JOB DEMANDS, JOB RESOURCES AND WORK-RELATED FLOW OF EMPLOYEES IN THE MINING INDUSTRY IN SOUTH AFRICA.

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REMARKS

The reader is reminded of the following:

- The editorial style as well as the references referred to in this *mini-dissertation* follow the format prescribed by the Publication Manual (*5th edition*) of the American Psychology Association (APA). This practice is in line with the policy of the Programme in Industrial Psychology of the North-West University (Potchefstroom Campus) to use APA style in all scientific documents as from January 1999.

- The mini-dissertation is submitted in the form of a research article. The name of the study leader and Assistant Study Leader article as it was submitted for publication in a national journal.

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TABLES OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Topic: Job demands, Job resources and work-related flow of employees in the mining industry in South Africa.

Key terms: Job demands, job resources, work-related flow, mining industry, mining companies.

The mining industry plays an important role in the economy of South Africa. This industry is an employer of thousands of people and the development of South Africa has depended on the development of the mining industry in more than one way. However, working conditions in the mining industry is poor, harsh and dangerous and employees are also faced with job insecurity. This may lead to stressors in the working environment and these stressors, which are closely related to work characteristics, may have negative effects on employees as well as on their productivity levels. Studies relating organisational resources to work-related flow have provided additional evidence for the motivational potential or resources. The focus of this study is on job characteristics, consisting of job demands and job resources and whether these characteristics can foster work-related flow.

The objective of this study was to determine the relationship between job demands, job resources and work-related flow and to determine whether the availability of job resources and the lack of job demands foster the experience of work-related flow.

The research method consisted of a literature review and an empirical study. A cross-sectional survey design was used o collect the data. An availability sample (N = 326) from employees in the mining industry was taken. The *Job Demands and Resources Scale* (JDRS) (which was developed for the purpose of this study to measure job demands and job resources for employees in the mining industry) and the *Work-Related Flow Scale* (WOLF) and a *biographical questionnaire* were also administered. The statistical analysis was carried out with the help of the SPSS programme and AMOS programme. The statistical methods utilised in the article consisted of descriptive statistics, Cronbach alpha coefficients, Pearson product-moment correlation coefficients and structural equation modelling methods.

Pearson product moment correlation in this study showed that Supervision correlated positively with Task Freedom, Support, Pay and Benefits, Opportunities for Growth and Resources Availability. Workload correlated positively with Working Conditions. Working Conditions correlated positively with Working Hours and negatively with Resources Availability. Task Freedom correlated positively with Opportunities for Growth and Intrinsic Motivation, and Support correlated positively with Opportunity for Growth. Pay and Benefits correlated positively with Opportunity for Growth and Resource Availability, whereas Opportunity for Growth correlated positively to Work Enjoyment. Resources Availability correlates negatively with Working Hours, and Absorption indicates a positive correlation to Work Enjoyment and Intrinsic Motivation. Work Enjoyment correlates positively to Intrinsic Motivation.

A structural model of work-related flow for employees in the mining industry comprising of job demands, job resources and work-related flow was tested. Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resource Availability) may have a positive impact on Work-Related Flow and could increase the levels of work-related flow of employees in the mining industry. Job Demands (i.e. Workload, Working Conditions, Job Security, and Working Hours) has a negative impact on Work-Related Flow, thus job demands may negatively influence the experience of work-related flow in employees in the mining industry.

Recommendations for future research were made.

OPSOMMING

Onderwerp: Werkseise, werkshulpsbronne en werksverwante vloei van werknemers in die myn industrie in Suid-Afrika.

Sleutelterme: Werkseise, werkshulpbronne, werksverwante vloei, myn industrie, myn maatskappye.

Die myn industrie speel 'n belangrike rol in die ekonomie van Suid-Afrika. Hierdie industrie is 'n werkgewer vir duisende mense en die ontwikkeling van Suid-Afrika was afhanklik van die ontwikkeling van die myn industrie en meer as een opsig. Nogtans is werkskondisies in die myn industrie swak, ru en gevaarlik en die werknemers staar ook werksonsekerheid in die gesig. Dit kan lei tot stressore in die werk omgewing en hierdie stressore, wat verband hou met die werk karaktereinskappe, kan 'n negatiewe effek op werknemers sowel as op hulle produktiwiteisvlakke, hê. Studies wat organisasie hulpbronne verbind met werksverwante vloei het addisionele bewyse gelewer vir die motiverende potensiaal van hulpbronne. Die fokus van hierdie studie is op werk karaktereienskappe, bestaande uit werkseise en werkshulpbronne en of hierdie karaktereienskappe werksverwante vloei kan bevorder.

Die doelstelling van hierdie navorsing was om die verband tussen werkseise, werkshulpbronne en werksverwante vloei te bepaal en of die beskikbaarheid van werkshulpbronne en die te kort aan werkseise die ervaring van werksverwante vloei bevorder.

Die navorsingsmetode het uit 'n literatuur oorsig en 'n empiriese studie bestaan. 'n Dwarsdeursnee-opnameontwerp is gebruik om die data in te win. 'n Beskikbaarheidssteekproef ($N = 326$) van werksnemers in die myn industrie is geneem. Die *Werkseise en Werkshulpbronne Skaal* (JDRS) (wat ontwikkel is vir doel van hierdie studie om die werkseise en werkshulpbronne te meet van werknemers in die myn industrie) en die *Werksverwante Vloei Skaal* (WOLF) en 'n *biografiese vraelys* is afgeneem. Die statistiese analise is gedoen met behulp van die SPSS-program en AMOS-program. Die statistiese metodes gebruik in die artikel behels beskrywende

statistiek, Cronbach alfa koëffisiënte, Pearson produkmoment-korrelasie koëffisiënte en strukturele vergelykings modelleringsmetodes.

Pearson produkmoment-korrelasies in hierdie studie dui daarop dat Supervisie korreleer positief met Taak Vryheid, Ondersteuning, Betaling en Voordele, Geleenthede vir Groei en Hulpbron Beskikbaarheid. Werkslading korreleer positief met Werkskondisies. Werkskondisies korreleer positief met Werksure en negatief met Hulpbron Beskikbaarheid. Taak Vryheid korreleer positief met Geleenthede vir Groei en Intrinsieke Motivering, en Ondersteuning korreleer positief met Geleenthede vir Groei. Betaling en Voordele korreleer positief met Geleenthede vir Groei en Hupbron Beskikbaarheid, waar Geleenthede vir Groei positief korreleer met Werksgenot. Hulpbron Beskikbaarheid korreleer negatief met Werksure en Absorpsie dui op 'n positiewe korrelasie met Werksgenot en Intrinsieke Motivering. Werksgenot korreleer positief met Intrinsieke Motivering.

'n Strukturele model van werksverwante vloei vir werknemers in die myn industrie bestaande uit werkseise, werkshulpbronne en werksverwante vloei is getoets. Werkshulpbronne (d.i. Supervisie, Taak Vryheid, Ondersteuning, Betaling en Voordele, Geleenthede vir Groei en Hulpbron Beskikbaarheid) kan 'n positiewe impak op Werksverwante vloei hê en kan die vlakke van werksverwante vloei van werknemers in die myn industrie verhoog. Werkseise (d.i. Werkslading, Werkskondisies, Werk Sekuriteit, en Werksure) het 'n Werksverwante vloei, dus kan werkseise 'n negatiewe invloed op die ervaring van werksverwante vloei in werknemers in die myn industrie hê.

Aanbevelings vir toekomstige navorsing is aan die hand gedoen.

CHAPTER 1

INTRODUCTION

This mini-dissertation focuses on the relationship between job demands, job resources and work-related flow of employees in the mining industry in South Africa.

Chapter 1 contains the problem statement, research objectives and research methodology employed. This chapter starts out with a problem statement, giving an overview of previous, related research on job demands, job resources and work-related flow of employees in the mining industry, linking it with this research project and its research objectives. A discussion of the research method follows, with details regarding the empirical study, research design, participants, measuring instruments and statistical analyses. The chapter concludes with an overview of the chapters that comprise this mini-dissertation.

1.1 PROBLEM STATEMENT

Hundreds of thousands of people are employed in the mining industry in South Africa. With millions of people dependent on the wages earned, the manufacturing industry also depends on the mining industry for a large proportion of its sales (Van der Poll, 1998). As a result, the development of South Africa has depended on the development of the mining industry in more ways than one (Van Zyl, Human, & Tshabalala, 2004), with almost 72% of the South African economy being controlled by the mining industry (Van Zyl, et al., 2004).

A large percentage of the South African government's revenue is derived from the mining industry. In 1995, the 810 mines then in South Africa contributed 7,70% to the Gross Domestic Product and employed 4,10% of the economically active population (Van der Poll, 1998). Gold accounted for 65% of the value of mined output, and for 53% of the R44 billion earned in exports in 1995 (Hinde, 1996). In 1978, South Africa was responsible for 72% of Western gold production. However, this figure fell to 27,60% in 1995 (Gold Fields of South Africa, 1997).

Faced with a decline in production, rapidly escalating costs and the downward pressure on profitability of mines in South Africa, mining houses found themselves in serious financial jeopardy. This has led to large-scale downsizing in personnel and material support, and to the closing of mines (De Lange, 2005; Van der Walt, 2005). Nevertheless, in many South African mining operations, mining remains a very labour-intensive practice, whereas many other countries such as Canada, Australia and the United States of America have opted for more mechanisation due to high labour costs and mining's poor safety record (McGwin, Valent, Taylor, Howard, Davis, Brissie, & Rue III, 2002).

The working conditions in the South African mining industry have also been found to be harsh, difficult and hazardous, especially for female employees (Calitz, 2004). Employees do not only face poor working conditions, and health and safety problems, but also have to deal with a sense of job insecurity (Calitz, 2004). Mine workers spend most of their day performing physical tasks. They work with explosives, place pencil sticks in stopes, test geological formations, operate load haul-dump (LHD) machines and maintain mining machinery in conventional mines (Anon., 2000). The equipment and techniques used are varied and complex, with many areas requiring significant safety and skills training (Anon., 2000). Employees in the mining industry also seem to be faced with a lack of personnel and material resources, organisational politics and bureaucracy (red tape).

Thus, it is evident that there are certain stressors in the mining industry that could have a negative impact on employees and, as a result, on their productivity (Arvidsson, Akesson, & Hansson, 2003). Some of the main stressors seem to be underutilisation of skills, job insecurity, role conflict and ambiguity, variation in workload, a lack of job resources and supervisor support, and a lack of participation in decision making (Arvidsson, et al., 2003; Calitz, 2004; McGwin, et al., 2002; Singer, 2002). These stressors seem to be closely related to the work characteristics at the level of the organisation (e.g. job security), at the interpersonal level (e.g. supervisor and co-worker support), at the level of work (e.g. role clarity, participation and decision making), and at the task level (e.g. performance feedback, skill variety, task identity, task significance and autonomy) (Bakker, Demerouti, De Boer, & Schaufeli, 2001; Hackman & Oldham, 1976).

