

# Investigating the influence of work-life balance on the quality of work and occupational stress of automation engineers

**JN Pretorius**

 [orcid.org/0000-0001-9705-2066](https://orcid.org/0000-0001-9705-2066)

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Supervisor: Prof PA Botha

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Student number: 33464154

## **PREFACE AND ACKNOWLEDGEMENTS**

Growing up with a hard-working engineering father and father-in-law, I always knew that they had to cope with the challenges of being a husband, father, successful worker, and family supporter in life. Reflecting on the challenges of juggling it all has interested me to read more and learn how to cope with balancing all these challenges in one's life. The more one reads about work-life balance, the more one becomes aware of how big the issue is for many households, companies, and employers. Reading about possible medical consequences of leading an unbalanced life made me realise how important work-life balance is. To balance one's work and family life takes discipline and a strong mindset. One needs to set certain limits and apply time management to have a balanced life.

## **ABSTRACT**

The study aimed to investigate the influence of work stress and the quality of work (job quality) on the quality of life of a specific group of engineers working in a project environment. Therefore, the research did not focus specifically on the interference between work and family but the relationship between work and non-work activities.

Work-life balance is a well-researched topic in the business world, and much emphasis is put on the quality of work and the working environment. Research also indicates that when one's quality of work is of higher quality, one's work-life balance is better, leading to more productive employees.

Items used measured the interference between work life and personal life, personal life interference with work, work enhancement of personal life and personal life enhancement of work.

A quantitative research approach was followed using three well-structured instruments to understand the influence of work quality and work stress on a balanced lifestyle better. The target population was engineers of three different companies with a sample size of 101. The research was conducted with a questionnaire covering four sections and utilising three well-structured instruments work/nonwork interference, quality of work and work stress.

**Keywords:** Job stress, job satisfaction, quality of work, occupational stress, time management, well-being, work-life balance.

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Thanks to my study group, who were incredibly supportive throughout the MBA and PGDip programme.

## **DECLARATION**

I, J.N. Pretorius, do hereby declare that this dissertation is the result of my own investigation and research and that it has not been submitted in part or in full for any degree or for any other degree to any university.

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## LIST OF ABBREVIATIONS

Abbreviation	Meaning
ANOVA	Analysis of Variance
DCS	Distribution Control System
ISMA	International Stress Management Association
JCD	Job Demand Control Model
JD-R Model	Job Demands-Resource model
MQW	Measuring Quality of Work questionnaire
NIOSH	National Institute for Occupational Safety and Health
OSI	Occupational Stress Index
PLC	Programmable Logic Controller
PLEW	Personal Life Enhancement of Work
PLIW	Personal Life Interference with Work
QOQ	Quality of Work Index
QWL	Quality of Work
RSI	Repetitive Strain Injury
SCADA	Supervisory Control and Data Acquisition
SI	System Integrator
WEPL	Work Enhancement of Personal Life
WHO	World Health Organisation
WHOQOL	The World Health Organisation Quality of Life
WIPL	Work Interference with Personal Life

# CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

## 1.1 Introduction

In today's busy world with its "time is money" lifestyle, balancing your private and work life and leading a quality lifestyle is essential. This study investigates the influence of work-life balance on the quality of work and occupational stress of automation engineers working in a project or construction environment. Construction projects are time- and budget-driven, aiming to deliver a quality product with high standards on time. The time taken up by projects can lead to an unbalanced work-life balance and work-related stress. Occupational stress and an unbalanced lifestyle can threaten and influence employees' quality of life (Bowen *et al.*, 2014:12).

Most studies on work-life balance and occupational stress focus on professional groups and mostly in first-world countries (Bowen *et al.*, 2014). This study investigates the relationship between work-life balance, occupational stress, and the quality of work of a specific group of engineers in the automation industry in South Africa.

Chapter one provides an overview of the literature regarding the three constructs: work-life balance, occupational stress, quality of work, and how they influence each other. This is followed by discussing the research method, design, and instruments used.

## 1.2 Problem statement and background

Work-life balance is an essential component of 21st-century society. Companies implement policies to better their employees' work-life balance and reduce work-related stress in the workplace (Downes & Koekemoer, 2011). Research is available on the quality of work and work-life balance in various industries and professions (Bowen *et al.*, 2014; Ganiyu *et al.*, 2017; Törnquist *et al.*, 2017). If management understands work-life balance better and reduces job-related stress, they can better manage the organisation and improve productivity (Russo & Morandin, 2019).

A healthy work-life balance is not always possible for control and instrumentation engineers (automation engineers) working on projects. Management experiences the same constraints and does not always understand the value of work-life balance for the organisation. Automation and construction projects are time-consuming and have budget constraints. The problem with a greenfield (new plant) or brownfield (existing plant upgrade) project is that it takes effort and commitment from the project team to deliver a successful project on time and within budget. These challenges give rise to critical questions, e.g., how difficult is it to maintain a healthy work-life balance for engineers working on construction projects?

