

CHAPTER 2

THE FUNDAMENTALS OF HUMAN PERFORMANCE

2.1 INTRODUCTION

This chapter is the first of three that documents a literature review on the central concepts of this study. The purpose of this chapter is to introduce human performance as the foundation of people's accomplishments, and of outcomes and results in the world of work. This chapter is divided into three sections, discussing the following:

- a definition of human performance;
- human performance models; and
- variables and trends that affect human performance.

2.2 DEFINING THE TERM "HUMAN PERFORMANCE"

The word "performance" denotes a quantified result or a set of results that are obtained. It also refers to the accomplishment, execution or carrying out of anything that has been ordered or undertaken, to something performed or done, to a deed, achievement, or exploit, and to the execution or accomplishment of work (Stolovitch & Keeps, 1992:4). Nickols (quoted by Stolovitch & Keeps, 1992:4) defines "performance" as "the outcomes of behaviour". The adjective "human" is used to qualify the term "performance" to make it clear that the term refers specifically to the performance of people, rather than the performance of machines or other forms of equipment or technology. In short, human performance refers to people's accomplishments, outcomes and results.

2.3 HUMAN PERFORMANCE MODELS

The founders of human performance technology have observed that improved performance was often a consequence of a combination of interventions that

responded to a valid and reliable analysis of a problem or an opportunity. Furthermore, they realized that any single discipline – for example, training, organisational development, or feedback systems – by itself is no longer sufficient to address situations effectively and efficiently. Several models have therefore been developed to help communicate these conclusions (Rosenberg, Coscarelli & Hutchison, 1992:26-27).

In this section, the following seven human performance models are discussed from the perspectives of the different theorists and practitioners:

- Rummler and Brache's model;
- the ACORN model and the BEM developed by Thomas F. Gilbert;
- James H. Harless's model;
- Robert F. Mager and Peter Pipe's Situational Model;
- Rothwell's model for human performance enhancement;
- the TIME performance model; and
- the ASTD's Human Performance Improvement Process Model.

2.3.1 Rummler and Brache's model

One of the cornerstones of human performance is the notion of systems thinking (Piskurich, 2002:7). Authors such as Geary A. Rummler and Alan P. Brache have popularized and operationalized the idea of looking holistically and strategically at organisational problems (in Piskurich, 2002:7). Rummler and Brache (in Piskurich, 2002:8) have labelled and described three distinct parts of an organisation's performance system:

- *The organisation level of performance*
This level encompasses the relationship between the organisation and its market; and it describes the main functions of the organisation, as depicted in its organisational chart of reporting relationships and departmental functions (Piskurich, 2002:8).
- *The process level of performance*
This level considers the work flow across departments. It also

includes the job design, required input and desired outputs, and outlying processes required to support the performance that is being analysed (Piskurich, 2002:8).

- *The job/performer level of performance*

This level focuses on things such as hiring and promotion, individual performance goals, and past levels of performance (Piskurich, 2002:8).

Combined, the above three levels make up the operational fabric of an organisation (Piskurich, 2002:8).

Based on Rummler and Brache's model, Figure 2.1 sets out the organisational performance system.

The three levels of performance	The three performance needs		
	Goals	Design	Management
Organisation level	Organisation goals	Organisation design	Organisation management
Process level	Process goals	Process design	Process management
Job/performer level	Job/performer goals	Job design	Job/performer management

Figure 2.1 Rummler and Brache's nine performance variables

Source: Rothwell *et al.* (2000:54)

One clear strength of Rummler and Brache's framework is that it is based on a systems perspective of the organisation and illustrates the relationship between the three performance levels and the three performance needs (Rothwell *et al.*, 2000:54-55). Probing questions can be asked for each of the nine performance variables to diagnose the current state of affairs. Where there is a lack of congruence or alignment among the levels, or where there are problems or inefficiencies within the matrix, interventions may be recommended to bridge these performance gaps (Rothwell *et al.*, 2000:55).

2.3.2 Models developed by Thomas F. Gilbert

Thomas F. Gilbert developed a classic holistic model for performance and reached several conceptual milestones in describing human performance and how it is analysed. He believed that performance is a function of behaviour (a process or what can be observed as an activity) and accomplishment (what is seen after people stop working). Gilbert differentiated between deficiencies of knowledge, deficiencies of execution, and a combination of these two kinds of deficiency (Rothwell, 2005:150). For Gilbert, any performance system can be analysed from the following six vantage points (Rothwell, 2005:42):

- *the philosophical level* – the beliefs according to which the organisation functions;
- *the cultural level* – the larger environment within which the organisation operates;
- *the policy level* – the missions that define the organisation's purpose;
- *the strategic level* – the plans the organisation has established to accomplish its mission;
- *the tactical level* – specific duties carried out to realize plans; and
- *the logistic level* – all the support activities that help people to perform their duties.

Gilbert developed several important models to describe his ideas – one is the ACORN model, and another the “Behavior Engineering Model” (BEM).

The ACORN model was intended to bring clarity to the mission level and focuses on the following (Rothwell, 2005:42):

- **Accomplishment:**
Is the stated accomplishment a result, not a behaviour?
- **Control:**
Does the performer possess the necessary authority to carry out the accomplishment?

- **Overall objective:**
Does the accomplishment represent the real reason for the job's existence, or is it merely one of several tasks?
- **Reconcilable:**
Is this accomplishment reconciled with, or congruent with, the mission of the organisation and the goals for carrying it out, or is it inconsistent with them?
- **Numbers:**
Can the accomplishment be measured to determine practicality and cost-effectiveness?

Gilbert's other model, the "Behavior Engineering Model" (BEM), is a holistic model that intends to bring a comprehensive perspective to troubleshooting human performance problems or identifying possible human performance improvement opportunities. The model identifies six general aspects of behaviour that can be influenced to improve performance, namely data, instruments, incentives, knowledge, capacity, and motives (Rothwell *et al.*, 2000:61). These six elements can be classified on two levels: those elements possessed by the individual performer that affect performance and those in the work environment that support and affect performance (Rothwell *et al.*, 2000:59-62).

	Information	Instrumentation	Motivation
Environment supports	Data	Instruments	Incentives
Person's repertory of behaviour	Knowledge	Capacity	Motives

Figure 2.2 Gilbert's "Behavior Engineering Model"

Adapted from: Rothwell *et al.* (2000:61)

The BEM is comprehensive and provides a broad perspective to diagnose human performance (Rothwell *et al.*, 2000:59). The goal of the model is to examine all the variables influencing performance – both

in the work environment and at the individual level – and to structure them in such a manner that the desired performance is achieved (Rothwell *et al.*, 2000:63).

2.3.3 James H. Harless's model

James H. Harless focused on the context of an organisation and directed his focus towards human performance on the job. Rather than dividing performance into six areas, as Gilbert did, Harless identified the following three categories that influence human performance on the job (Rosenberg *et al.* 1992:26):

- skill or knowledge;
- the environment; and
- motivation.

