularly Heidi Wheeler, who did much of the pioneering work in this field and the rest of the OD Unit, Mr M H Rogers, previous General Manager of Tavistock Collieries Ltd and Mr C J Van Heerden, previous Manager Manpower, for their

support during the implementation phase of a concept, which was at the time a relatively novel one; Mr P M Coetzer, General Manager Tavistock Collieries Ltd and Mr P C Henderson, Manager Personnel Services, for their current support and most particularly Tavistock Collieries Ltd Line Management for their previous and ongoing support, are gratefully acknowledged.

The kind agreement of Dr Eric Charoux to include the section on the Leadership Concept's FAIR process (Assessment Centre) is also appreciated.

Reference

The South African Society for Industrial Psychology (1992). *Guidelines for the Validation and Use of Personnel Selection Procedures.* ◆

Introducing a new Council member



Dr L.A. Cramer was born in Berlin, Wisconsin, USA. His initial years were spent in modelling concentrator operations and in the application of various process control strategies. Thereafter he progressed to the middle management ranks in various minerals processing facilities: antimony, platinum group metals,

copper, uranium, gold and silver operations. These experiences gave Dr Cramer considerable exposure to the unit operations of crushing, ball milling, autogenous milling, flotation, liquid-solid separation, ion exchange, leaching, solvent extraction and tailings disposal. In later years he assumed management responsibility for smelting, base metal and precious metal refining facilities; as these were at a senior management level there was little detailed technical exposure in those areas but broad conceptual understanding of the technical issues was required to drive the many changes needed to improve the operations' competitiveness. On several occasions he was intimately involved in minerals processing design for new capital projects, commissioning and, to a lesser extent, project management. ◆

New appointment at Mintek*



Dr Mike Cortie has been appointed Director of Mintek's Physical Metallurgy Division ◆

* Issued by Mintek, Private Bag X3015, Randburg 2125.