An unbalanced lifestyle can lead to exhaustion, absence at home and family life, and workload increase (Fernandez-Crehuet *et al.*, 2016:342). Steffgen *et al.* (2015:14991) cite various research projects that show negative and positive correlations between specific work components and employees' health. A summary of the important items cited by Steffgen *et al.* (2015:14991) are as follows:

- A negative correlation has been found between the overall health of employees and intensification of their work.
- Employees experience distress in their family relationships when their daily work load increases or when they have to divide their attention and time between different tasks simultaneously.
- The health of employees undergoes positive growth when they are supported by management.

Lastly, there are indications that employees might experience symptoms related to specific health issues such as cardiovascular problems and depression due to poor social relationships in the workplace.

An unbalanced lifestyle can lead to stress, and stress has adverse effects on one's well-being. For example, stress can cause cardiovascular disease, sexual health problems, a weakened immune system, migraines and headaches, stiff muscles, backaches, acne, depression, weight gain, substance addiction, nervousness, trouble concentrating, forgetfulness, irritability, weak coping skills, insecurities, lowered self-esteem, feelings of lack of control, and mental and physical fatigue (WebMD, 2017). Previous research shows that a lack of work-life balance leads to occupational stress and causes social problems (Törnquist *et al.*, 2017). It is difficult to calculate the cost of work-related stress, but many studies show that it significantly impacts the economy and human suffering (Woods & West, 2015:307).

From the above discussion, the problem statement can be formulated as follows: a poor work-life balance leads to lower perceived quality of work and higher occupational stress levels (Törnquist *et al.*, 2017:2365). Therefore, the rationale for this study is discussed in the next section.

### **1.3 Rationale and significance of the study**

Two shortcomings were identified in the literature studies. First, research is not available about automation engineers working for System Integrator (SI) companies to implement and commission projects away from home for weeks to months. Second, the engineers and managers

on the project do not always value a healthy work-life balance—they do not understand the value it holds for the employee and the employer. A balanced lifestyle, low job stress, and quality of work have advantages for the employee and the employer. Existing research lacks investigating the challenges associated with working on projects away from home and implementing work-life balance policies.

Work-life balance, occupational stress, and quality of work are ethical topics. It has to do with the well-being of people. A change in management's approach to work-life balance may influence productivity and lead to healthier employees. In an International Charter Accountants Society (ICAS) report, the following statement is made: "The emphasis is on culture change and work redesign - changing the way in which work is done and the culture in which work is performed." (Thielst, 2005:185)

This chapter provides an overview of the meaning of a balanced lifestyle and balancing one's work and private life. In addition, the chapter focuses on the influence an insufficient work-life balance has on quality of work and occupational stress. The field of study is human resources management. A quantitative correlational research approach is used to research the influence of work-life balance on automation engineers, quality of work, and occupational stress. The research utilised existing literature and surveys. The focus group is engineers in the system integrators environment to form part of the data collection.

#### **1.4 Aim and objectives of the study**

This study determines the association between work-life balance, quality of work, and occupational stress of automation engineers. The objectives are to:

- Measure the perceived work-life balance, quality of work, and occupational stress levels of automation engineers.
- Establish if there are statistically significant differences in work-life balances, quality of work, and occupational stress between gender, age groups, years of work experience, and qualification levels of automation engineers.
- Determine if there is an association or relationship between work-life balance, quality of work, and occupational stress.

#### **1.5 Research question and hypothesis**

Based on the research objectives, the following research questions were formulated:

- What are the perceived work-life balance, quality of work, and occupational stress levels of automation engineers?
- Are there statistically significant differences in the mean scores of work-life balances, quality of work, and occupational stress between gender, age groups, years of work experience, and qualification levels of automation engineers?
- Is there a correlation between work-life balance, quality of work, and occupational stress?

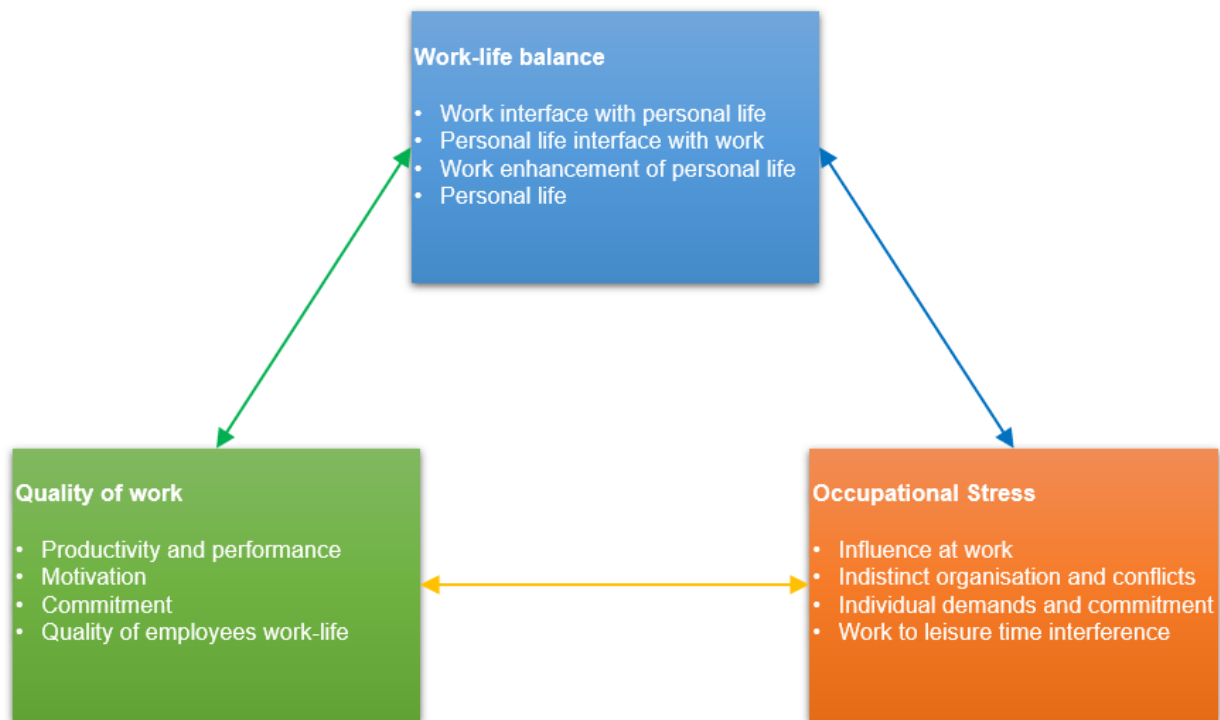
The working hypothesis is that poorly perceived work-life balance is associated with lower quality of work and higher occupational stress levels amongst automation engineers. Based on the working hypothesis, the following null and alternative hypotheses were formulated, namely:

$H1_{n=}$  There is no statistical relationship between automation engineers' perceived work-life balance, quality of work, and occupational stress.

$H1_a=$  There is a statistical relationship between automation engineers' perceived work-life balance, quality of work, and occupational stress.

## **1.6 Preliminary literature review**

This study investigates the relationship between three constructs: work-life balance (Fisher *et al.*, 2009; Gagnano *et al.*, 2017:376), quality of work, and occupational stress. The figure below shows the conceptual relationship between the three abstracts.



**Figure 1-1: Conceptual and theoretical framework**

The preliminary literature review focuses on recent research related to the relationship between the different constructs. For example, a balanced lifestyle leads to a lower occurrence of psychological strain, depression, anxiety, and higher job satisfaction reducing occupational job stress (Fisher *et al.*, 2009; Gragnano *et al.*, 2017:376). In addition, the study investigates the correlation-relationship between the variables, meaning that if one changes, it influences the other and changes accordingly (Trochim & Donnelly, 2001:6).

### 1.6.1 Work-Life balance

Workers struggle to create a healthy balance between their work and private life. What does a work-life balance of a perfect engineer versus father and husband entail? In today's working environment, work-life balance is becoming a priority for employees and employers. The Cambridge Business English Dictionary (2021) defines work-life balance as the amount of time one spends working compared to the amount of time one spends with one's family and doing things one enjoys. However, there is no general definition of work-life balance with which all researchers agree. Researchers look at the various aspects of work-life balance. Work-life balance is defined by multiple roles (Greenhaus *et al.*, 2003:511), equity across multiple roles (Greenhaus *et al.*, 2003:513), satisfaction between multiple roles (Kirchmeyer, 2000:80), the fulfilment of role salience between multiple roles (Greenhaus *et al.*, 2006), the relationship between conflict and facilitation (Frone, 2003:145; Grzywacz & Bass, 2003:257), and perceived

control between multiple roles (Fleetwood, 2007:351). Kalliath and Brought (2008:326) define work-life balance as follows: "Work-life balance is the individual perception that work and non-work activities are compatible and promote growth by an individual's current life priorities."

Lockwood (2003:2) mentions that three factors contribute to the interest and importance of work-life balance: (1) global competition; (2) renewed interest in personal lives, work-life and family values; and (3) an ageing workforce. Work-life balance reaches an equilibrium in one's life between one's career, family life, and personal time. Reaching equilibrium in one's life does not mean that the amount of time spent at one aspect of one's life is the same spent at another. People who have balance in their lives are satisfied with their career and home life and fulfil their responsibilities at work, home, and community without guilt and have control over their lives (Anhange *et al.*, 2018:32). These viewpoints lead to important questions, such as: (1) What if one is not at home and works away from home for weeks at a time? (2) Does one still have control over one's life? (3) How does one manage a balanced life as an engineer?

Work-life balance has been studied in various fields comparing careers/disciplines (Akanni & Odauran, 2017), healthcare professions (Schwartz *et al.*, 2019:142), countries (Wepfer *et al.*, 2015:1), gender-based studies (Steenkamp, 2018), regions, single and married people (Anhange *et al.*, 2018), religion, industries, ethnic and cultural groups (Potgieter & Barnard, 2010). However, the work-life balance of automation engineers constantly engaged in projects needs more in-depth studying. Therefore, this study examines the work-life balance of engineers in the automation industry doing work all over the globe.