Harless's model indicates that all three these areas should be in alignment with the organisation's goals. It also implies that, in addition to analysing influences on performance, it is important to consider who the performers are, what the specific performance is, and how well it is being done. Harless's model presents generic areas of intervention relevant to the influence categories, and it depicts interrelationships among the three areas (Rosenberg *et al.*, 1992:26-27).

2.3.4 Robert F. Mager and Peter Pipe's Situational Model

Robert F. Mager and Peter Pipe's Situational Model differentiates between skill deficiencies, management deficiencies, and a combination of these deficiencies (Rothwell, 2005:150). As depicted by Figure 2.3, Mager and Pipe's model is designed as a flowchart with alternative branches, decision points, and suggested action steps. Thus it provides a systematic process for addressing performance.

Although Mager and Pipe's model has been criticized for its simplicity, it is very effective when troubleshooting a difference between what is and what should be happening.

2.3.5 Rothwell's model for human performance enhancement

By combining the classic elements found in Mager and Pipe's and Gilbert's models, William J. Rothwell (2005:48-49) developed a model for human performance enhancement that can be applied both situationally and comprehensively. The model focuses attention both outside the organisation (from customers, suppliers, distributors, and other stakeholders) and inside the organisation, thus considering the different environments that influence human performance.

Rothwell's model offers a systematic approach to identifying or anticipating human performance problems and human performance improvement opportunities. The model consists of the following steps (Rothwell, 2005:48-50):

- Step 1: Analyse what is happening.
- Step 2: Envision what should be happening.
- Step 3: Clarify present and future gaps.
- Step 4: Determine the present and future importance of the gaps.
- Step 5: Identify the underlying cause(s) of the gap(s).
- Step 6: Select human performance enhancement strategies, individually or collectively, that close the gaps by addressing their root cause(s).
- Step 7: Assess the likely outcomes of implementation to minimize negative side effects and maximize positive results.
- Step 8: Establish an action plan for implementation of the human performance enhancement strategies.
- Step 9: Implement the human performance enhancement strategies.
- Step 10: Evaluate results during and after implementation, feeding information back into Step 1 to prompt continuous improvement and organisational learning.

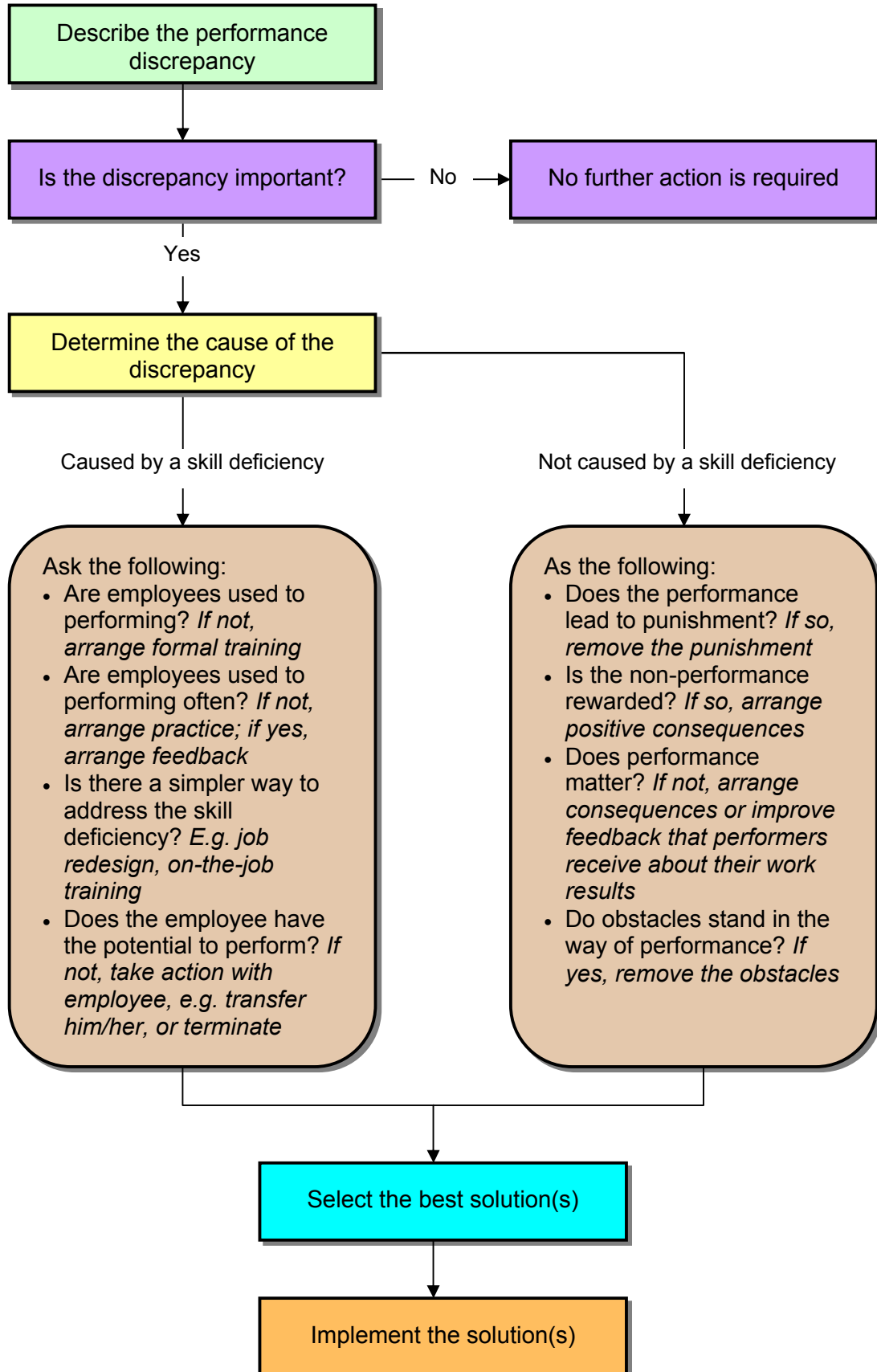


Figure 2.3 Situational model for human performance

Source: Rothwell *et al.* (2000:64)

2.3.6 The TIME performance model

This model analyses a performance problem by focusing on the following four key interrelated components (Main, 2002:109):

- *Training*: The purpose of training is to provide workers with the knowledge, skills and abilities to perform their work.
- *Incentives and motivation*: These include intrinsic and extrinsic factors that may influence a person's will to perform.
- *Environment*: These are the extrinsic environmental factors that influence a person's work and working environment.
- *TIME support mechanisms*: These factors represent the cultural environment and the association of work, worker, and workplace. They all need to be aligned correctly to support the performance system.