According to Bakker, et al. (2001), work characteristics may evoke two different processes. Firstly, high job demands (i.e. work overload) may exhaust employees' mental and physical resources and may therefore lead to health problems or burnout (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Secondly, poor or lacking job resources preclude actual goal accomplishment, which is likely to result in frustration. This, in turn, may lead to withdrawal from work, and reduced motivation or commitment (Bakker, Demerouti, & Schaufeli, 2003). When the external environment lacks resources, individuals cannot reduce the potentially negative influence of high job demands and they cannot achieve their work goals. This may lead to reducing commitment as a self-protection mechanism in order to prevent the future frustration of not obtaining work-related goals (Hackman & Oldham, 1976).

The Job Demands-Resources model is a heuristic model that specifies how health impairment and motivation or involvement in any organisation may be produced by two specific sets of working conditions (Bakker, et al., 2003). The first set concerns job demands that represent characteristics of the job that potentially evoke strain, in cases where they exceed the employee's adaptive capability (Bakker, et al., 2003). Job demands refer to those physical, social or organisational aspects of the job that require sustained physical and/or psychological effort on the part of the employee and are therefore associated with certain physiological and/or psychological costs (e.g. high work pressure, role overload, poor environmental conditions and exhaustion) (Bakker, et al., 2001; 2003). Job demands may turn into job stressors (Meijman & Mulder, 1998). This happens especially when meeting job demands require high effort from employees while the employees may experience difficulty to adequately recover from these efforts.

The second set of working conditions concerns the extent to which the job offers resources to individual employees (Bakker, et al., 2003). Demerouti, et al. (2001) define job resources as those physical, psychological, social or organisational aspects of the job that: (1) are functional in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, and/or (3) stimulate personal growth and development. Examples of job and organisational resources are social support from colleagues, performance feedback, good

material, supervisory coaching, skill variety and job control. Job resources are necessary to deal with job demands, but they are also important in their own right (Elsass & Veiga, 1997).

Research with the Job Demands-Resources (JD-R) model has shown that job resources contribute positively to the motivation and performance of individuals (Bakker, in press). Bakker, Demerouti, and Verbeke (2004) have shown that resources foster work engagement, which in turn is predictive of organisational citizenship behaviour. Furthermore, in a series of studies in several occupational settings, it was found that organisational resources can be important predictors of work engagement, which in turn is predictive of important organisational outcomes, including proactive behaviour (Salanova, Carrero, Pinazo, & Schaufeli, in press), service climate (Salanova, Agut, & Peiró, in press), and group performance (Salanova, Llorens, Cifre, Marinez, & Schaufeli, 2003). Other studies relating organisational resources to work-related flow have provided additional evidence for the motivational potential of resources. According to Salanova, Bakker, and Llorens (in press), reciprocal relationships exist between job resources and work-related flow.

Flow has been defined as a concept to describe the sense of effortless action in moments that stand out as the best in one's life (Csikszentmihalyi, 1997). It is a state of consciousness where people become totally immersed in an activity, and enjoy it intensely (Salanova et al., in press). Csikszentmihalyi (1990, p. 3-4), who conceptualised the term, describes flow as "a state in which people are so intensely involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it".

Bakker (in press) applies the concept of flow to the work situation, and defines flow as a short-term peak experience at work that is characterised by absorption, work enjoyment and intrinsic work motivation. *Absorption* refers to a state of total concentration and a state where employees are totally immersed in their work (Salanova & Bakker, in press). They forget about time and everything else around them. Employees who *enjoy* their work and feel happy make a very positive judgment about the quality of their working life. This enjoyment or happiness is the outcome of cognitive and affective evaluation of the flow experience (Salanova, et al., in press). *Intrinsic work motivation* refers to the need to perform a certain work-related activity with the

aim of experiencing the inherent pleasure and satisfaction in the activity. Flow is achieved when all levels of consciousness are in harmony with each other (Csikszentmihalyi, 1975; 1988; 1993; 1997).

Csikszentmihalyi's (1997) experience sampling studies have shown that people more often experience flow during their work than during their free time. Research generally agrees that the occurrence of flow is most likely when people perceive a balance between the challenge of a situation and their own skills to deal with this challenge (Bakker, in press). Employees should therefore be more inclined to experience flow when their job demands match their professional skills. Goals will be reached when employees have certain skills or have sufficient resources in their work. Flow experiences are more likely to occur when one becomes engaged in controllable but challenging tasks or activities that require considerable skill and that are intrinsically motivating (Carr, 2004).

Salanova, et al. (in press) assume that flow develops over time when personal and organisational resources are sufficiently available, as these positive aspects seem to foster flow experiences. In a way, these results are supportive of the predicted upward spiral in which positive emotions are building resources, which in turn influence positive emotions (Fredrickson, 2002).

Within the South African context, and specifically the mining industry, no research could be found on the relationship between job demands, job resources and work-related flow. The objective of this research is therefore to determine the relationship between job demands, job resources and work-related flow of employees in the mining industry.

The research will make certain contributions to the subject of Industrial Psychology and the practice thereof in organisations by attempting to answer the following research questions that have emerged from the problem statement:

- Are the measurement instruments of job demands, job resources and work-related flow valid and reliable?
- How are job demands, job resources and work-related flow conceptualised in the literature?

- What is the relationship between job demands, job resources and work-related flow according to the literature?
- What is the relationship between job demands, job resources and work-related flow in a sample of employees in the mining industry?
- Do the availability of job resources and the lack of job demands foster the experience of work-related flow?

1.2 RESEARCH OBJECTIVES

The research objectives are divided into a general objective and specific objectives.

1.2.1 General objective

With reference to the above formulation of the problem, the general objective of this research is to determine the relationship between job demands, job resources, and work-related flow of employees in the mining industry in South Africa.

1.2.2 Specific objectives

The specific research objectives are as follows:

- To determine the construct validity and internal consistency of the Job Demands and Resources Scale and the Work-Related Flow Scale for employees in the mining industry.
- To conceptualise job demands, job resources and work-related flow from the literature.
- To determine the relationship between job demands, job resources and work-related flow according to the literature.
- To determine the relationship between job demands, job resources and work-related flow in a sample of employees in the mining industry.
- To determine whether the availability of job resources and the lack of job demands foster the experience of work-related flow.
- To make recommendations for future research.

1.3 RESEARCH METHOD

The research method consists of a literature review and an empirical study. The results obtained from the research are presented in the form of a research article.

1.3.1 Literature review

The literature review focuses on previous research on job demands, job resources and work-related flow. An overview is given of the conceptualisation of these constructs in the literature, and on the findings in terms of job demands, job resources and work-related flow. The reader should note that a brief literature review is compiled for purposes of the article.

1.3.2 Research design

A cross-sectional design, with a survey as the data collection technique, was used to achieve the research objectives. Cross-sectional designs are used to examine groups of subjects in various stages of development simultaneously, while a survey is a data-collection technique in which questionnaires are used to gather data about an identified population (Burns & Grove, 1993). Information collected is used to describe the population at a particular point in time. This design can also be used to assess interrelationships among variables within a population. According to Shaughnessy and Zechmeister (1997), this design is best suited to addressing the descriptive and predictive functions associated with the correlational design, whereby relationships between variables are examined.

1.3.3 Participants

The participants could be defined as an availability sample of employees in the mining industry in South Africa (N = 326). The sample consisted mainly of Afrikaans-speaking (46,30%) men (79,10%) in their thirties (40,30%), with a grade 12 (44,50%). The average number of years employed in the organisation was between eleven and twenty years (34,90%). The participants

were mainly employed in production (32,40%) and logistics and services (22,20%) and in C-upper grading positions (30,40%).

1.3.4 Measuring battery

Three questionnaires are administered in this study, namely a biographical questionnaire, the Job Demands and Resources Scale (JDRS), which was developed for the purpose of this study and the Work-Related Flow Scale (WOLF) (Bakker, 2001).

A *biographical questionnaire* is developed to gather information about the demographical characteristics of the participants. Information gathered included age, gender, race, home language, education, marital status and years employed in current position.

The *Job Demands and Resources Scale* (JDRS) is developed for the purpose of this study to measure job demands and job resources for employees in the mining industry. Various demands and resources in the mining industry were identified through the use of focus groups. Based on these results, a unique job demands and resources scale was compiled. The items were measured on a four-point scale, ranging from 1 (*never*) to 4 (*always*). The internal consistency and construct validity of the scale were determined.

The *Work-Related Flow Scale* (WOLF; Bakker, 2001) is used to assess flow at work. The WOLF includes thirteen items measuring absorption (4 items), work enjoyment (4 items), and intrinsic work motivation (5 items). Examples are: "When I am working, I forget everything else around me" (absorption), "When I am working very intensely, I feel happy" (work enjoyment), and "I get my motivation from the work itself, and not from the rewards for it" (intrinsic work motivation). The participants were asked to indicate how often they had each of the experiences during the preceding week (0 = never, 6 = every day). Bakker (in press) found the following reliability results: Absorption (0,80); Work Enjoyment (0,90); and Intrinsic Work Motivation (0,75).

1.3.5 Statistical analysis

The statistical analysis is carried out with the help of the SPSS programme (SPSS Inc., 2003) and the AMOS programme (Arbuckle, 2003). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) are used to analyse the data. Cronbach alpha coefficients are used to assess the internal consistency, homogeneity and unidimensionality of the measuring instruments (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale.

Pearson product-moment correlation coefficients are used to specify the relationship between the variables. In terms of statistical significance, it is decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Effect sizes (Steyn, 1999) are used to determine the practical significance of the findings. A cut-off point of 0,30 (medium effect, Cohen, 1988) is set for the practical significance of correlation coefficients.

Covariance analysis or structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 2003), are used to determine the factorial validity of the theoretical Work-Related Flow model and to construct and test a structural model of Work-Related Flow consisting of Work-Related Flow, Job Demands and Job Resources. Hypothesised relationships are tested empirically for goodness of fit with the sample data. The χ^2 statistic and several other goodness-of-fit indices summarise the degree of correspondence between the implied and observed covariance matrices. However, because the χ^2 statistic equals $(N-1)F_{min}$ this value tends to be substantial when the model does not hold and the sample size is large (Byrne, 2001). Researchers addressed the χ^2 limitation by developing goodness-of-fit indices that take a more pragmatic approach to the evaluation process.