Dunn (2019:13) classifies work-life balance into three different types, namely, (1) zero work-life balance and zero flexibility; (2) maximum work-life balance; and (3) having no flexibility and maximum flexibility at the same time. He also emphasises that one can choose two of the three different work-life balance types while earning the third one. Work-life balance is a mindset, and it does not always have to do with the amount of time one spends on a particular activity but more about the quality of time spent. In *Creating Balance?* (Kaiser *et al.*, 2011:ix), four types of work-life balance are described: (1) beneficial; (2) harmful; (3) active; and (4) passive. Some authors and experts argue that work-life balance is a myth and that one cannot prosper in one part of one's life without neglecting another (Life, 2015). Tracy (2016) formulates his viewpoint as follows: "There are no shortcuts. To be a big success, start earlier, work a little bit harder, and stay a little later." He also gives tips on work-life balance, of which the most important one is time management (Tracy, 2016).

Burchard, a three-time New York Times bestselling author and motivational speaker is a firm believer in work-life balance. He believes that it is possible to take control of one's life, and give

pointers to achieve a work-life balance (Burchard, 2015a; Burchard, 2017b). According to him, one must ask oneself why a work-life balance is necessary. Work-life balance applies to any career. It is important to ask oneself what a work-life balance means, and how work-life balance is described? Remove distractions that use up one's time and begin to apply time management; learn to say 'no'; improve one's health; start to exercise, eat healthier, be more active; and be more positive towards life itself (Burchard, 2015).

Work and private life are becoming more intertwined, and boundaries are not always clear. Some workers' time spent at work has become less or remain the same, where professional working hours have increased (Kaiser *et al.*, 2011:vii). Professionals experience an intensification of work. They are expected to perform more demanding tasks and be available all the time because of technology. For example, not reading and answering emails when at home is not easy. Reviewing work email at home is becoming a habit and not easy to get rid of.

Companies pay extra attention to work-life balance and implement work-life policies (Downes & Koekemoer, 2011:3). Downes and Koekemoer (2011:3) categorise the work-life balance policies into five categories: (1) flexitime work schedule; (2) flexi place or telecommuting; (3) job-sharing; (4) part-time, flexible places; and (5) sabbaticals or career breaks. Flexitime and creating a work-life balance is possible when an engineer works in an office. However, this policy does not apply during on-site building, implementing, and commissioning a new plant. Project management focuses on staying within the parameters of a budget and finishing a project on time. However, when projects start to fall behind schedule and management and employees spend more time on the projects, overtime becomes the norm and weekends change into workdays. When one is busy with a project, it is easy to forget what is essential, like eating healthier, exercising and sufficient rest, because one focuses on the task. Rogers states in *Engineering and Technology* that engineers benefit from their jobs and enjoy their time spent at work. However, she also mentions: "We should work to live, not live to work" (Rogers, 2019).

Studies that investigate and explore the relationship between work-life balance and well-being of supervisors (Rahim *et al.*, 2020), temporary contract workers in construction (Marule *et al.*, 2019), project engineers (Valdes-Vasquez *et al.*, 2016), IT professionals (Rangeswara Reddy, 2018), and software engineers (Sumi, 2019) were used as background for this study.

### **1.6.2 Quality of work**

Work quality is the worth of a job delivered by an employer or employee. Quality of work (QWL) is a concept that focuses on an employee as a person rather than just the work done by the employee (MBA Skool Team, 2021). Scientists are in agreement that job quality refers to every

aspect of a job related to an employee's well-being (Steffgen *et al.*, 2020). Thus, quality of work refers to the ways and conditions under which work activities can affect employees' well-being, and focuses on the specific job context, roles, work conditions, and environment (Steffgen *et al.*, 2020). By delivering quality of work is an important way in which employees can satisfy their needs through their working experience. Its focus is on creating a work environment where employees work cooperatively and contribute to organisational objectives. Organisations have different ways of achieving quality of work. However, the most common elements are providing job security, job enrichment, career growth plans, open communication, increased employee participation, flexible work timing, and reward and recognition (MBA Skool Team, 2021).

An unhealthy work environment can negatively impact a company's culture and influence employees which may lead to a careless approach, lower self-confidence, diminishing of morale, and lack of growth (Mooney, 2018). The negative consequences of poor quality of work may influence an employee's work-life balance and leads to work stress. Research done by Zin (2004) investigated the quality of work of professional engineers to determine the relationship between the perceived presence of quality of work factors and organisational commitment. The conclusion was that two quality of work factors, namely growth and development and pay and benefit, were significant in explaining organisational commitment. Anandh and Gunasekaran's (2016) research was to construct a model to examine the impact of quality of work on the work-life balance among civil engineering in the construction industry. The study concludes that there is a high effect of quality of work on work-life balance. If the employees are satisfied with the quality of work, it is possible to balance their personal and professional life better.

### **1.6.3 Occupational or job stress**

Work-related stress can be described as the damaging physical and emotional responses that employees experience when presented with the daily demand for work that does not match their ability, knowledge, and know-how (Carvalho *et al.*, 2017:1021; WHO, 2020). Thus, employees are continuously challenged by how they cope with the demand. Occupational stress is viewed as a physical or psychological disorder associated with the occupational environment where one finds oneself each day (Business Dictionary, 2020).

The financial impact on societies and organisations related to job stress and psychosocial risks in the work environment is considerable (Hassard *et al.*, 2014). The cost per year to society has ranged between US\$221.3 million–US\$187 billion (Hassard *et al.*, 2014). Managing and preventing job stress, improving the psychosocial work environment, and promoting mental health are cost-effective. It is important to realise that the work environment can have a positive effect on employee health and well-being and not just a negative one (Hassard *et al.*, 2014).