The model's four components depend on each other – for performance to run smoothly, all four components must be in harmony. If one component in the model fails, the entire performance system becomes unstable. The centre of the performance model is the point where all of the elements unite to form the point of optimal job performance. At this point, everything is in place for a performer to perform the job at the maximum level of proficiency (Main, 2002:108-109). The model is depicted in Figure 2.4 (next page).

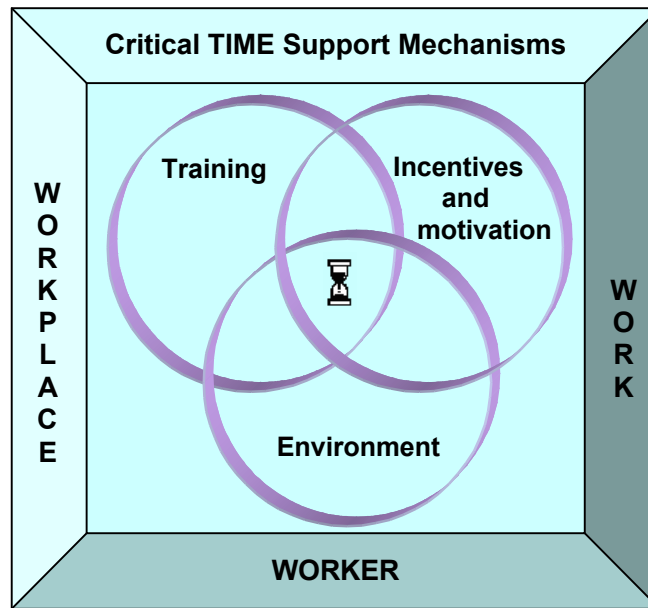


Figure 2.4 The TIME performance model

Source: Main (2002:108)

The TIME performance model can be an effective tool for intervention selection and grouping. Table 2.1 presents Roger E. Main’s (2002:111) list of intervention groups in relation to the TIME performance model’s components.

Table 2.1 The TIME performance model intervention grouping

Component	Intervention group
Training	Interventions that support the acquisition of knowledge, skills and abilities
Incentives and Motivation	Interventions designed to motivate the desired human performance
Environment	Interventions designed to adjust or modify the work environment
TIME Support Mechanisms	Interventions designed to align the key organisational structure components of work, worker, and workplace

Adapted from: Main (2002:111)

2.3.7 The ASTD's Human Performance Improvement Process Model

In 1996, the American Society for Training and Development (ASTD) subsidised research to identify the roles, competencies and outputs associated with human performance improvement. The result was the *ASTD Model for Human Performance Improvement*. It represents the most recent and most formal attempt to identify competencies associated with human performance improvement work (Rothwell *et al.*, 2000:13).

The human performance improvement process model was derived from many sources and was confirmed by means of an expert-based study. Figure 2.5 represents Eduardo Saleh's (2004:2) presentation of the ASTD's Human Performance Improvement Process Model.

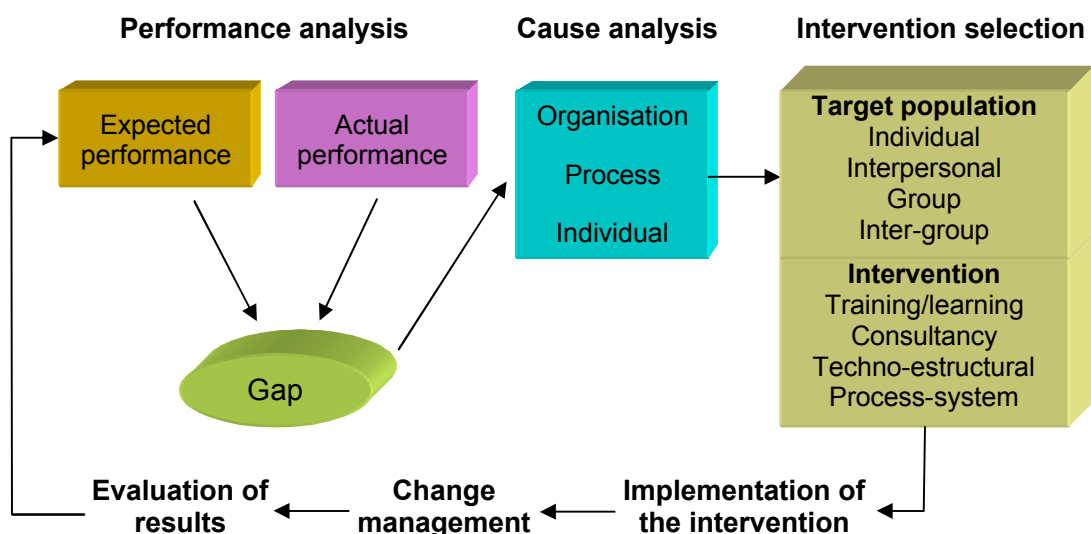


Figure 2.5 The Human Performance Improvement Model

Source: Saleh (2004:2)

The ASTD's Human Performance Improvement Process Model consists of the following six steps, which represent the primary components that are found in most comprehensive performance improvement

frameworks, and that will be discussed in greater detail below (Rothwell *et al.*, 2000:14-15):

- Step 1: Performance analysis
- Step 2: Cause analysis
- Step 3: Selection of appropriate intervention
- Step 4: Implementation
- Step 5: Change management
- Step 6: Evaluation and measurement

2.3.7.1 Step 1: Performance analysis

Performance analysis involves the identification of gaps, or discrepancies in performance (Rothwell *et al.*, 2000:45). The performance gap or discrepancy is the difference between the desired performance and the current performance:

- The *current performance* explains the existing conditions and present level of performance.
- The *desired performance* explains the ideal, or most-wanted, end-results, in other words, what performance will look like when the organisation serves its customers and other stakeholders optimally, is optimally organised internally to promote a high-performance work organisation, and is optimally positioned to encourage efficient and effective work and workers.
- William J. Rothwell (2005:125) defines the *performance gap* as the “difference between what is happening and what should be happening”, or the “difference between the way things are and the way they are desired to be”. In short, performance gaps focus on any deficiency or proficiency that may affect human performance.

Once a performance gap has been identified, it is important also to assess the impact, results, or consequences of the

discrepancy. The following questions should be asked in forecasting the importance of the performance gap (Boyd, 2002:45; Rothwell, 2005:143-144):

- How often does the gap occur?
- What consequences stem from the performance gap?
- What costs and benefits can be estimated for the gap?
- What costs and benefits can be pinpointed for taking action to close the performance gap?
- How do the costs and benefits compare?
- What non-financial measures may be important?
- What is the importance of the identified performance gap?

2.3.7.2 Step 2: Cause analysis

“Cause analysis involves examining the discrepancies identified through performance analysis and determining their root cause(s). In other words, cause analysis attempts to determine the reason for the discrepancy” (Rothwell *et al.*, 2000:46).