A value <2 for χ^2/degrees of freedom ration (CMIN/df) (Wheaton, Muthén, Alwin, & Summers, 1977) indicates acceptable fit (Tabachnick & Fidell, 2001). The hypothesised relationships with the data are also tested using the following goodness-of-fit statistics: Adjusted Goodness-of-Fit Index (AGFI), Parsimony Goodness-of-Fit Index (PGFI), Normed Fit Index (NFI), Comparative

Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA).

1.4 OVERVIEW OF CHAPTERS

In Chapter 2 the relationship between job demands, job resources and work-related flow are discussed. Chapter 2 also deals with the empirical study. Chapter 3 deals with the conclusions, limitations and recommendations of this study.

1.5 CHAPTER SUMMARY

This chapter discussed the problem statement and research objectives. The measuring instruments and research method used in this research were explained, followed by a brief overview of the chapters that follow.

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CHAPTER 2

RESEARCH ARTICLE

JOB DEMANDS, JOB RESOURCES AND WORK-RELATED FLOW OF EMPLOYEES IN THE MINING INDUSTRY IN SOUTH AFRICA

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ABSTRACT

The objective of this study was to determine the relationship between job demands, job resources and work-related flow of employees in the mining industry in South Africa. A cross-sectional survey design with an availability sample ($N = 326$) was used. A self-constructed instrument (JDRS) was used to measure the unique job demands and job resources in the mining industry. The Work-Related Flow Scale (WOLF) was used to measure the experience of flow in the work situation. The results showed that job resources (i.e. supervision, task freedom, support, pay and benefits, opportunity for growth, and resources availability) predict work-related flow. Although job demands have a negative impact on work-related flow, none of the job demands were significant predictors of work-related flow.

OPSOMMING

Die doel van hierdie studie was om die verband tussen werkseise, werkshulpbronne en werksverwante vloei van werknemers in die myn industrie in Suid-Afrika te bepaal. 'n Dwarsdeursnee-ondersoekontwerp met 'n beskikbaarheidssteekproef ($N = 326$) is gebruik. 'n Selfsaamgestelde vraelys (JDRS) is gebruik om die unieke werkseise en werkshulbronne in die mynindustrie te meet. Die Werksverwante Vloei Skaal (WOLF) is gebruik om die belewing van vloei in die werksituasie te meet. Die resultate het getoon dat werkshulpbronne (d.i. toesighouding, taakvryheid, ondersteuning, salaris en voordele, geleenthede vir groei en hulpbronne beskikbaarheid) betekenisvolle voorspellers is van werksverwante vloei. Al het werkseise 'n negatiewe impak op werksverwante vloei getoon, was geen van die werkseise betekenisvolle voorspellers van werksverwante vloei gewees nie.

Faced with a decline in production, rapidly escalating costs and the downward pressure of profitability of mines in South Africa, mining houses have been in serious financial jeopardy. Not only are they faced with harsh and difficult working conditions but they also face huge down scaling in personnel, material support, and the probable closing of mines (De Lange, 2005; Van der Walt, 2005). As a result, the International Institute for Environment and Development (IIED) (2002a, p. 10) opted that the mining industry needs to adopt a more positive and proactive approach to environmental management and social development and ensure greater openness and transparency in its policy decisions, operational strategies and performance to contribute more to the community and to ensure sustainability.

However, this approach may be very difficult to adopt, as mining, especially in South Africa, remains a very labour-intensive practice, whereas many other countries such as Canada, Australia and the United States of America have opted for more mechanisation due to high labour costs and mining's poor safety record (McGwin, Valent, Taylor, Howard, Davis, Brissie, & Rue III, 2002). For attracting and retaining highly qualified staff in the mining industry, working conditions have become important (IIED, 2002b). In an approach to manage and better the working conditions, organisations within the industry have to show that they have sound environmental planning, management and rehabilitation knowledge, and plans to minimise potential negative impacts in order to receive government approval for projects (Minerals Council of Australia (MCA), 1999, p. 14).

Unfortunately, the working conditions in the South African mining industry are still harsh, difficult and hazardous, especially for female employees (Calitz, 2004). Underground mining is one of the most hazardous occupations amongst major industrial activities (Maiti, 2003). Miners must cope with several insidious hazards to safety and health, such as gases and dust, in addition to a high concentration of mechanical equipment in a confined working space (Maiti, 2003).

Mine workers spend most of their day performing physical tasks. They work with explosives, place pencil sticks in stopes, test geological formations, operate load haul-dump (LHD) machines and maintain mining machinery in conventional mines (Anon., 2000). The equipment and techniques used are varied and complex, with many areas requiring significant safety and skills

training (Anon., 2000). With continual changes in the working faces during mining operations, workers may also experience problems with regard to adequate ventilation, proper supervision, and being informed of changes (Maiti, 2003). This increases the risk of occupational injuries and illnesses.

The increasing demands for survival, difficult working conditions and changes as indicated, make the quest to establish a motivated and committed workforce to cope in this environment, especially important (Cilliers & Kossuth, 2002). Research indicates that employees with positive ways of cognitively and effectively appraising the world are more likely to show a readiness and willingness to exploit the resources at their potential disposal (Antonovsky, 1984), thus enhancing their motivation and commitment.

When the organisation do not try to better the working conditions, minimise health and safety issues and control feelings of job insecurity, these aspects may lead to stressors and may negatively effect employees and their productivity levels (Arvidsson, Akesson, & Hansson, 2003). Some of the main stressors seems to be underutilisation of skills, job insecurity, role conflict and ambiguity, variation in workload, a lack of job resources and supervisor support, and a lack of participation in decision making (Arvidsson, et al., 2003; Calitz, 2004; McGwin, et al., 2002; Singer, 2002). These stressors seem to be closely related to the work characteristics at the level of the organisation (e.g. job security), at the interpersonal level (e.g. supervisor and co-worker support), at the level of work (e.g. role clarity, participation and decision-making), and at the task level (e.g. performance feedback, skill variety, task identity, task significance and autonomy) (Bakker, Demerouti, De Boer, & Schaufeli, 2001; Hackman & Oldham, 1976).

Work characteristics may evoke two different processes (Bakker, et al., 2001). Firstly, high job demands (i.e. work overload) may exhaust employees' mental and physical resources and may therefore lead to health problems or burnout (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Secondly, poor or lacking job resources preclude actual goal accomplishment, which is likely to result in failure and frustration. This, in turn, may lead to withdrawal from work, and reduced motivation or commitment (Bakker, Demerouti, & Schaufeli, 2003). When the external environment lacks resources, individuals cannot reduce the potentially negative influence of high

job demands and they cannot achieve their work goals. This may lead to reducing commitment as a self-protection mechanism in order to prevent the future frustration of not obtaining work-related goals (Hackman & Oldham, 1976). Within South Africa, limited research was found identifying the unique job demands and job resources in the mining industry. A first research objective therefore is that there are certain job demands and job resources within the mining industry and that these demands and resources need to be identified.

Job demands and job resources

The Job Demands-Resources (JD-R) model is a heuristic model that specifies how health impairment and motivation or involvement in any organisation may be produced by two specific sets of working conditions (Bakker, et al., 2003). At the heart of Demerouti, et al.'s (2001) Job Demands-Resources model lays the assumption that whereas every occupation may have its own specific risk factors associated with burnout, these factors can be classified into two general categories, namely job demands and job resources. This constitutes an overarching model that may be applied to various occupational settings, irrespective of the particular demands and resources involved. Job demands represent characteristics of the job that potentially evoke strain, in cases where they exceed the employee's adaptive capability (Bakker, et al., 2003). More specifically, job demands refer to those physical, social or organisational aspects of the job that require sustained physical and/or psychological effort on the part of the employee and are therefore associated with certain physiological and/or psychological costs (e.g. high work pressure, role overload, poor environmental conditions and exhaustion) (Bakker, et al., 2001; 2003). Job demands may turn into job stressors (Meijman & Mulder, 1998). This happens especially when meeting job demands require high effort from employees while the employees may experience difficulty to adequately recover from these efforts.

The second set of working conditions concerns the extent to which the job offers resources to individual employees. Demerouti, et al. (2001) defines job resources as those physical psychological, social, or organisational aspects of the job that: (1) are functional in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, and/or (3) stimulate personal growth and development. Examples of job and organisational

resources are social support from colleagues, performance feedback, good material, supervisory coaching, skill variety and job control. Job resources are therefore not only necessary to deal with job demands, but are also important in their own right (Elsass & Veiga, 1997).

Job resources may play either an intrinsic motivational role (by fostering the employee's growth, learning and development), or an extrinsic motivational role (by being instrumental in achieving work goals). In general, job demands and resources are negatively related, since job demands such as high work pressure and emotionally demanding interactions with clients may preclude the mobilisation of job resources. Moreover, high job resources, such as social support and feedback, may reduce job demands. The effects of job demands and job resources are illustrated in Figure 1.

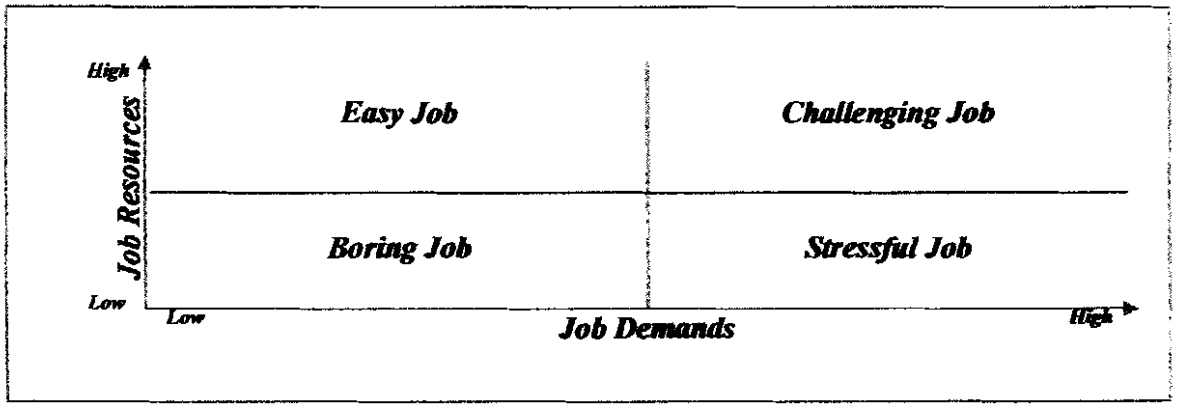

Figure 1: Job Demands and Job Resources

As illustrated above, low job demands and low job resources will result in a boring job, whereas low job demands and high job resources will results in a easy job. In a stressful job situation, a person will have high job demands but low job resources. In a challenging job, there will be high job demands and high job resources. Thus, in this area the high job resources reduces the high job demands and will result in more motivation and performance.