In his research, Karasek (cited by Woods & West, 2015:318) argues that one can understand the effect of stressors upon strain by investigating the balance between demand and control in the workplace. Karasek defines control as the degree of self-sufficiency and discretion a person uses different skills (Woods & West, 2015:318). Job-related stress occurs in different circumstances, that may be worsened by a bad working environment and ineffective management. Employees can sometimes feel confused by the pressure and challenges created by management or the job (WHO, 2020). The main stressors are indicated as work pressure, lack of management support, work-related violence, and bullying (Woods & West:307). A study on project managers in Australia shows they experience workload, long hours, and insufficient time with the family as the three most significant stressors (Bowen *et al.*, 2014:3).

The most common factors that cause stress in the work environment are physical stressors, role stressors, workload, work pace, work schedule, time rigidity, conflict at work, perceived control, emotional constraints, task contents, and work-life/nonwork-life conflict which is sometimes called work-family conflict (i.e. lack of work-life balance) (Woods & West, 2015:312). Occupational job stress puts pressure or strain on an individual which can be divided into three main categories: behavioural, psychological, and physiological (Woods & West, 2015:315)

The World Health Organisation (WHO) distinguishes between two stress-related hazards at work: work contents and work context (WHO, 2020). Work contents include: (1) job content; (2) workload; (3) working hours; (4) participation; and (5) control. Work context includes: (1) career development; (2) status and position, and role in the organisation; (3) interpersonal relationships; (4) organisational culture; and (5) work-life balance.

A study done by Malan and Rothmann (2003) to assess the occupational stressors of engineers in South Africa describes the relationships between occupational stress, organisational commitment, and physical and psychological ill-health. Work overload was identified as an average stressor for engineers, but work overload may be more stressful if engineers have little control. The research corresponds with Karasek's (1979) control theory of occupational stress, stating that "work characteristics may evoke different processes".

#### **1.6.4 Relationship between work-life balance, quality of work, and occupational stress**

Long work hours, tight deadlines, and difficulties in one's job lead to occupational job stress, causing an imbalance in one's work-life balance. The construction and project industries are known for work-related stress (Bowen *et al.*, 2014). Most studies investigate how work interferes with personal life and *vice versa* (Gragano *et al.*, 2017; Hayman, 2005). A balanced lifestyle positively influences one's career and psychological well-being (Rahim *et al.*, 2020). Low job

stress and a balanced lifestyle also positively influences the various domains of one's life such as family life, leisure time, community life, material and financial life (Lee & Sirgy, 2018:772).

The phenomenon of occupational stress has attracted researchers worldwide to research the impact of stress on workers' health and on the organisation such as increased medical expenses, sick leave, and decreased worker efficiency. Occupation stress causes a change in the quality of the conjugal relationship in a family and a withdrawal from personal and work-related activities (Carvalho *et al.*, 2017). If employees experience conflicting demands from two or more sources, they experience role conflict. The most common role conflict is between family and work when labour demands interfere with family and private roles (Carvalho *et al.*, 2017:1022). Research done by Kaur (2017:8487) partly proves a positive relationship between work-life balance, mental health, job satisfaction, and life satisfaction which means that there is a positive correlation between life and job satisfaction. Therefore, a change in one variable may lead to change in other variables.

Quality of work and work-life balance are related to each other and describe an employee's well-being. The two factors influence the job satisfaction of the employees. Employees' work performance is based on their quality of work and work-life balance. It plays a dominant role in most employee-essential performance areas such as employee motivation, engagement, retention, and commitment (Anandh & Gunasekaran, 2016).

Most research focuses on the overlap between work and family roles (Anhange *et al.*, 2018; Wepfer *et al.*, 2015). However, Fisher, Bulger and Smith (2009) focus on work and nonwork interference and enhancement without limiting the research to only interference with family roles. Research shows that a negative relationship between work-life balance and occupation stress is also present (Bowen *et al.*, 2014). Where an imbalance in work-life and quality of work is present, occupational stress is also present (Bowen *et al.*, 2014). The lack of balance between one's work demands and private life creates severe mental and physical stress to an employee (Nyati, 2012:47). Occupational stress is known for its negative impact on employees' health, as mentioned before (see par. 1.2). However, it also negatively impacts employee productivity and satisfaction with their job. Thus, occupation stress negatively impacts the quality of work and work-life balance (Carvalho *et al.*, 2017).

## **1.7 Definitions of key concepts**

- **Quality of work**

Quality of work indicates an employee's level of satisfaction, motivation, involvement, commitment, and individual experience concerning their work life. In addition, quality of work is

the degree to which individuals are able to satisfy their essential personal needs while employed, which includes economic rewards and benefits, security, working conditions, organisational and interpersonal relationships, and their intrinsic meaning in a person's life (Steffgen *et al.*, 2020:2).

- **Occupational stress**

Occupational stress is a general term used to define job-related stress. In the *Business Dictionary* (2020) occupational stress is defined as a: "physical or psychological disorder associated with an occupational environment and manifested in symptoms such as extreme anxiety, tension, or cramps, headaches, or digestion problems". Therefore, occupational stress is psychological stress related to one's job.