The result of the cause analysis should be a clear description of what is causing the performance gaps. The most frequently used techniques for analysing human performance problems are brainstorming, the fishbone diagram, and the five why’s technique (Piskurich, 2002:57-58; Rothwell *et al.*, 2000:67-71). Tools used from root cause analysis methodologies include affinity diagrams, Pareto charts, and scatter diagrams. The following analytical methods can also be used (Piskurich, 2002:58):

- telephonic, written or Internet surveys;
- interviews with key workers with follow-up observation;
- simulated demonstrations and/or live observations;
- panels;
- reviews of performance data;

- interviews of deficient performers and their supervisors or managers; and
- reviews of records such as performance appraisals, Human Resources records, disciplinary actions, lost time histories, or maintenance records.

In addition to the above mentioned tools and techniques, George M. Piskurich (2002:63-64) has also developed a list of “look for” statements that could be helpful during the cause analysis process (see Table 2.2). These statements help the user to gather the data needed to isolate the correct cause(s) of the performance gap.

2.3.7.3 *Step 3: Select appropriate interventions*

The purpose of this step is to formulate a solution that will solve the performance problem by removing its cause(s). One should resist the urge to jump ahead to an immediate solution to a performance problem, or to select the one that simply feels good at the time. The possible interventions should be carefully analysed, so that the most appropriate and effective intervention can be selected (Rothwell *et al.*, 2000:84).

A systematic process should be followed when evaluating and selecting appropriate interventions (Rothwell *et al.*, 2000:91). Rothwell *et al.* (2000:91-107) suggest the following four-step process because they argue that it contains the primary components of a good decision-making system:

- Establish selection criteria, namely the standards, measures or constraints by which potential interventions are evaluated and ultimately chosen.
- Consider alternative interventions, by scanning the list of potential interventions, generating additional interventions, and weighing the alternatives.

- Evaluate each potential intervention against each criterion.
- Select the appropriate intervention(s) and determine its viability.

2.3.7.4 Step 4: Implementation

In this step, the intervention(s) is implemented in a way that is consistent with the desired results and that will help individuals and groups achieve the results they desire (Rothwell *et al.*, 2000:116).

An implementation plan should cover the following elements (Andersen & Fagerhaug, 2006:158, *verbatim*):

- *required activities* – activities that need to be carried out to implement the improvement proposals generated in the problem-solving process;
- *activity sequence* – the order in which the activities must be carried out;
- *organisation and responsibility* – an indication of who is responsible for both carrying out and monitoring the progress of each activity;
- *schedule* – a more detailed plan for when the activities should be carried out, including milestones for key results expected throughout the project; and
- *costs* – estimates of the costs involved in the implementation.

Table 2.2 “Look for” statements to consider in cause analysis

Market/Organisational Level	Management Level	Process/Function Level	Job Performer Level
<ul style="list-style-type: none"> • Look for recent changes in the company. • Look for trends in the company. • Look to see if the gap is isolated within one group or is common throughout the organisation. • Look for new products or services that have been recently implemented. • Look at the current business environment. • Look for reorganisation, consolidation, or mergers. • Look to see if the organisation’s mission or vision has changed. • Look to see if the organisational structure has recently changed. • Look to see if cultural values or norms are changing in the organisation or workforce. • Look for restrictive policies that inhibit worker or organisational performance. • Look at the organisational climate. • Look for linkage between performance and organisational goals. 	<ul style="list-style-type: none"> • Look for distinctive elements that affect achieving the proper performance. • Look for a lack of confidence in the worker’s ability to do the job on the part of managers. • Look for disagreements between managers and workers as to job values. • Look at where authority resides compared to where responsibility is placed. • Look at management’s responsiveness to workers’ needs and complaints. • Look to see if the right people are being recruited and hired. • Look to see if feedback is timely and sufficient. • Look for goals being communicated to all levels. • Look at regular versus special incentives. • Look for compensation commensurate with performance. • Look at how management perceives training programmes. • Look at management’s expectations for training. 	<ul style="list-style-type: none"> • Look for new procedures recently put in place. • Look for new systems or equipment. • Look to see if work processes are optimally organised. • Look to see if the physical environment is conducive to high level performance. • Look at work group priorities and their consistency with performance measures. • Look at communication both up and down the line. • Look for job aids. • Look at materials consumed during performance, their availability and quality. • Look at staffing levels and staffing requirements. • Look for tasks that interfere with each other. • Look for tasks that are boring or socially negative. • Look for safety issues that affect performance. • Look at how training is matched to performance. • Look at what is covered in training programmes. 	<ul style="list-style-type: none"> • Look for trends in work quality. • Look to see if all performers doing the same task have the same problem. • Look for job function changes. • Look for changes in the behaviour of workers or groups. • Look for a lack of confidence in their ability to do the job on the part of the workers. • Look to see if the workers are given enough data and information to do the job properly. • Look for conflicting job demands. • Look to see if performers have sufficient time to do the job properly. • Look for barriers to performance and their sources. • Compare high and low performers. • Look at master/exemplary performers. • Look at job standards and their reasonableness. • Look for clear, personal consequences of poor performance.

Table 2.2 “Look for” statements to consider in cause analysis (continued)

Market/Organisational Level	Management Level	Process/Function Level	Job Performer Level
<ul style="list-style-type: none"> • Look at and listen to corporate history. 		<ul style="list-style-type: none"> • Look at the tools and equipment needed to do the job. • Look at job instructions for clarity and completeness. • Look to see if job instructions are followed. 	<ul style="list-style-type: none"> • Look to see if incentives are appropriate. • Look to see if the workers want to achieve the expected results. • Look to see what the workers expect for top performance. • Look to see if performers agree with the way the task is supposed to be done. • Look for tools and materials that are not ergonomically sound. • Look for links to another performer’s deficient output. • Look for high turnover and find out why it exists. • Look at turnover and promotion histories. • Look at how learners perceive training. • Look for adequate time for training.

Source: Piskurich (2002:63-64)

Most performance improvement interventions begin when a senior manager approves the use of the organisation's resources. Once the proposal has been accepted, the performance improvement strategy is implemented. There are three general ways by means of which a performance improvement strategy can be implemented (Rothwell *et al.*, 2000:136-140):

- implementing a performance improvement intervention with one leader who receives specific instructions from senior executives about how to implement the intervention;
- implementing a performance improvement intervention with a team, committee, or task force who work together to achieve the performance improvement results; and/or
- implementing a performance improvement intervention with objectives, by clarifying the role that each manager and worker in the organisation is expected to play during implementation.

The following additional thoughts about the implementation of a performance improvement strategy are offered by Andersen and Fagerhaug (2006:168, *verbatim*):

- Involve everyone responsible for results to ensure full support for the changes.
- Try to elicit involvement and inspiration from those involved in the project.
- Follow a clearly communicated plan.
- Keep the affected persons constantly informed about progress and achieved results.
- Emphasize the importance of patience – changes do not happen overnight.
- Put the process under pressure – delays are common.
- Pick low-hanging fruit and celebrate wins.