The JD-R model assumes that two different underlying psychological processes play a role in the development of burnout. In the first process, chronic job demands (i.e. work overload) may lead to exhaustion. According to Hockey's (1993) control model of demand management, individuals use performance-protection strategies under the influence of environmental demands.

Performance protection is achieved through the mobilisation of sympathetic activation (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2002). Hence, the greater the activation and/or effort, the greater the physiological costs for the individual.

The second process is motivational in nature, where it is assumed that job resources possess motivational potential. The lack of such resources may have detrimental effects on workers' motivation and performance, eventually leading to disengagement from work (cynicism) and a reduced sense of professional efficacy (Bakker, et al., 2002). According to Bakker, et al. (2002), two types of job resources can be distinguished: (1) resources that are extrinsic to the job (e.g. financial rewards and social support), and (2) resources that are intrinsic to the job (e.g. autonomy, feedback and professional development). The former have been identified by Herzberg (1966) as "hygiene factors", whereas the latter have also been termed "motivation factors".

Research with the JD-R model has shown that job resources contribute positively to the motivation and performance of individuals (Bakker, in press). It fosters work engagement, which in turn is predictive of organisational citizenship behaviour (Bakker, Demerouti, & Verbeke, 2004). Furthermore, in a series of studies in several occupational settings, it was found that organisational resources can be important predictors of work engagement, which in turn is predictive of important organisational outcomes, including proactive behaviour (Salanova, Carrero, Pinazo, & Schaufeli, in press), service climate (Salanova, Agut, & Peiró, in press), and group performance (Salanova, Llorens, Cifre, Marinez, & Schaufeli, 2003).

The lack of organisational resources has been found to have detrimental effects on workers' motivation and performance (Wong, Hui, & Law, 1998), since it precludes actual goal accomplishment and undermines employees' learning opportunities (Kelly, 1992). Houkes, Janssen, De Jonge, and Bakker (2003) included several job characteristics in a longitudinal research among bank employees and teachers, and found evidence for a causal effect of the "motivational potential score" (an additive index, including skill variety, task identity, task significance, autonomy and job feedback) on intrinsic work motivation.

Bakker's (2005) study among music teachers, relating organisational resources to work-related flow, has also provided additional evidence for the motivational potential of resources. In their study among human service professionals (including consultants, nurses and teachers) Bakker, et al. (2003) have shown that production workers' organisational resources foster organisational commitment, which in turn causes reduced absence frequency. Reciprocal relationships were also found between resources and flow (Salanova, Bakker, & Llorens, in press).

While there is no direct empirical evidence that job resources and job demands are related to work-related flow, there is indirect evidence to suggest that this is indeed the case (Csikszentmihalyi, 1997). Within South Africa, and specifically the mining industry, no research could be found investigating the relationship between job demands, job resources and work-related flow. A second research objective therefore is to determine the relationship between job demands and job resources and work-related flow within the mining industry and to determine whether the lack of job demands and the availability of job resources foster the experience of work-related flow.

Work-related flow

Flow has been defined as a concept to describe the sense of effortless action in moments that stand out as the best in one's life (Csikszentmihalyi, 1997). It is a state of consciousness where people become totally immersed in an activity, and enjoy it intensely (Salanova & Bakker, in press). Csikszentmihalyi (1990, pp. 3-4), who conceptualised the term, describes flow as "a state in which people are so intensely involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it". It is a holistic sensation that people feel when they act with total involvement (Csikszentmihalyi, 1975). According to May, Gilson, and Harter (2004), people seek fulfilment through self-expression at work. They believe that for a human being to thrive at work, individuals must be able to completely immerse themselves in their work. Thus, they must be able to engage the cognitive, emotional and physical dimensions of themselves in their work (May, et al., 2004).

When individuals are in a 'flow' state, little conscious control is necessary for their actions (Csikszentmihalyi, 1975). They narrow their attention to specific stimuli and they lose a sense of consciousness about their 'selves' as they merge with the activity itself (May, et al., 2004). Flow experiences also provide feedback that is automatically taken into account by the individual (May, et al., 2004). Furthermore, individuals experiencing flow need no external rewards or goals to motivate them, as the activity itself presents constant challenges (Csikszentmihalyi, 1975).

Although both engagement and flow have self-employment underpinnings (Kahn, 1990), engagement differs from the concept of flow in that flow has been conceptualised and measured primarily as cognitive absorption. However, according to Kahn (1990), individuals vary in the degree to which they immerse themselves in their roles. They would use all aspects of themselves – cognitive, emotional as well as physical (Kahn, 1990). For example, expression of emotion at work should facilitate engagement in work and make the connections with others at work more meaningful (Waldron, 1994). Work by Hochschild (1983) suggests that when there is a lack of congruence between one's felt emotion and the organisationally desired emotion, individuals will experience emotional labour and potentially disengage from their work.

Bakker (in press) applies the concept of flow to the work situation, and defines flow as a short-term peak experience at work that is characterised by absorption, work enjoyment and intrinsic work motivation. *Absorption* refers to a state of total concentration, whereby employees are totally immersed in their work (Salanova, et al., in press). They forget about time and everything else around them. Employees who *enjoy* their work and feel happy make a very positive judgment about the quality of their working life. This enjoyment or happiness is the outcome of cognitive and affective evaluation of the flow experience (Salanova, et al., in press). Finally, *intrinsic work motivation* refers to the need to perform a certain work-related activity with the aim of experiencing the inherent pleasure and satisfaction in the activity. Flow is achieved when all levels of consciousness are in harmony with each other (Csikszentmihalyi, 1975; 1988; 1993; 1997). Intrinsically motivated employees are continuously interested in the work they are involved in (Harackiewicz & Elliot, 1998). Employees who are motivated by the intrinsic aspects of their work tasks want to continue their work – they are fascinated by the tasks they perform

(Bakker, in press). Csikszentmihalyi (1997) and Hackman and Oldham (1975) see the sense of control or autonomy as an important element promoting the experience of flow or motivation respectively. Autonomy or employees' freedom in scheduling their work and in determining work methods has repeatedly been found to increase positive affect and motivation (Fried & Ferris, 1987).

Studies have shown that people more often experience flow during their work than during their free time (Csikszentmihalyi, 1997) and that managers and supervisors tend to experience more flow than clerical or blue-collar workers (Csikszentmihalyi, 1990). Researchers generally agree that the occurrence of flow is most likely when people perceive a balance between the challenge of a situation and their own skills to deal with this challenge (Bakker, in press). Employees should therefore particularly experience flow when their job demands match their professional skills. Goals will be reached when employees have certain skills or have sufficient resources in their work. Flow experiences occur when one becomes engaged in controllable but challenging tasks or activities that require considerable skill and that are intrinsically motivating (Carr, 2004).

Salanova, et al. (in press) assume that flow develops over time when personal and organisational resources are sufficiently available, as these positive aspects seem to foster flow experiences. This assumption is supported by a longitudinal study done by Bakker, et al. (2004) where the results indicated that the theoretical model of work-related flow, including cross-lagged reciprocal relationships between resources and work-related flow fits the empirical data the best. In a way, these results are supportive of the 'broaden-and-build' theory in which positive emotions are building resources, which in turn influence positive emotions (Fredrickson, 2002). According to the 'broaden-and-build' theory, positive emotions 'broaden' people's momentary thought-action repertories and 'build' their enduring personal resources (Bakker, et al., 2004). Research has shown that positive emotions such as joy, happiness and interest have long-term adaptive benefits because broadening builds enduring personal resources including physical, intellectual, social and psychological resources (Fredrickson, 2002). Moreover, research with the broaden-and-build theory showed that momentary experience of positive emotions can build enduring psychological resources and trigger upward spirals towards emotional well-being.

Thus, positive emotions do not only make people feel good for the moment, but also in the future (Fredrickson & Joiner, 2002). Experiences of positive emotions (such as flow at work) build people's enduring personal resources (Bakker, et al., 2004).

Within South Africa, and specifically the mining industry, no research could be found on the relationship between job demands, job resources and work-related flow. The objective of this study is therefore to determine the impact of job demands and job resources on the experience of work-related flow among employees in the mining industry.

Based on the above discussion, the following hypotheses are formulated:

H_1: There are practical and statistical significant relationships between job demands, job resources and work-related flow of employees in the mining industry.

H_2: Job demands and job resources are significant predictors of work-related flow.

METHOD

Research design

A cross-sectional design, with a survey as the data collection technique, was used to achieve the research objectives. Cross-sectional designs are used to examine groups of subjects in various stages of development simultaneously, while a survey is a data-collection technique in which questionnaires are used to gather data about an identified population (Burns & Grove, 1993). Information collected is used to describe the population at a particular point in time. This design can also be used to assess interrelationships among variables within a population. According to Shaughnessy and Zechmeister (1997), this design is best suited to addressing the descriptive and predictive functions associated with the correlation design, whereby relationships between variables are examined.

Participants

The participants could be defined as an availability sample of employees working in different sectors in the mining industry. A total population of 1 400 employees were targeted in different mining organisations (i.e. Platinum, Gold, Phosphate and Copper). Only responses from organisations in the gold and the phosphate industry were obtained. A response rate of 24% was achieved, of which 326 responses (97%) could be utilised.

Descriptive information of the sample is given in Table 1.

Table 1

Characteristics of the Participants

Item	Category	Frequency (Percentage)
Age	20-29 years	41 (12,60%)
	30-39 years	131 (40,30%)
	40-49 years	105 (32,30%)
	50-59 years	43 (13,00%)
	Older than 60 years	1 (0,30%)
Gender	Male	258 (79,10%)
	Female	65 (19,90%)
Race	White	185 (56,70%)
	African	132 (40,50%)
	Other	6 (1,80%)
Home language	Afrikaans	151 (46,30%)
	English	41 (12,60%)
	African languages	131 (40,20%)
Marital status	Single	35 (10,70%)
	Engaged / in a relationship	18 (5,50%)
	Married	245 (75,20%)
	Divorced	17 (5,20%)
	Separated	3 (0,90%)
	Remarried	5 (1,50%)

Table 1 (continued)

Characteristics of the Participants

Item	Category	Frequency (Percentage)
Education	Grade 10	25 (7,70%)
	Grade 11	28 (8,60%)
	Grade 12	145 (44,50%)
	Grade 12 + Diploma	57 (17,80%)
	Grade 12 + Higher Diploma or Degree	41 (12,60%)
	Grade 12 + Higher Diploma or Degree (Honours)	17 (5,20%)
	Grade 12 + Higher Diploma or Degree (Master's)	7 (2,10%)
Industry	Gold	251 (77,00%)
	Phosphate	71 (21,7%)
Current position	Human Resources	44 (11,2%)
	Production	107 (32,40%)
	Logistics and Services	74 (22,20%)
	Protection services	3 (0,90%)
	Plant	15 (4,50%)
	Engineering	9 (2,40%)
	Survey	6 (1,80%)
	Contractor	4 (1,20%)
Years employed in current position	One to ten years	106 (32,10%)
	Eleven to twenty years	116 (34,90%)
	Twenty-one years or more	78 (23,40%)
Current Patterson grading	B-band	25 (7,50%)
	C-lower	56 (16,90%)
	C-upper	100 (30,40%)
	D-lower	42 (12,70%)
	D-upper	20 (8,40%)
	E-band	5 (1,50%)

The sample consisted mainly of mainly of Afrikaans-speaking (46,30%) men (79,10%) in their thirties (40,30%), with a mean education of grade 12 (44,50%) working in the Gold industry (77,00%). The average number of years employed in the organisation was between eleven and

twenty years (34,90%). The participants were mainly employed in production (32,40%) and logistics and services (22,20%), in C-upper grading positions (30,40%).