- **Work-life balance**

Work-life balance is defined as the amount of time one spends at work compared to the amount of time spent with family or at home doing what one enjoys and does not relate to a job-related task (Cambridge Dictionary, 2021). Kalliath and Brought (2008) define work-life balance as follows: "Work-life balance is the individual perception that work and nonwork activities are compatible and promote growth in accordance with an individual's current life priorities." Bulger and Fisher (2012:182) define work-life balance as the: "ability to accomplish the goals or meet the demands of one's work and personal life and achieve satisfaction in all life domains". Shah (2017:86) defines work-life balance as a state of reconciliation between all priorities and aspects of life.

## **1.8 Research philosophy**

Three primary epistemological positions were considered for the research. Epistemology is the theory regarding the validity, methods, and scope of knowledge which means it is concerned with what is adequate knowledge in a discipline. The three primary epistemological positions are positivism, realism, and interpretivism (Bryman *et al.*, 2019). Positivism was used for this study because it advocates the natural sciences method to research and understand social reality.

The positivistic approach uses natural scientific methods to study, interpret, and understand social reality (Bryman *et al.*, 2019:13). Positivism is based on the idea that science is the only way to learn about the truth. Knowledge is exclusively derived from the experience of natural phenomena and their properties and relations. A positivist paradigm has its roots in physical science. The research is conducted through a positivist methodological approach using an opinion online survey questionnaire collecting quantitative data (Bowen *et al.*, 2014:3). The preferred method for positivism is quantitative research. Positivism required the research to be valid, reliable, and

representative (Johnson, 2018). Quantitative research has a more scientific approach than qualitative research and is thus more reliable. In addition, quantitative data provides objective information that researchers can use to make scientific assumptions.

Positivism is structured and well-defined and follows specific rules that use objective mathematical and scientific tools. A disadvantage of positivism is that it discards human emotions. Positivists depend on how one can measure everything and tend to be inflexible. Positivists see things as they are and sometimes disregard unexplained phenomena. Positivists' inflexibility can eliminate lateral thinking, whereas lateral thinking helps to find answers creatively and indirectly to solve a problem (Bryman *et al.*, 2019:13; Johnson, 2018).

## **1.9 Research method**

A quantitative research method was used to determine the impact of low work-life balance on automation engineers' quality of work and occupational stress. The aim of quantitative research is to collect, analyse, and describe collected numerical data. To attain this goal, quantitative research uses measurement to quantify differences in results and develop a consistency device to measure and evaluate the relationships between results (Whitley & Kite, 2013:33). Quantitative research is deductive in nature, striving for objectivity when analysing and interpreting collected data. Within the context of this study, its focus is to analyse the collected data in order to determine the influence of a balanced lifestyle on the quality of work and occupational stress of engineers in the automation industry (Bryman *et al.*, 2019:41).

A quantitative research strategy incorporates a natural science module of the process and is influenced by positivism (Bryman *et al.*, 2019:382). Yilmaz (2013:311) defines quantitative research as “a type of empirical research into a social phenomenon or human problem, testing a theory consisting of variables which are measured with numbers and analysed with statistics in order to determine if the theory explains or predicts phenomena of interest”. Yilmaz’s definition is an accurate description of the methodological approach in this dissertation. Quantitative research has been done on these subjects in different fields and topics worldwide (De Silva *et al.*, 2017; Fisher *et al.*, 2009; Jacukowicz & Merecz-Kot, 2020; Leitão *et al.*, 2019; Schwartz *et al.*, 2019). This mini-dissertation will test some theories and use existing studies to investigate automation engineers' work-life balance working on projects in South Africa and globally (Bowen *et al.*, 2014). The quantitative research in this study will focus on how engineers experience work-life balance and occupational stress in their everyday lives.

A quantitative approach was selected to make it possible to generalise resources of work-life balance and occupational job stress in the engineering project environment and also to compare

the result to previous studies (Törnquist *et al.*, 2017). The main aim of quantitative research is to describe, explain, predict, and compare the investigated variables (Silverman & Marvasti, 2008:144) The current study will use an online questionnaire survey with a cross-sectional design to investigate the variables' correlation.

### **1.10 Research design**

This study used a cross-sectional correlational design to answer the research questions (Bryman *et al.*, 2019). A cross-sectional study takes place at a single point in time. The online Microsoft Forms survey was sent to every participant simultaneously using a gatekeeper from the university, and the results were analysed together. The study did not take place over time, therefore a longitudinal design was not used (Trochim & Donnelly, 2001:6).

The research was conducted using existing literature and a combination of existing questionnaires on work-life, quality of work, and occupational stress. The survey focused on automation engineers in the system integrators environment. In addition, the study used an opinion survey questionnaire to collect information.

The study investigated the influence of work-life balance on the participants' quality of work and occupational stress. Correlation-relationship design which is used in this study indicates when two or more variables perform simultaneously meaning that a lack of work-life balance will increase occupational job stress (Trochim & Donnelly, 2001:6). Conversely, a healthy work-life balance will decrease occupational job stress and improve the work experience. The correlation design has identified the relationship between the variables that were investigated.