2.3.7.5 *Step 5: Change management*

During this step, the implementation process of the intervention is monitored. Feedback is important to establish whether the performance improvement strategy is successful. Information about progress toward the objectives of the performance improvement strategy can be collected in the following ways (Rothwell *et al.*, 2000:142):

- Clarify from stakeholders what results are sought from the performance improvement intervention.
- Ensure that the outcomes can be made specific and measurable.
- Identify who should receive feedback about performance to ensure that progress is being achieved toward the goals.
- Work with stakeholders and performers to identify the most effective methods by which to convey feedback.
- Start a tracking system to collect feedback and give it to performers.

It is important that the above measures occur and that the data are fed back to the key stakeholders.

2.3.7.6 *Step 6: Evaluation and measurement*

Managers and other stakeholders of performance improvement interventions want to know what business requirements have been satisfied and what return on investment has been received from the resources invested in the performance improvement interventions. An evaluation must be made of how well the performance improvement interventions were implemented, their impact, any changes that were made, actions taken, the results achieved, and the benefits that were received from the performance improvement intervention(s). Evaluation is a way of

connecting business performance outcomes with the inputs, outputs, and processes of a human performance improvement intervention, along with showing the benefits of the results in comparison to the costs of the intervention (Burkett, 2002:155).

Holly Burkett (2002:157) gives the following additional and compelling reasons why evaluation is important:

- It helps the users to understand the business and what measures management uses.
- It makes good economic sense and should be required for any activity that represents a significant expenditure of funds.
- It provides solid measurements of a past programme's success to secure additional funds for the future.
- There is increased pressure from management to ensure accountability and show that value-added contributions have been made.
- The performance evaluation standards keep rising.
- Satisfaction is gained when the bottom-line contribution is known and clearly articulated and it can be demonstrated that the efforts people have put in have indeed made a difference in the organisation.
- Evaluation skills sets are a core competency with the evaluator role in human performance improvement work.
- It shows the worth of the human performance improvement function in the organisation.

According to Burkett (2002:155), Donald Kirkpatrick's model for assessing the results of training can be used to evaluate performance improvement interventions; it can occur at any time and with any frequency – it can occur before an intervention, during development, or after implementation. However, it is important that evaluation be integrated into the human performance improvement process. This requires a framework

that links evaluation strategies throughout the various stages of the performance improvement intervention (Burkett, 2002:157).

Burkett (2002:159-163) suggests the following guidelines to help plan an evaluation:

- Establish an evaluation framework that provides the roadmap for conducting evaluation and allows one to begin with the end in mind.
- Develop a data collection plan that includes a variety of methods to collect data and integrates the data into the performance improvement objectives that have been set.
- Establish an evaluation purpose that includes the following (Burkett, 2002:161-162):
 - determining if the intervention is accomplishing its objectives;
 - finding out if the human performance gap has been closed or narrowed;
 - gauging the extent of transfer to the job and identifying barriers and enablers to transfer;
 - assessing improvement areas in the needs assessment and the intervention;
 - calculating the benefit-cost ratio of a performance improvement or Human Resources development programme; and
 - providing data for decision-making about expanding or discontinuing programmes.
- Set evaluation levels or targets that provide a compass with which to set direction and maintain focus.
- Develop instruments to collect evaluation data. The seven most common instruments are surveys, questionnaires, interviews, focus groups, tests, observations and performance records (Burkett, 2002:162).

- Consider and communicate the timing for follow-up evaluation.

Almost anything can be the object or the focus of evaluation. George L. Geis and Martin E. Smith (1992:141-144) present the following detailed list of possible objects for evaluation:

- *people*, for example, quality of performance;
- *products*, for example, quality and/or number of products produced;
- *processes*, for example, the frequency and types of interactions between different divisions of the organisation;
- *purposes*, for example, the objectives of a programme;
- *facilities and resources*, for example, the number of books and journals in the library;
- *rates*, for example, number of students processed through a course;
- *costs/profits*, for example, the cost of an intervention, as well as any addition to profits as a result of an intervention;
- *outcomes*, for example, the amount learned from a demonstration of new skills as a result of an instructional unit; and
- *impacts*, for example, long-term customer satisfaction.

Many factors can influence a performance measure. Hence, a sound and rigorous evaluation plan should include a method to isolate the effects of the programme from other influences. The following are six proven methods for doing this (Burkett, 2002:170-171):

- Use a control group that is demographically similar to the experimental group and is subjected to the same environmental influences, but does not receive the performance improvement intervention. As a result, measures taken after the intervention show the disparity

between the two groups that can be directly ascribed to the intervention.

- Do a trend line analysis by drawing a line from the current performance to the future performance. After the performance improvement intervention, the post-intervention performance can be compared to the performance predicted on the trend line.
- When a mathematical relationship between input and output variables is known, then the value of the performance improvement intervention can be forecast by using an equation to isolate the effects.
- Use customer input to determine the extent to which the performance improvement intervention influences the customer's decision to use a product or service.
- Use participants' and supervisors' estimates of the extent to which improvements are directly related to the performance improvement intervention.
- Use experts' estimates of the extent to which improvements are directly related to the performance improvement intervention.

2.3.8 Summary

The seven models that were discussed in this section are summarized in Table 2.3 (see next page).

Table 2.3 Summary of human performance models

Human Performance Model	Central Theme
Rummler and Brache's model (Piskurich, 2002:7-8; Rothwell <i>et al.</i> , 2000:54-55)	This model is based on a systems perspective of the organisation and illustrates the relationship between three performance levels and three performance needs.
Models developed by Thomas F. Gilbert (Rothwell, 2005:42,150; Rothwell <i>et al.</i> , 2000:59-63)	The ACORN model clarifies the mission level, while the BEM identifies six behavioural aspects that can be manipulated to improve performance.
James H. Harless's model (Rosenberg <i>et al.</i> 1992:26-27)	This model identifies three categories – skill/knowledge, the environment, and motivation – that should be aligned with the organisation's goal to improve performance.
Robert F. Mager and Peter Pipe's Situational Model (Rothwell, 2005:150; Rothwell <i>et al.</i> , 2000:64)	This model distinguishes between skill deficiencies, management deficiencies, and a combination of these two aspects as influencers of human performance.
Rothwell's model for human performance enhancement (Rothwell, 2005:48-50)	This model focuses on different environments inside and outside the organisation that affect human performance.
The TIME performance model (Main, 2002:108,111)	This model analyses performance problems by focusing on four interrelated components of human performance, namely training, incentives and motivation, environment, and the cultural environment and the relationship of work, the worker and workplace.
ASTD's Human Performance Improvement Process Model (Andersen & Fagerhaug, 2006:158, 168; Boyd, 2002:45; Burkett, 2002:155, 157, 159-163, 170-171; Geis & Smith, 1992:141-144; Piskurich, 2002:57-58, 63-64; Rothwell <i>et al.</i> , 2000:13-15, 45-46, 67-71, 84, 91-107, 116, 136-140, 142; Rothwell, 2005:125, 143-144; Saleh, 2004:2)	This model represents a six-step process consisting of the primary components associated with human performance improvement.