Measuring battery

The following measuring instruments were used in the empirical study:

A *biographical questionnaire* was developed to gather information about the demographical characteristics of the participants. Information gathered included age, gender, race, home language, education, marital status and years employed in current position.

The *Job Demands and Resources Scale* (JDRS) was developed for the purpose of this study to measure job demands and job resources of employees in the mining industry. Various demands and resources in the mining industry were identified through the use of focus groups. Based on the results a unique job demands and resources scale was compiled. The items were measured on a four-point scale, ranging from 1 (*never*) to 4 (*always*). The internal consistency and construct validity of the scale were determined.

The *Work-Related Flow Scale* (WOLF; Bakker, 2001) was used to assess flow at work. The WOLF includes thirteen items measuring absorption (4 items), work enjoyment (4 items), and intrinsic work motivation (5 items). Examples are: "When I am working, I forget everything else around me" (absorption), "When I am working very intensely, I feel happy" (work enjoyment), and "I get my motivation from the work itself, and not from the rewards for it" (intrinsic work motivation). The participants were asked to indicate how often they had each of the experiences during the preceding week (0 = never, 6 = every day). Bakker (in press) found the following reliability results: Absorption (0,80); Work Enjoyment (0,90); and Intrinsic Work Motivation (0,75).

Statistical analysis

The statistical analysis was carried out with the help of the SPSS program (SPSS Inc., 2003) and the AMOS program (Arbuckle, 2003). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) were used to analyse the data. Cronbach alpha coefficients were used to assess the internal consistency, homogeneity and unidimensionality of the measuring instruments (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale.

Pearson product-moment correlation coefficients were used to specify the relationship between the variables. In terms of statistical significance, it was decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Effect sizes (Steyn, 1999) were used to determine the practical significance of the findings. A cut-off point of 0,30 (medium effect, Cohen, 1988) was set for the practical significance of correlation coefficients.

Covariance analysis or structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 2003), were used to determine the factorial validity of the theoretical Work-Related Flow model and to construct and test a structural model of Work-Related Flow consisting of Work-Related Flow, Job Demands and Job Resources. Hypothesised relationships were tested empirically for goodness of fit with the sample data. The χ^2 statistic and several other goodness-of-fit indices summarised the degree of correspondence between the implied and observed covariance matrices. However, because the χ^2 statistic equals $(N-1)F_{min}$ this value tends to be substantial when the model does not hold and the sample size is large (Byrne, 2001). Researchers addressed the χ^2 limitation by developing goodness-of-fit indices that take a more pragmatic approach to the evaluation process.

A value <2 for χ^2/degrees of freedom ration (CMIN/df) (Wheaton, Muthén, Alwin, & Summers, 1977) indicates acceptable fit (Tabachnick & Fidell, 2001). The hypothesised relationships with the data were also tested using the following goodness-of-fit statistics: Adjusted Goodness-of-Fit Index (AGFI), Parsimony Goodness-of-Fit Index (PGFI), Normed Fit Index (NFI), Comparative

Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA).

RESULTS

A simple principle component analysis was conducted on the 77 items of the JDRS on the total sample of employees in the mining industry. Analysis of the eigenvalues (larger that 1) and the scree plot indicated that ten factors could be extracted, explaining 52,25% of the total variance. Principle component analysis followed, using a direct oblimin rotation to carry out factor analysis.

The results of the factor analysis on the JDRS are shown in Table 2. Loading of variables on factors, communalities and percentage of variance are shown. Variables are ordered and grouped by size of loading to facilitate interpretation. Labels for each factor are suggested in a footnote.

Table 2

Factor Loadings, Communalities (h^2), and Percentage Variance for Principal Factors Extraction and Direct Oblimin Rotation on JDRS Items

Item	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	h^2
3A. Do you get on well with your supervisor / manager?	0,62	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,48
3B. In your work, do you feel appreciated by your supervisor / manager?	0,71	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,63
3C. Do you know exactly what your direct supervisor thinks of your performance?	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,60
3D. Do you have autonomy to do your work as you prefer?	0,42	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,51
3E. Do you receive sufficient information on the results of your work?	0,74	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,57
3F. Does your direct supervisor inform you about how well you are doing your work?	0,79	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,67
3G. Are you kept up-to-date about important issues within the mining industry affecting your job?	0,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,48
3H. Can you discuss work problems with your direct supervisor?	0,69	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,58
3I. Can you count on your supervisor when you come across difficulties in your work?	0,66	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,54
3J. Are you and your colleagues treated fairly?	0,63	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,60
3K. Are your work performance affected by 'red-rape'?	0,00	0,25	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,19
7A. Are uncontrollable events in your work environment affecting your work performance?	0,00	0,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,38
7B. Are you exposed to health risks in your work environment (i.e. HIV/AIDS, tuberculosis, gases, etc.)?	0,00	0,68	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,53
7C. Are there security risks posed in the area where your job is located?	0,00	0,55	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,38

Table 2 (continued)

Factor Loadings, Communalities (h^2), and Percentage Variance for Principal Factors Extraction and Direct Oblimin Rotation on JDRS Items

Item	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	h^2
7D. Do you have to deal with crisis situations?	0,00	0,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,55
7E. Do you have to make critical, on-the-spot decisions?	0,00	0,66	0,00	0,00	0,00	0,00	0,00	0,00	0.00	0,00	0,57
7F. Do you experience conflict with other departments/divisions?	0,00	0,43	0.00	0,00	0,00	0,00	0,00	0,00	0,00	0.00	0,41
7G. Do you experience language and communication barriers with co-workers?	0,00	0,32	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,29
7I. Is your job performance affected by a legal appointment?	0,00	0,54	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,34
7K. Do you work in dangerous conditions?	0,00	0,75	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,60
7L. Do you work in unsafe conditions?	0,00	0,69	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,54
7M. Do you have a stressful working environment	0.00	0,54	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,52
2A. Do you have to work under time pressure?	0,00	0,00	0,41	0,00	0,00	0,00	0,00	0.00	0,00	0.00	0,31
2B. Do you have to work very hard?	0,00	0,00	0,54	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,44
2C. Do you have enough time to get the job done?	0,00	0,00	-0,30	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40
2D. Does your job require long periods of intense concentration on the task?	0,00	0,00	0,41	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,31
2E. Are your tasks often interrupted before they can be completed?	0,00	0,00	0,47	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,36
2F. Is your job hectic?	0,00	0,00	0,65	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,48
2G. Do you have too much work to do?	0,00	0,00	0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,52
2H. Do you have work left when you leave work?	0,00	0,00	0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,50
2I. Are you asked to do an excessive amount of work?	0,00	0,00	0,66	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,51
2J. Do you find it difficult to complete all your tasks for the day?	0,00	0,00	0,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,52
2K. Do you have to meet targets that seem impossible/ unrealistic?	0,00	0,00	0,51	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,47
9A. Do you know exactly for what you are responsible and which areas are not your responsibility?	0,00	0,00	0,00	0,31	0,00	0,00	0,00	0,00	0,00	0,00	0,27
9H. Do you have freedom in carrying out your work activities?	0,00	0,00	0,00	0,49	0,00	0,00	0,00	0,00	0,00	0,00	0,47
9I. Can you decide for yourself how to carry out your work?	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,00	0,00	0,00	0,60
9J. Do you have any influence over decisions about when a piece of work must be completed?	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,00	0,00	0,00	0,54
9K. Can you decide for yourself how much time you would like to spend on a certain task?	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,00	0,00	0,00	0,55
9L. Do you solve problems that arise in your work yourself?	0,00	0,00	0,00	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,50
9M. Can you determine the content of your work yourself?	0,00	0,00	0,00	0,66	0,00	0,00	0,00	0,00	0,00	0,00	0,53
9N. Do you have influence in the planning of your work activities?	0,00	0,00	0,00	0,58	0,00	0,00	0,00	0,00	0.00	0,00	0,43
8A. Can you count on your co-workers when you come across difficulties in your work?	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,00	0,00	0,56
8B. If necessary, can you ask your co-workers for help?	0,00	0.00	0.00	0,00	0,77	0,00	0,00	0,00	0,00	0,00	0,61
8C. Do your co-workers help you to get the job done?	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,00	0,00	0,59
8D. Do you receive sufficient technical support to complete your tasks?	0,00	0,00	0,00	0,00	0,62	0,00	0,00	0,00	0,00	0.00	0,58
8E. Do you receive the right technical support to complete your tasks?	0,00	0,00	0,00	0,00	0,59	0,00	0,00	0,00	0,00	0,00	0,58
8F. Do you receive support from other people or places than the organisation (i.e. trade union)?	0,00	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,00	0,00	0,34

Table 2 (continued)

Factor Loadings, Communalities (h^2), and Percentage Variance for Principal Factors Extraction and Direct Oblimin Rotation on JDRS Items