### **1.11 Delimitations, assumptions, and limitations of the study**

The study focuses on how an unbalanced lifestyle leads to low quality of work and job stress. It covers three different domains: work-life balance, quality of work, and work stress of engineers working in a project environment. The study aims to show whether the correlation between work-life balance, quality of work, and work stress is significant and to indicate if demographics influence one's lifestyle. In addition, the study indicates how male and female engineers deal with balancing their lifestyles and if there are any differences between gender groups.

The research has excluded other engineering professions, focusing exclusively on automation engineers developing industrial software and implementing automation projects. The participants were contacted by email, sent by a gatekeeper requesting the participants to complete the questionnaire online.

The engineers' participation was not as good as expected, and only company A's results were used to complete the research. However, the instrument's reliability is good, and it is recommended that the research includes the engineering industry as a whole for further research. The results were reliable for company A: it gives an insight into company A and shows that the instrument can be used to measure a company on its own and assist management to understand their employees.

Fewer females than males were included in the research. Therefore, it is essential to include more female engineers in future research. The main reason for including more females in future research is to make a concrete conclusion if gender plays a role in experiencing and handling work-life balance, quality of work and work stress.

### **1.12 Population**

The population selected are automation engineers at three system integrator companies. The participants represent the process control divisions within the companies. The three systems integrated companies have offices in Midrand Johannesburg with other national and global branches. The expertise in the process control divisions is employed in three areas, namely Distribution Control System (DCS), Programmable Logic Control (PLC) programming, and Supervisory Control and Data Acquisition (SCADA) developing and process optimisation.

Due to the small population group, a census was done of the total population. The main reasons for using a census are the size of the sample, the cost, the time, and the accessibility of the sample. As already mentioned above (see par. 1.10), the survey was done using an online questionnaire on Microsoft Forms. The human resource department assisted the researcher to find and have access to the participants (Bryman *et al.*, 2019:178). Even if the participants were readily available to the researcher because they work for company A and they also work as automation engineers, they are relevant to the main research question. An independent gatekeeper sent a link to the online survey to the respondents.

### **1.13 Measuring instruments**

Three instruments were used to measure work/nonwork interference, quality of work, and work stress:

- The work/nonwork interference questionnaire was designed to address the gap for measuring work/nonwork enhancement and interference appropriate for all workers regardless of their relationship or family life status (Fisher *et al.*, 2009).

- The quality of work questionnaire measures six factors: satisfaction and respect, mobbing, mental strain at work, cooperation, communication and feedback, and appraisal (Steffgen *et al.*, 2015:19449). The Measuring Quality of Work questionnaire (MQW) offers a means for measuring the quality of work to test the effectiveness of interventions or as an assessment tool
- The work stress questionnaire was developed as a self-administered questionnaire to identify individuals at risk of being absent due to work-related stress. The instrument has previously been tested for reliability and face validity among women and male workers with satisfactory results (Frantz & Holmgren, 2019).

According to Microsoft Forms and a dummy test, the estimated time to complete the form is 15–20 minutes. The results are automatically uploaded to Microsoft Forms once it had been completed. The questionnaire consists of four sections. A link to the online Microsoft Forms questionnaire will be forwarded to the participants using email.

#### **1.14 Data coding and analysis**

The quantitative approach in the study was supported and carried out by utilising Statistical Package for Social Science (SPSS) software Version 2021 to analyse data, make predictions, and indicate relationships between the constructs. SPSS uses various techniques to analyse, transform, and produce patterns between different data variables.

The data analysis methods and techniques combine descriptive and inferential statistics. Inferential statistics help to reach a conclusion about group results based on a set of sample data (Leard Statistics, 2018).

The following statistical techniques were utilised by the SPSS software to provide answers to the research questions:

- Descriptive statistics of the demographic characteristics of the respondents and work-life balance, quality of work-life and occupational stress mean scores, and standard deviations
- Cronbach's alphas were done to measure the reliability of the work-life balance, quality of work, and occupational stress measuring instruments
- An independent sample t-test was done to compare the mean scores of work-life balances, quality of work, and occupational stress
- The effect size was calculated because of the small sample size

- To compare the mean scores between age groups, years of work experience, and qualification levels and analysis of variance (ANOVA) was done
- Pearson product-moment correlation was conducted to establish the relationship between work-life balance, quality of work, and occupational stress

### 1.15 Reliability of the measuring instruments

Most quantitative research uses Cronbach's alpha as a test of internal reliability. According to the research, reliability indicates how well the test measures what it is supposed to measure. Cronbach's alpha calculates the average possible split-half reliability coefficient (Bryman *et al.*, 2019:38). Thus, Cronbach's alpha is not a statistical test but a reliability coefficient (or consistency). It can be written as a function of the number of items and the average inter-correlation among items.

Cronbach's alpha tests the reliability of the multiple-questions Likert scale survey. The Likert scale is used to ask attitude questions. The respondent is asked their agreement with a series of statements that together form a multiple-indicator or item measure (Bryman *et al.*, 2019:379). The latent variables are challenging to measure in real life. Cronbach's alpha will indicate if the used test accurately measures the variable of interest (Glen, 2014).