The above models contributed and added the following value to this study:

- These models assist us to understand the theories and what is involved in human performance better.

- They help us identify and understand the different variables that could influence human performance.
- They help us identify and understand the different components that must be in harmony for human performance to run smoothly.
- A model such as that of Rothwell (2005:48-50) offers a ten-step process for identifying or anticipating problems and human performance improvement opportunities.
- A model such as that of Robert F. Mager and Peter Pipe (Rothwell *et al.*, 2000:64) provides a systematic process in a form of a flowchart for addressing human performance problems.

The researcher regards all the above contributions as valuable in developing a root cause analysis process that aims to uncover the root causes of uncontrolled variations in human performance.

2.4 VARIABLES AND TRENDS THAT AFFECT HUMAN PERFORMANCE

According to Rummler and Brache (1992:37-38), every performer operates in what they refer to as the Human Performance System. In the Human Performance System (see Figure 2.6 on next page), the performer is required to process a variety of inputs. For each input, there is a required output, and for every output produced, as well as for the action required to deliver an output, there is a resultant set of consequences – an event that influences the performer and is uniquely interpreted by the performer as either positive or negative (Rummler and Brache, 1992:37). The last component of the Human Performance System is feedback.

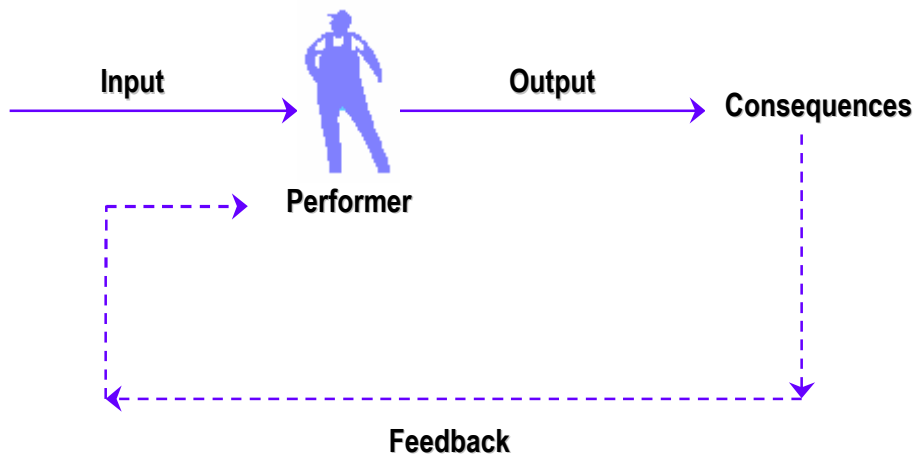


Figure 2.6 The human performance system

Source: Rummler and Brache (1992:38)

The significance of the Human Performance System is that human performance in an organisation is always a function of a number of variables or factors. In other words, people tend to perform at the desired levels if the criteria for optimal performance are met.

2.4.1 Variables that affect human performance

In order to understand human performance fully, one needs to recognize the variables that affect performance. Table 2.4 (see next page) summarizes several researchers' findings on variables that affect human performance, namely the findings of

- Peter Pipe (1992:356-359)
- John M. Keller (1992:278)
- Robert F. Mager and Peter Pipe (1997:3)
- Robert Bacal (n.d.:2-3)
- Dean L. Gano (1999:145)
- William J. Rothwell (2005:156-157)
- The U.S. Department of Labor (Rothwell, 2005:14-16)
- James Reason and Alan Hobbs (2003:63)
- George M. Piskurich (2002:55)
- Thomas F. Gilbert (Rothwell *et al.*, 2000:6-8)
- Geary A. Rummler and Alan P. Brache (Rothwell *et al.*, 2000:5-6)
- Maren Franklin (2006:9)
- EQE International Inc. (1999:A9-A10)

Table 2.4 Summary of research findings on variables that affect human performance

Findings by Peter Pipe (1992:356-359)	Findings by John M. Keller (1992:278)	Findings by Robert F. Mager and Peter Pipe (1997:3)	Findings by Dean L. Gano (1999:145)
<p>All inputs may be candidates for change that may potentially affect performance. The following are inputs to task performance that need to be considered:</p> <ol style="list-style-type: none"> 1. Relevant inputs by the job performer – mental (skills of remembering, analysis, synthesis, and problem solving) and physical skills directly linked to task accomplishment 2. Irrelevant inputs by the job performer – irrelevant or counterproductive behaviour 3. Other relevant inputs – raw materials, data, the efforts of others, and conditions in the environment where work is done, the quality of information 4. Other irrelevant inputs – any external factor that distracts from the desired performance 	<p>The extent and quality of a person’s performance are also determined by appropriate internal motivation and motivational support from the environment, resources, and working conditions. The following are the three main influences on performance:</p> <ol style="list-style-type: none"> 1. Capability <ul style="list-style-type: none"> • abilities • knowledge • skills 2. Opportunity <ul style="list-style-type: none"> • role match • resources • guidance 3. Motivation <ul style="list-style-type: none"> • conditions and circumstances of the job • the person’s perceptions of the situation 	<ol style="list-style-type: none"> 1. People do not know what is expected and, therefore, they do not do what they should be doing 2. People do not have the tools, space or authority to perform in the desired manner 3. People do not get feedback about performance quality 4. People are punished when they do it right 5. People are rewarded when they do it wrong 6. People are ignored whether they do it right or wrong 7. People do not know how to do it 	<ol style="list-style-type: none"> 1. There is too much information to comprehend 2. The tasks is boring 3. The person is not proficient at the task 4. People are unaware of action causes 5. There is a lack of confidence, people, procedures, or hardware 6. People rely on success in past experiences 7. People suffer from weariness or fatigue 8. There is confusion 9. There is a reactive response 10. Memory lapses occur 11. Fear of failure hampers people 12. Priorities are misaligned 13. People are spatially misoriented 14. There is inattention to detail 15. There is a rigid mindset 16. People have a myopic view of the situation 17. Scheduling pressure to complete task is high 18. People lack the specific knowledge required 19. Habit dies hard 20. Inappropriate assumptions are made 21. People use shortcuts 22. People do not understand instructions 23. Job performance standards are not defined 24. Disbelief in sensory input hampers performance 25. People use a favourite indication instead of diverse input 26. Indifferent attitudes prevail 27. Illness reduces productivity 28. Righteousness affects judgement 29. People are unable to focus on a task
		<p style="text-align: center;">Findings by Robert Bacal (n.d.:2-3)</p> <ol style="list-style-type: none"> 1. Aptitude – a person’s natural ability to perform the task(s) 2. Skill level 3. Understanding the nature of the task and what is expected 4. Choice to expend effort 5. Choice of degree of effort to expend 6. Choice to persist 7. Outside factors that are beyond the control of the individual 	