Item	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	h^2
5A. Do you think your organisation pays good salaries?	0,00	0,00	0,00	0,00	0,00	-0,82	0,00	0,00	0,00	0,00	0,74
5B. Do you think you are paid enough for the work that you do?	0,00	0,00	0,00	0,00	0,00	-0,86	0,00	0,00	0,00	0,00	0,76
5C. Does your job offer you the possibility to progress financially?	0,00	0,00	0,00	0,00	0,00	-0,65	0,00	0,00	0,00	0,00	0,62
5D. Can you live comfortably on your pay?	0,00	0,00	0,00	0,00	0,00	-0,77	0,00	0,00	0,00	0,00	0,73
5E. Do you think your organisation provides good benefits?	0,00	0,00	0,00	0,00	0,00	-0,61	0,00	0,00	0,00	0,00	0,46
7J. Do you experience a lot of improvement in the area where your job is located?	0,00	0,00	0,00	0,00	0,00	0,00	-0,34	0,00	0,00	0,00	0,27
9B. Does your work make sufficient demands on all your skills and capacities?	0,00	0,00	0,00	0,00	0,00	0,00	-0,26	0,00	0,00	0,00	0,35
9D. Do you have enough variety in your work?	0,00	0,00	0,00	0,00	0,00	0,00	-0,41	0,00	0,00	0,00	0,35
9E. Does your job offer you opportunities for personal growth and development?	0,00	0,00	0,00	0,00	0,00	0,00	-0,82	0,00	0,00	0,00	0,76
9F. Does your job give you the feeling that you can achieve something?	0,00	0,00	0,00	0,00	0,00	0,00	-0,77	0,00	0,00	0,00	0,71
9G. Does your job offer you the possibility of independent thought and action?	0,00	0,00	0,00	0,00	0,00	0,00	-0,41	0,00	0,00	0,00	0,50
9O. Does your organisation give you opportunities to follow training courses?	0,00	0,00	0,00	0,00	0,00	0,00	-0,48	0,00	0,00	0,00	0,52
9P. Does your job give you the opportunity to be promoted?	0,00	0,00	0,00	0,00	0,00	0,00	-0,70	0,00	0,00	0,00	0,55
4A. Do you need to be more secure that you will still be working in one year's time?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,89	0,00	0,00	0,77
4B. Do you need to be more secure that you will keep your current job in the next year?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,92	0,00	0,00	0,86
4C. Do you need to be more secure that you will keep the same function level as currently?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,87	0,00	0,00	0,78
1A. Do you have adequate resources (i.e. material/equipment/labour) to complete your daily tasks?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,73	0,00	0,68
1B. Is material (i.e. equipment) available when you need it?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,83	0,00	0,74
1C. Do you have the right resources (i.e. material/equipment/labour) available to complete your daily tasks?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,83	0,00	0,76
1D. Are materials issued on time?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,74	0,00	0,61
1E. Do you have access to resources (i.e. material/equipment/labour) when you need it?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,71	0,00	0,61
1H. Are there sufficient personnel /labour to handle the workload?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,49	0,00	0,45
1I. Are there enough staff/labour to do the work?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,51	0,00	0,47
6A. Do you have to work socially undesirable hours?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,54	0,58
6B. Do you have to work irregular hours?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,52	0,58
6C. Do you have to work overtime?	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,32	0,30
Percentage of variance	15,76	9,45	5,46	4,35	3,60	3,48	2,97	2,74	2,43	2,02	

F_1 Supervision F_2 Working Conditions F_3 Workload F_4 Task Freedom F_5 Support F_6 Pay and Benefits F_7 Opportunity for Growth F_8 Job Security F_9 Resources Availability F_8 Working Hours

Ten internally consistent factors were extracted, explaining 52,25% of the total variance. Four of the 77 variables did not load on any of the factors.

The first factor was labelled *Supervision*. Items loading on this factor relate to supervision in the work environment. It involved mainly the receiving of sufficient information regarding work results, purpose of work and work performance, clear expectations from superiors, and relationship with immediate supervisor. The second factor was labelled *Working Conditions* and included factors that affected the working conditions – such as uncontrollable events in the working environment, health and security risks, crisis and conflict situations, communication barriers with co-workers, dangerous, unsafe working conditions and stressful working conditions. The third factor was labelled *Workload*. The items that loaded on this factor include aspects such as working under time pressure, working very hard, the requirement of long periods of intense concentration on tasks, too much work to do, ask to do an excessive amount of work, difficulty in completion of all tasks for the day, and having to meet targets that seem impossible or unrealistic.

The fourth factor was labelled *Task Freedom* and included factors that measured knowledge of own responsibilities, the freedom to carry out work activities, the freedom to decide how to carry out work, responsibility for problem solving in work, determining the content of work, and influence in the planning of work activities. The fifth factor was labelled *Support*. The items that loaded on this factor included aspects such as relying on colleagues when facing difficulties at work, asking colleagues for help, and getting on well with colleagues. The sixth factor was labelled *Pay and Benefits* and included perceptions of pay, the ability to progress financially, and the benefits provided by the organisation. The seventh factor was labelled *Opportunity for Growth*. The items that loaded on this factor included aspects such as the influence of "red tape" (bureaucracy) on performance, the repetition of the same thing, variety in the work, opportunities for personal growth and development, and feelings of achievement. The eighth factor was labelled *Job Security* and reflected participants' indication that they would still be working in one year's time and would keep the current level of functioning; and that they need to be more secure in keeping their current job in the next year. The ninth factor was labelled *Resources Availability*. The items that loaded on this factor included aspects such as the availability of

adequate resources, material (i.e. equipment) available when needed, the availability of the right resources (i.e. material/equipment/labour) to complete daily tasks, receiving tasks and/or assignments without adequate resources (i.e. material/equipment/labour) to execute them, sufficient personnel or labour to handle the workload. The tenth factor was labelled *Working Hours* and included factors such as having to work socially undesirable and irregular hours, and working overtime.

A second-order factor analysis was performed on the ten factors of the JDRS. Two factors were extracted, explaining 47,54% of the total variance. These two factors were labelled Job Resources (consisting of Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability) and Job Demands (consisting of Workload, Working Conditions, Job Security, and Working Hours).

The Factorial validity of the WOLF was determined with the help of the AMOS program (Arbuckle, 2003). The obtained χ^2 goodness-of-fit statistic, degrees of freedom and probability or significant level were studied. Comparative fit indices, such as the Goodness-of-fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Parsimony Goodness-of-Fit Index (PGFI), the Normed Fit Index (NFI), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA) were also utilised. The goodness-of-fit statistics are given in Table 3.

Table 3

Goodness-of-Fit Statistics for the WOLF

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Model 1 (one-factor)	215,89	77	0,92	0,89	0,67	0,87	0,89	0,90	0,07
Model 1 (three-factor)	180,96	74	0,92	0,90	0,66	0,89	0,91	0,93	0,06
Model 2 (three- factor)	159,10	73	0,94	0,91	0,65	0,90	0,93	0,94	0,06

A one-factor and a three-factor model were tested. The χ^2 value of 215,89 ($df = 77$; $p = 0,00$) obtained for the one-factor model were significantly lower than the χ^2 value of 180,96 ($df = 74$; p

= 0,00) for the theoretical three-factor model (Model 1). Further analysis was therefore done on the theoretical three-factor model.

The goodness-of-fit indices showed an acceptable fit for the three-factor model by reaching the recommended critical values – except for PGFI, which is lower than 0,80, and NFI, which is lower than 0,90. To pinpoint possible areas of misfit, modification indices were examined. Errors IM14 and IM17 were allowed to correlate. Subsequence analysis was therefore performed on the re-specified model (Model 2). The goodness-of-fit indices showed acceptable fit and no further modification of the model was deemed necessary.

The descriptive statistics, alpha coefficients and inter-item correlation of the measuring instruments, namely the JDRS and the WOLF, are given in Table 4.

Table 4

Descriptive Statistics and Alpha Coefficients of the JDRS and the WOLF

Item	Mean	*SD*	Skewness	Kurtosis	α
JDRS					
Supervision	28,63	6,80	-0,27	-0,69	0,89
Workload	27,85	4,80	0,18	-0,09	0,72
Working Conditions	27,04	7,00	0,38	-0,35	0,83
Task Freedom	23,94	4,56	-0,15	-0,55	0,82
Support	17,25	3,65	-0,10	-0,57	0,78
Pay and Benefits	10,81	4,03	-0,48	-0,61	0,87
Opportunity for Growth	20,85	4,85	-0,11	-0,47	0,80
Job Security	8,02	3,00	-0,17	-1,16	0,89
Resources Availability	20,14	4,86	-0,18	-0,657	0,89
Working Hours	6,12	2,13	0,62	-0,19	0,72
WOLF					
Absorption	16,81	5,40	-0,04	-0,70	0,59
Work Enjoyment	19,03	5,89	-0,37	-0,46	0,84
Intrinsic Motivation	23,63	8,16	0,07	-0,59	0,71

Table 4 shows that acceptable Cronbach alpha coefficients varying from 0,71 to 0,89 were obtained, except for Absorption (0,59). These alpha coefficients compare reasonably well with

the guideline of 0,70 (0,55 in basic research), demonstrating that a large portion of the variance is explained by the dimensions (internal consistency of the dimensions) (Nunnally & Bernstein, 1994). It is evident from Table 4 that most of the scales of the measuring instruments have relatively normal distributions, with low skewness and kurtosis.

The product-moment correlation coefficients between job demands, job resources and work-related flow are given in Table 5.

Table 5

Product-Moment Correlation Coefficients between the JDRS and the WOLF

Item	1	2	3	4	5	6	7	8	9	10	11	12
1. Supervision	-	-	-	-	-	-	-	-	-	-	-	-
2. Workload	-0,22*	-	-	-	-	-	-	-	-	-	-	-
3. Working Conditions	-0,09	0,41*+	-	-	-	-	-	-	-	-	-	-
4. Task Freedom	0,39*+	-0,03	-0,05	-	-	-	-	-	-	-	-	-
5. Support	0,36*+	-0,08	-0,03	0,24*	-	-	-	-	-	-	-	-
6. Pay and Benefits	0,38*+	-0,09	-0,05	0,21*	0,23*	-	-	-	-	-	-	-
7. Opportunity for Growth	0,44*+	0,04	0,08	0,47*+	0,39*+	0,34*+	-	-	-	-	-	-
8. Job Security	-0,04	0,03	0,19*	-0,04	0,06	-0,16*	-0,01	-	-	-	-	-
9. Resources Availability	0,40*+	-0,16	-0,34*+	0,28*	0,25*	0,34*+	0,23*	-0,28*	-	-	-	-
10. Working Hours	-0,08	0,28*	0,48*+	-0,15*	0,04	-0,01	0,07	0,16*	-0,36*+	-	-	-
11. Absorption	0,10	0,17*	0,05	0,19*	0,14*	0,03	0,22*	0,02	0,02	0,08	-	-
12. Work Enjoyment	0,29*	-0,11*	-0,15*	0,29*	0,28*	0,01	0,35*+	0,08*	0,12*	-0,11*	0,53*++	-
13. Intrinsic Motivation	0,28	-0,04	-0,12*	0,30*	0,25*	0,03	0,29*	0,07	0,09	-0,03	0,54*++	0,73*++

* $p \leq 0,05$ – statistically significant

\+ $r > 0,30$ – practically significant (medium effect)

++ $r > 0,50$ – practically significant (large effect)

Table 5 shows statistically significant positive correlations and (practically significant, medium effect) between Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability. Workload shows a statistically significant positive correlation (practically significant, medium effect) with Working Conditions. Working Conditions shows a statistically significant negative correlation (practically significant, medium effect) with Resources Availability and a statistically significant positive correlation (practically significant, medium effect) with Working Hours. Task Freedom shows statistically significant positive correlations (practically significant, medium effect) with Opportunity for Growth. Support shows

a statistically significant positive correlation (practically significant, medium effect) with Opportunity for Growth. Pay and Benefits shows statistically significant positive correlations (practically significant, medium effect) with Opportunity for Growth, and Resources Availability. Opportunity for Growth shows a statistically significant positive correlation (practically significant, medium effect) with Work Enjoyment. Resources Availability shows a statistically significant negative correlation (practically significant, medium effect) with Working Hours. Absorption shows a statistically significant positive correlation (practically significant, large effect) with Work Enjoyment and Intrinsic Motivation and Work Enjoyment shows a statistically significant positive correlation (practically significant, large effect) with Intrinsic Motivation.

Next, a model based on the results of the product-moment correlations as well as consensus of findings based on a review of the literature on job characteristics and work-related flow, with specific bearing on employees in the mining industry, was tested with SEM analysis. Results indicated that the model did not fit the data adequately. Further modification of the model was thus required. Inspection of the modification indices (MI) revealed that the fit between the model and the data could be further improved if correlation was allowed between the measurements errors of job characteristics. This means that the fit of the proposed model can be improved it the measurement errors between Resources Availability and Working Conditions (MI = 11,51) Resources Availability and Working Hours (MI = 15,47), Resources Availability and Job Security (MI = 16,24), Opportunities for Growth and Resources Availability (MI = 10,59) and Supervision and Workload (MI = 14,52) are allowed to correlate. The revised model – including covariation – shows a good fit (χ^2 = 108,00, GFI = 0,95, RMSEA = 0,06, CFI = 0,94, IFI = 0,94, and TLI = 0,91). The final model is given in Figure 2.

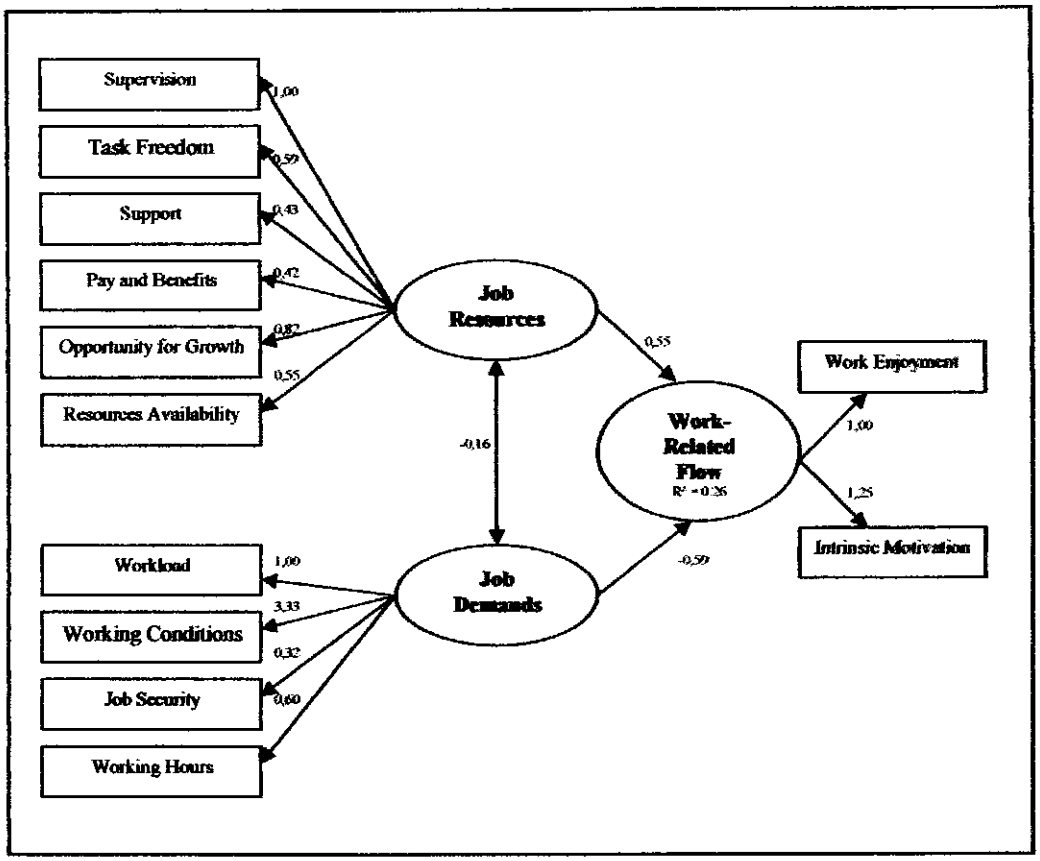

Figure 2: A Structural Model of Work-Related Flow

As can be seen in Figure 2, the path from Job Resources to Work-Related Flow is significant. This means that the availability of job resources increases the experience of work-related flow of employees in the mining industry. The path from Job Demands to Work-Related Flow is also significant, indicating that job demands such as job security, working hours, working conditions, and workload may negatively influence the experience of work-related flow. Job Resources and Job Demands predict 26% of the variance in work-related flow. According to the standard regression weights, Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunities for Growth, and Resources Availability) is the only significant predictors of Work-Related Flow.

Based on the above-mentioned findings, Hypothesis 1 is accepted. Hypothesis 2 is only partially accepted.

DISCUSSION

The objective of this study was to determine the relationship between job demands, job resources and work-related flow. First, a simple factor analysis was conducted on the JDRS, identifying a ten-factor structure explaining 52,25% of the variance. These factors were labelled Supervision, Workload, Working Conditions, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, Job Security, Resources Availability and Working Hours.

A second-order factor analysis was then performed on the ten factors of the JDRS and two factors were extracted, explaining 47,54% of the total variance. These two factors were labelled Job Resources (consisting of Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability) and Job Demands (consisting of Workload, Working Conditions, Job Security, and Working Hours).

Next, the factorial validity of the WOLF was determined with the AMOS program (Arbuckle, 2003). Initially, a one-factor model was tested, but the theoretical three-factor model, as postulated by Bakker (in press), displayed a better χ^2 value. Further analysis was therefore conducted on the three-factor model. After the modification indices were examined, one error pair (IM14-IM17) was allowed to correlate. The goodness-of-fit indices showed acceptable fit for the re-specified theoretical three-factor model and no further modification of the model was deemed necessary.

Thirdly, the construct validity and internal consistency of the JDRS subscales and the WOLF subscales were determined. Cronbach alpha coefficients varying from 0,71 to 0,89 were obtained, except for Absorption (0,59). These alpha coefficients compare reasonably well with the guideline of 0,70 (0,55 in basic research), demonstrating that a large portion of the variance is explained by the dimensions (internal consistency of the dimensions) (Nunnally & Bernstein, 1994). Most of the scales of the measuring instruments had relatively normal distributions, with low skewness and kurtosis.

Pearson product-moment correlation showed that Supervision correlated positively with Task Freedom, Support, Pay and Benefits, Opportunities for Growth, and Resources Availability. Workload correlated positively with Working Conditions. Working Conditions correlated positively with Working Hours and negatively with Resources Availability. Although Csikszentmihalyi (1990) and Bakker (in press) found that job demands such as work pressure and emotional demands had a positive relationship with absorption, no correlation could be found in this study.

Task Freedom correlated positively with Opportunity for Growth, and Support correlated positively with Opportunity for Growth. Pay and Benefits correlated positively with Opportunity for Growth, and Resources Availability. Bakker (in press) found that Opportunities for Growth were positively related to each of the three flow dimensions. However, in this study, Opportunity for Growth was only positively related to Work Enjoyment. Resources Availability correlated negatively with Working Hours and Absorption correlated positively with Work Enjoyment and Intrinsic Motivation. Work Enjoyment correlated positively with Intrinsic Motivation.

Lastly, a structural model of work-related flow for employees in the mining industry comprising job demands, job resources and work-related flow was tested. Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability) may have a positive impact on work-related flow and could increase the levels of work-related flow of employees in the mining industry. Job Demands (i.e. Workload, Working Conditions, Job Security, and Working Hours) has a negative impact on Work-Related Flow, thus job demands may negatively influence the experience of work-related flow of employees in the mining industry. Job Resources and Job Demands predict 26% of the variance in Work-Related Flow. According to the standard regression weights, Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunities for Growth, and Resources Availability) is the only significant predictor of Work-Related Flow.

Hypothesis 1 was accepted, while hypothesis 2 was only partially accepted.

RECOMMENDATIONS

The South African mining industry plays an important role in the economy and the development of South Africa, contributing around 7,70% to the Gross Domestic Product and employing 4,10% of the economically active population (Van der Poll, 1998). Almost 72% of the South African economy is currently controlled by the mining industry (Van Zyl, Human, & Tshabalala, 2004). The possibility of downsizing in personnel and material support, and the closing of mines (De Lange, 2005; Van der Walt, 2005), can therefore have severe consequences for the country's economy.

As a result, it is important to assist the mining industry in ensuring sustainability, through critically examining the job characteristics (i.e. job demands and job resources) in the environment. No research could be found on the unique job characteristics in the mining industry in South Africa and the relationship thereof with positive constructs such as work-related flow. Bakker (in press) defines work-related flow as a short-term peak experience at work that is characterised by absorption, work enjoyment and intrinsic work motivation. Research (Bakker, 2005; Bakker, et al., 2003; Salanova, Bakker, et al., in press) shows that resources are related to work-related flow and may therefore have motivational powers.

It is recommended that more research be done on the motivational power and positive impact of work-related flow in the industry and the relationship thereof with job demands and job resources. More research should also be done on the impact of job resources and job demands on other positive constructs. Job resources appear to be significant predictors of work-related flow. It is therefore necessary to determine whether there are other job characteristics than those already identified that may enhance the experience of work-related flow.

Although the JDRS was developed for the purpose of this study, it is possible that certain information was not included in the compilation of the instrument. It may therefore be necessary to investigate the factor structure of the JDRS in other organisations in the mining industry. The factorial validity of the WOLF was determined with the AMOS programme (Arbuckle, 2003).

Further research regarding the factor structure of the WOLF in other South African populations should be conducted.

The first limitation of this study was the use of a cross-sectional survey design. Despite the use of advanced structural equation modelling techniques, no causal relationship inferences could be drawn. To deal with the limitation of the use of a cross-sectional design, prospective longitudinal and quasi-experimental research designs are needed to further validate the hypothesised structural relationships within the study. Another limitation was that the results were obtained purely by self-report measures, which could lead to a problem referred to as "method variance" or "nuisance". Even though a total population of 1 400 was targeted, a response rate of only 24% was achieved. This indicates a third limitation. Participants were reluctant to participate in the study and were very suspicious. This could have been caused by the negative external factors that had affected the mining industry in South Africa.