Table 2.4 Summary of research findings on variables that affect human performance (continued)

Findings by William J. Rothwell (2005:156-157)	Findings by the U.S. Department of Labor (Rothwell, 2005:14-16)	Findings by James Reason and Alan Hobbs (2003:63)	Findings by George M. Piskurich (2002:55)
<p>Rothwell (2005:156-157) provides the following perceived causes of human performance problems, in order of frequency:</p> <ol style="list-style-type: none"> 1. Lack of knowledge 2. Insufficient opportunity to practise work tasks 3. Lack of rewards 4. Lack of clear feedback 5. Lack of timely feedback 6. Lack of information when needed 7. Lack of information 8. Not knowing who is responsible for what 9. Lack of worker motivation 10. Lack of clear organisational plans 11. Lack of tools 12. Rewards for undesirable performance 13. Lack of clear organisational policies 14. Fear for job security 15. Inadequate (wrong) tools 16. Lack of ability (wrong hire) 17. Rewards for not performing 18. Inadequate equipment 19. Lack of sense of who reports to whom 20. Tools/equipment not ergonomic 	<ol style="list-style-type: none"> 1. Skills and information <ul style="list-style-type: none"> • Training and continuous learning • Information sharing 2. Participation, organisation and partnership <ul style="list-style-type: none"> • Employee participation • Organisation structure • Worker-management partnerships 3. Compensation, security and work environment <ul style="list-style-type: none"> • Compensation linked to performance and skills • Employee security • Supportive work environment 4. Putting it all together <ul style="list-style-type: none"> • The company fully integrates its human resources policies and workplace practices with other essential business strategies • Quality and continuous improvement efforts are meshed with training, work organisation, employee involvement, and alternative compensation programs • Workers are involved in the design and purchase of new technologies • Workers have the opportunity to modify the technologies they use • Employees receive adequate training to use new technologies effectively 	<p>According to Reason and Hobbs (2003:63), performance problems are shaped by situation and task factors that are part of the environment in which the person is functioning. They have identified the following key factors that increase the probability of performance problems:</p> <ol style="list-style-type: none"> 1. Poorly designed documentation 2. Time pressure 3. Poor housekeeping and tool control 4. Lack of coordination and poor communication practices 5. Availability and design of tools and equipment 6. Fatigue 7. Lack of knowledge and experience 8. Poorly designed procedures 9. Lack of procedure usage 10. Personal beliefs that promote violations 	<ol style="list-style-type: none"> 1. Lack of knowledge or skills 2. Lack of the proper physical resources to do the job 3. A problem or weak link in the structure or process of the work or work flow 4. A need for more information concerning the job 5. A lack of or change in leadership 6. Lack of information about the consequences of poorly done work for the organisation or personally for the performer 7. A problem with the motives and expectations of the workforce 8. Inadequate feedback 9. Inadequate incentives or rewards 10. Performer's lack of capacity to do the job

Table 2.4 Summary of research findings on variables that affect human performance (continued)

Findings by Thomas F. Gilbert (Rothwell <i>et al.</i> , 2000:6-8)	Findings by Geary A. Rummler and Alan P. Brache (Rothwell <i>et al.</i> , 2000:5-6)	Findings by EQE International Inc. (1999:A9-A10)
1. Environmental variables (external) <ul style="list-style-type: none"> • Data and information – the expectations about the job and the desired performance, such as job standards, goals and feedback • Financial resources, tools, equipment, time and environmental supports • Consequences, incentives and rewards 2. Individual variables (internal) <ul style="list-style-type: none"> • Skills and knowledge • Individual capacity is the capability that is required to perform effectively • Motives are the deeply embedded characteristics possessed by people and include the reasons that people do what they do, how people view themselves, their needs, desires, fears, and other internal personality traits 	1. Barriers that are related to the inputs to perform – signals to perform, conflicting tasks and actions, and resources, such as tools, equipment, finances and information 2. Performance expectations – standards, goals, and expectations regarding the output 3. Positive and negative consequences that are linked with the outcomes of performance 4. Feedback that relates to the information people obtain regarding their performance 5. The individual’s knowledge and skill level in respect of the job and task 6. The individual’s capacity or ability to perform the job or task	1. Lack of equipment design records and equipment operating/maintenance history 2. Lack of an equipment reliability programme 3. Lack of a program for corrective maintenance, preventive maintenance, predictive maintenance, proactive maintenance, failure finding maintenance, and routine equipment rounds 4. Lack of standards, policies, or administrative controls; standards, policies, or administrative controls are not used; lack of safety/hazard/risk review; lack of problem identification control; lack of product/material control; lack of procurement control; lack of document and configuration control; and lack of customer/interface/services 5. Procedures not used, or are misleading/confusing, or wrong/incomplete 6. Poor workplace layout, poor work environment, excessive workload, and intolerant systems 7. Lack of training, a poor training records system, and poor training 8. Lack of preparation and poor supervision during work 9. Lack of communication or communication that is not timely, misunderstood communication, wrong instructions, poor communication during job turnover 10. Inability to detect problems, poor sensory/perceptual capabilities, poor reasoning capabilities, poor motor/physical capabilities, poor attitude/attention, lack of rest/sleep (fatigue), and personal medication problems
	Findings by Maren Franklin (2006:9)	
	1. Physical resources 2. Structure/process 3. Information 4. Knowledge 5. Motives 6. Wellness	

2.4.2 Trends that affect human performance

In addition to the performance variables listed in Table 2.4, cognisance should also be taken of several trends, because they are regarded as key drivers of change that affect human performance in organisations. Rothwell *et al.* (2000:173) classify these trends into three categories, namely corporate trends, workforce trends and Human Resources trends. These three categories are discussed in more detail below.

2.4.2.1. Corporate trends

While each industry has its own unique characteristics and unique responses to the global economy, the following trends appear to be true for most organisations, regardless of the industry they are in (Rothwell *et al.*, 2000:173-182):

- *Organisations are shifting from a focus on restructuring and downsizing to a focus on improving customer service and growth.*

This shift requires skilled workers in addition to material resources and investment capital. Career development opportunities are regarded as an employment benefit and, as a result, workers demand assignments that are challenging and provide growth opportunities. This, in turn, drives up the demand for workplace training; and succession planning becomes a more overt process (Rothwell *et al.*, 2000:174-175).

- *Organisations are growing via mergers and acquisitions.*

A survey conducted by Hewitt Associates LLC in 1998 (Rothwell *et al.*, 2000:176) found that integrating organisational cultures poses the most significant challenge to companies involved in mergers and acquisitions, that communication was not immediate enough, and that

inadequate resources were dedicated to the communication effort (Rothwell *et al.*, 2000:175-176).