Similar studies need to be undertaken for other samples from the mining industry. Further research is also needed in work-related flow. Future longitudinal research should be conducted to pinpoint the causal nature of, and determine the relationship between, variables and to ascertain which variables could enhance work-related flow. The inclusion of personality dimensions in future research is strongly recommended to establish the effects of personality differences on work-related flow. Larger sample sizes will also allow for testing of construct equivalence and item bias in multicultural samples.

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CHAPTER 3

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The purpose of this chapter is to provide conclusions regarding the results of the empirical studies of the research article. Conclusions are drawn with regard to the research objectives. Furthermore, limitations of the study are discussed. Finally, recommendations for the organisation are made and research opportunities that emanate from this research are presented.

3.1 CONCLUSIONS

The general objective of this research was to determine the relationship between job demands, job resources and work-related flow of employees in the mining industry in South Africa. Based on the results of the research article, the following conclusions can be drawn:

The first objective of this study was to determine the construct validity and internal consistency of the *Job Demands and Resources Scale* (JDRS) and the *Work-Related Flow Scale* (WOLF) for employees in the mining industry. A ten-factor structure for the JDRS (Supervision, Workload, Working Conditions, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, Job Security, Resources Availability and Working Hours) and a three-factor structure for the WOLF (Absorption, Work Enjoyment and Intrinsic Work Motivation) were obtained. A second-order factor analysis was performed on the ten factors of the JDRS and two factors were extracted. These factors were labelled Job Resources (consisting of Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability) and Job Demands (consisting of Workload, Working Conditions, Job Security, and Working Hours).

Cronbach alpha coefficients varying from 0,71 to 0,89 were obtained, except for Absorption (0,59). These alpha coefficients compare reasonably well with the guideline of 0,70 (0,55 in basic research), demonstrating that a large portion of the variance is explained by the dimensions (internal consistency of the dimensions) (Nunnally & Bernstein, 1994). Most of the scales of the measuring instruments had relatively normal distributions, with low skewness and kurtosis.

The second objective of the study was to conceptualise job demands, job resources and work-related flow from the literature. *Job demands* were conceptualised as the characteristics of the job that potentially evoke strain, in cases where they exceed the employee's adaptive capability (Bakker, Demerouti, & Schaufeli, 2003). *Job resources* were defined as those physical psychological, social, or organisational aspects of the job that: (1) are functional in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, and/or (3) stimulate personal growth and development (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). A heuristic model, the Job Demands-Resources model, specifies how health impairment and motivation or involvement in any organisation may be produced by these two specific sets of working conditions (Bakker, et al., 2003). The first set concerns job demands that represent characteristics of the job that potentially evoke strain, in cases where they exceed the employee's adaptive capability and the second set of working conditions concerns the extent to which the job offers resources to individual employees. (Bakker, et al., 2003).

Flow has been defined as a concept to describe the sense of effortless action in moments that stand out as the best in one's life (Csikszentmihalyi, 1997). It is considered to be a state of consciousness where people become totally immersed in an activity, and enjoy it intensely (Salanova, Bakker, & Llorens, in press). Flow has been described by Csikszentmihalyi (1990, p. 3-4) as "a state in which people are so intensely involved in an activity that nothing else seems to matter to them and that the experience in itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it. Bakker (in press, p. 4) defined work-related flow as "a short-term peak experience at work that is characterised by absorption, work enjoyment and intrinsic work motivation".

The third objective of this study was to determine the relationship between job demands, job resources and work-related flow according to the literature. Bakker's (2005) study among music teachers, related organisational resources to work-related flow. Reciprocal relationships were also found between resources and flow (Salanova, Bakker, & Llorens, in press). Apart from this research, there is no direct empirical evidence that job resources and job demands are related to work-related flow; although it appears that there may be indirect evidence to suggest that there is indeed a relationship (Csikszentmihalyi, 1997).

The fourth objective of this study was to determine the relationship between job demands, job resources and work-related flow in a sample of employees in the mining industry. Pearson product-moment correlation in this study showed that Supervision correlated positively with Task Freedom, Support, Pay and Benefits, Opportunities for Growth, and Resources Availability. Workload correlated positively with Working Conditions. Working Conditions correlated positively with Working Hours and negatively with Resources Availability. Although Csikszentmihalyi (1990) and Bakker (in press) found that job demands such as work pressure and emotional demands had a positive relationship with absorption, no correlation could be found in this study.

Task Freedom correlated positively with Opportunity for Growth, and Support correlated positively with Opportunity for Growth. Pay and Benefits correlated positively with Opportunity for Growth, and Resources Availability. Bakker (in press) found that Opportunities for Growth were positively related to each of the three flow dimensions. However, in this study Opportunity for Growth was only positively related to Work Enjoyment. Resources Availability correlated negatively with Working Hours and Absorption correlated positively with Work Enjoyment and Intrinsic Motivation. Work Enjoyment correlated positively with Intrinsic Motivation.

The last objective of this study was to determine whether the availability of job resources and the lack of job demands foster the experience of work-related flow. A structural model of work-related flow for employees in the mining industry, comprising job demands, job resources and work-related flow was tested. Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunity for Growth, and Resources Availability) may have a positive impact on Work-Related Flow and could increase the levels of Work-Related Flow of employees in the mining industry. Job Demands (i.e. Workload, Working Conditions, Job Security, and Working Hours) has a negative impact on Work-Related Flow, thus Job Demands may negatively influence the experience of work-related flow of employees in the mining industry. Job Resources and Job Demands predict 26% of the variance in Work-Related Flow. According to the standard regression weights, Job Resources (i.e. Supervision, Task Freedom, Support, Pay and Benefits, Opportunities for Growth, and Resources Availability) is the only significant predictor of Work-Related Flow.

3.2 LIMITATIONS

The first limitation of this study was the use of a cross-sectional survey design. Despite the use of advanced structural equation modelling techniques, no causal relationship inferences could be drawn. More complex forms of non-recursive linkages could no be examined. To deal with the limitation of the use of a cross-sectional design, prospective longitudinal and quasi-experimental research designs are needed to further validate the hypothesised causal relationships within the study.

Even though there was a total population of 1 400 targeted for this study, a response rate of only 24% was achieved. Participants were reluctant to take part in the study and were very suspicious. A lot of external factors have had a negative effect on the mining industry in South Africa, which could have had a negative effect on the participants. These external factors included strikes that were related to the working conditions and salaries of miners and the rand-dollar exchange rate that had negative financial influences on the industry and that could have affected the morale of the mining employees. Furthermore, mines in the North-West Province experienced serious seismic events that caused enormous damage – to such an extent that the mine had to be closed down for a period of time (Le Roux, 2005). These factors could have had a negative effect on the morale of the mining employees and the response rate of the questionnaires. Gender also represented a limitation in that the majority of the participants were male.

The sampling procedure created problems, and future studies could benefit from using a stratified random-sample design, which would ensure sufficient representation of the different groups in the total population and enable generalisation of findings to the total study population. Data was collected from different positions and gradings within the mining industry at different points in time, which means that unique organisational characteristics and/or historical events might have affected the findings. The characteristics of the sample also prevented specific findings regarding a specific position or grading.

The results were obtained solely by self-report measures. This may lead to a problem known as "method variance" or "nuisance". However, several authors argue that this phenomenon is not a

major threat if interactions are found (Dollard & Winefield, 1998). Another limitation was that the questionnaire booklets were given to the Human Resource Managers who then had to give the instructions to the rest of the mining employees that participated. The participants completed the questionnaire booklets either at home or at work. Some individuals working in the same area could have discussed the answers and this could have influenced their responses.

The questionnaire was available only in English. The possibility exists that respondents' level of English language skills (with English as a second, third or even fourth language) could have influenced the results.

Another limitation was that only selected job demands and job resources were included in this study. It is possible that certain information was not included in the compilation of the instrument. It may therefore be necessary to investigate the factor structure of the JDRS in other organisations in the mining industry.

3.3 RECOMMENDATIONS

Recommendations for the management of the organisation for future research are made in this section.

3.3.1 Recommendations for the management of the organisations

It is important to assist the mining industry in South Africa through critically examining the job characteristics (i.e. job demands and job resources) in the environment so as to ensure sustainability. By ensuring a balance in the load of tasks to be handled and equipping employees with the necessary knowledge, skills, material, instruments and other resources, the employees will increasingly feel that the work expectations are manageable and within their power and that their work is meaningful and of importance to others. Job demands such as workload, working conditions, job security, and working hours should be addressed and examined. Employees in the mining industry should be given the "tools" to handle these job demands. This can be achieved by educating them in task management, time management and crisis management, and by

preparing employees for a possible increase in their responsibilities. Research (Bakker, 2005; Bakker, et al., 2003; Salanova, Bakker, et al., in press) shows that resources related to work-related flow may have motivational powers.

However, no research could be found on the unique job characteristics in the mining industry in South Africa and their relationship with positive constructs such as work-related flow. It is therefore recommended that more research be done on the motivational power and positive impact of work-related flow in the industry and its relationship with job demands and job resources. More research should also be done on the impact of job resources and job demands on other positive constructs. Job resources appear to be a significant predictor of work-related flow. It is therefore necessary to determine whether there are other job characteristics than those already identified that may enhance the experience of work-related flow.

3.3.2 Recommendations for future research

Similar studies need to be undertaken for other samples from the mining industry. Further research is also needed on work-related flow. Future longitudinal research should be conducted to pinpoint the causal nature of, and determine the relationship between, variables and to ascertain which variables could enhance work-related flow. The inclusion of personality dimensions in future research is strongly recommended to establish the effects of personality differences on work-related flow. Larger sample sizes will also allow for testing of construct equivalence and item bias in multicultural samples.

Although the JDRS was developed for the purpose of this study, it is possible that certain information was not included in the compilation of the instrument. It may therefore be necessary to investigate the factor structure of the JDRS in other organisations in the mining industry. The factorial validity of the WOLF was determined with the AMOS program (Arbuckle, 2003). Further research regarding the factor structure of the WOLF in other South African populations should be conducted.

Despite the use of advanced structural equation modelling techniques, no causal relationship inferences could be drawn. To deal with the limitation of the use of a cross-sectional design,

prospective longitudinal and quasi-experimental research designs are needed to further validate the hypothesised structural relationships within the study.

Future studies should focus on the positive work-related attitudes and work behaviour. Positive constructs such as work-related flow and its effect on Work Wellness of employees in the mining industry, and the causes of work-related flow within different occupational settings should be studied.

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