- *Organisations are rapidly taking advantage of technology advances.*

Improving technology has been the driver behind widespread corporate downsizing and has improved workforce productivity dramatically. The pace of technological change has increased the demand for highly educated, skilled workers. In addition, speed of response, flexibility and the adaptability of structured learning events will be critical to future success (Rothwell *et al.*, 2000:176-177).

- *Organisations are reinventing their business processes due to the explosion of electronic commerce.*

Electronic commerce has led to a major revolution in the way businesses and organisations operate. This change has required the *redefinition* of work processes and an environment that welcomes wholesale changes in the way work gets done (Rothwell *et al.*, 2000:178-179).

- *Intellectual capital and knowledge management are increasingly important.*

Rothwell *et al.* (2000:179) define *intellectual capital* as “the knowledge and experience possessed by an organization’s workforce”, and *knowledge management* as “the process by which an organization creates and leverages intellectual capital”. Organisations have recognized that “knowledge management and the intellectual capital it creates are sources of competitive advantage” (Rothwell *et al.*, 2000:179).

- *Organisations are outsourcing supporting functions.*

“Outsourcing is a management strategy by which an organization farms out major, non-core functions to specialized, efficient service providers” (Rothwell *et al.*, 2000:180). Any function that is not directly associated with a

business's core competencies or competitiveness is a candidate for outsourcing. KPMG Peat Marwick and The Outsourcing Institute have identified the following advantages of outsourcing (Rothwell *et al.*, 2000:182) – outsourcing allows businesses to

- gain a greater level of expertise;
- enhance the ability of internal resources to focus on other, critical issues;
- become more flexible;
- accelerate reengineering benefits;
- access world-class capabilities;
- get a cash infusion;
- free internal resources for other purposes;
- outsource functions that are difficult to manage or are out of control;
- improve company focus;
- make capital funds available;
- reduce operating costs;
- reduce risks; and
- provide access to resources that are not available internally.

2.4.2.2. *Workforce trends*

- *Skill requirements are increasing.*

Due to the increasing skill requirements, there is an ongoing need for continuous training and career development. As a result, the recruitment and retention of skilled talent also become more of a challenge (Rothwell *et al.*, 2000:183).

- *Technological advances are continuous.*

Technological change has become a factor that organisations have accepted. They have therefore built continuous learning

solutions to address the ever-changing skill requirements to support the new technology (Rothwell *et al.*, 2000:183).

- *The workforce must become more educated and diverse.*
Unfortunately, the increasing levels of education are not keeping pace with the demand for advanced skills in the workplace. The skills gap will need to be bridged by organisations and educational institutions that work together to produce the skills that organisations need. There will also be a greater need in future for cultural focus in the workplace (Rothwell *et al.*, 2000:184-185).
- *Employees are working longer hours and weekends.*
Downsizing without work redesign has led to organisations' having to accomplish the same (or more) with fewer resources. As a result, employees often work weekends, work more than 40 hours per week, and/or work at home during some evenings. There is a growing demand to find ways to achieve organisational goals by working smarter rather than harder. This requires, amongst other things, that processes be redesigned, steps are taken to ensure that the necessary skills exist in the workplace, and performance management initiatives play a more important role in organisations (Rothwell *et al.*, 2000:185-186).
- *Employees are taking greater responsibility for their own development.*
Employees are taking responsibility for their own careers. In order to do this successfully, employees need to understand the organisation's goals and the objectives and task requirements of their work. They also need consistent and clear feedback on their performance, and access to resources and information to enhance their skills and knowledge (Rothwell *et al.*, 2000:186-187).



2.4.2.3 *Human Resources trends*

- *Corporate training departments are changing in size and composition.*

As employee-to-trainer ratios are growing smaller, the demand for external providers of training and other performance improvement services increases. The type of training that is typically outsourced is executive development, quality and business practices, and training delivered via learning technologies. The type of training that is delivered in-house tends to be training on subject matter that is organisation-specific, such as the orientation of new employees and customer service (Rothwell *et al.*, 2000:188-190).

- *Technology is revolutionizing the way training is delivered.*

While classroom training was the primary method of training in the past, technology-based delivery methods have begun to gain broader acceptance. These include CD-ROM-based training, video teleconferencing, satellite broadcasts, Internet-based training, and electronic performance support systems (Rothwell *et al.*, 2000:190-191).

- *Training departments are finding new ways to deliver services.*

In addition to the technology-based training methods mentioned above, non-traditional structured learning approaches have also begun to find favour in some organisations. These include groupware, knowledge management systems, action learning, Open Space Technology, self-directed learning, group-based instruction, job rotation, mentoring and coaching programmes (Rothwell *et al.*, 2000:191-192).

- *Training professionals are focusing more on interventions in performance improvement.*

Organisations have begun to realize that not all performance problems can be solved by training alone. Workforce strategies are needed that will assist organisations to achieve their goals, to cascade the goals down through the organisations and, ultimately, enable the workforce to achieve those goals (Rothwell *et al.*, 2000:192).

- *There is an increasing demand for employee development.*

The fact that skilled labour is increasingly in short supply, workers who demand that career development opportunities become a condition of employment, and new technology that creates a constant demand for skill-upgrading efforts – all these result in an increase in the demand for employment development. Organisations need to bridge the skills gap with programmes of their own and they need to work with educational institutions to supply the future talent that organisations need. Employees should also take charge of their own development and will increasingly exert greater pressure on organisations to provide planned and unplanned learning opportunities (Rothwell *et al.*, 2000:192-193).

- *Leadership development is seen as critical to organisational success.*

Organisations are beginning to realize that leadership development plays a key role in competitive success. Leadership development must support the vision of leadership and requires dedication and commitment from the top of the organisation (Rothwell *et al.*, 2000:193-194).

2.5 CONCLUSION

The purpose of this study is to develop a root cause analysis process for uncontrolled variations in human performance. A root cause analysis process

of this nature would require a specific set of dimensions and process questions. In order to develop these dimensions and questions, one needs to have a thorough understanding of human performance, as well as acknowledge the variables and trends that affect human performance. This chapter aimed to develop such an understanding.

The following is evident from the literature discussion in this chapter:

- Although various models follow different approaches, the general aim of all human performance models is to achieve the level of performance that would meet businesses' needs.
- The variances and trends that affect human performance can easily be regarded as a listing of the primary causes of performance problems. Although some research findings of the variances that affect human performance (as listed in this chapter) overlap, they prove that the causes of variations in human performance are diverse and numerous.

Performance problems occur when the conditions for optimal performance are lacking in some way. When this happens, the situation needs to be analysed further, so that first the performance gaps and then the root causes can be identified. The next chapter discusses how to analyse and manage human performance problems.