**Table 1-1: Cronbach's Alpha formula (Glen, 2014)**

$\alpha = \frac{N\bar{c}}{v + (N - 1)\bar{c}}$	N = Equal to the number of items
	$\bar{c}$ = Average inter-items covariance among the items
	$\bar{v}$ = Average variance

Table 1-2 below indicates how to interpret alpha for the question used in the survey.

**Table 1-2: Alpha results interpretation (Glen, 2014)**

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

The Cronbach's alphas of the work-life balance questionnaire in the study by Fisher (2009:446) show the following results: (1) work interference with personal life = 0.91; (2) personal life interference with work = 0.82; (3) work enhancement of personal life = 0.70; and (4) personal life enhancement of work = 0.81.

The questionnaire used for analysing the quality of work has a Cronbach's alpha of 0.84 in the research done to validate the instrument (Steffgen *et al.*, 2015). The Cronbach's alpha of 0.84 indicates that the questionnaire's reliability is also good.

For the reliability of the work stress questionnaire, a test-retest analysis was performed using a rank-invariant method for analysis of paired-ordered categorical data. This method for assessing the reliability of a questionnaire has been used previously and is recommended to analyse ordered categorical data (Frantz & Holmgren, 2019). The percentage agreement for the test-retest reliability of the items ranged from 55% to 98%, with an average percentage of 77%. Holmgren (2019) also calculated the relative rank variance, relative position and relative concentration for all the items.

#### **1.16 Ethical consideration**

The North-West University (NWU) has a high ethical standard and code of conduct to which researchers must adhere. The four main principles of the NWU are honesty, accountability, professionalism, and good stewardship (Reference). The code of conduct for research has to be signed and attached to the research. The code of conduct ensures that the ethical standard of research done at the NWU has been adhered to. In addition, a cover letter explaining the purpose and background of the research as well as the link to the online survey were sent to each participant.

This study's sole purpose was to obtain information from automation engineers to determine the nature of their everyday experience related to the research topic. Participation was entirely voluntary, and participants could opt-out at any time. They could also decide not to answer specific questions. Necessary background information was asked, e.g. age group, gender, years of work experience, qualification(s), and company. Information about the company only distinguished between companies and was referred to as 'A', 'B', and 'C' in the study. However, no personal identification information is required. The data's confidentiality was guaranteed and only the combined results were used for research and publication purposes. The data gathered from the online survey was used for research purposes only. Permission to distribute the survey was asked from the organisation.

The completed ethics application form and SCERF form are signed and handed in with the research.

### **1.17 Summary**

The research will investigate the quality of work and how work-life balance and occupational job stress influence engineers. In addition, the validation and reliability of the instrument will be evaluated as well as the consistency of the measurements.

The available literature will be compared to the result and will illustrate how they support the research findings. The result and research will give the system integrator management team an understanding of their engineers' work-life balance and occupational stress.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction

The productivity and performance of an organisation have a strong relationship with the quality of employee work-life (Leitão *et al.*, 2019). Furthermore, an organisation's workforce is considered an essential part of production compared to equipment, land, and capital (Drucker, 1993). Therefore, employees are an essential part of an organisation to achieve an organisational vision, mission, and goals. Therefore, it is critical to maintaining communication between the different management levels without a physical office (GWI, 2021).

### 2.2 Theoretical framework of work-Life balance

Work-life balance is defined as the balance of time one spends at work compared to the amount of time spent with family or at home doing what one enjoys that does not relate to one job-related task (Cambridge Dictionary, 2021). Kalliath and Brought (2008) define Work-life balance as "Work-life balance is the individual perception that work and nonwork activities are compatible and promote growth in accordance with an individual's current life priorities". Bulger and Fisher (2012:182) define work-life balance as the "ability to accomplish the goals or meet the demands of one's work and personal life and achieve satisfaction in all life domains". Shah (2017:86) defines work-life balance as a state of reconciliation between all priorities and aspects of life. Considering role theory and conservation of resource theory, work interference with personal life is a job stressor (Fisher *et al.*, 2009).

Occupation stress literature examined two theories to explain the negative and positive aspects of the interference between work and nonwork. The first theory is the role theory, and the second theory is the conservation of resource theory (Fisher *et al.*, 2009:442). The role theory assumes that roles accumulate in one life and include roles at work and outside of work. Thus, roles interference occurs when two or more pressure from different roles occurs simultaneously. Thus, the role interference can be positive or negative. Conservation of resource theory suggests that stress reacts to an environment threatened by the possible loss of skills or resources. Work nonwork interference would occur in this case when resources in one role, such as time or energy, are exhausted via meeting the requirement of the other roles.

On the other hand, the theory also implies that resources are renewable by completing the requirement of one role to help effective engagement in another role (Fisher *et al.*, 2009:442). Each year SIOP (Society for industrial and organisational psychology) compile a survey to determine the workplace trends for the current year. The table below compares the trends for

2019, 2020 and 2021. The work-life balance was ten in 2019 and did not focus in 2020 but moved to second place in 2021. Work-life integration is also mentioned as number seven in 2021. The change in work trends gives a brief indication that work and life balance is becoming more and more critical for employers and employees (Butina, 2021).

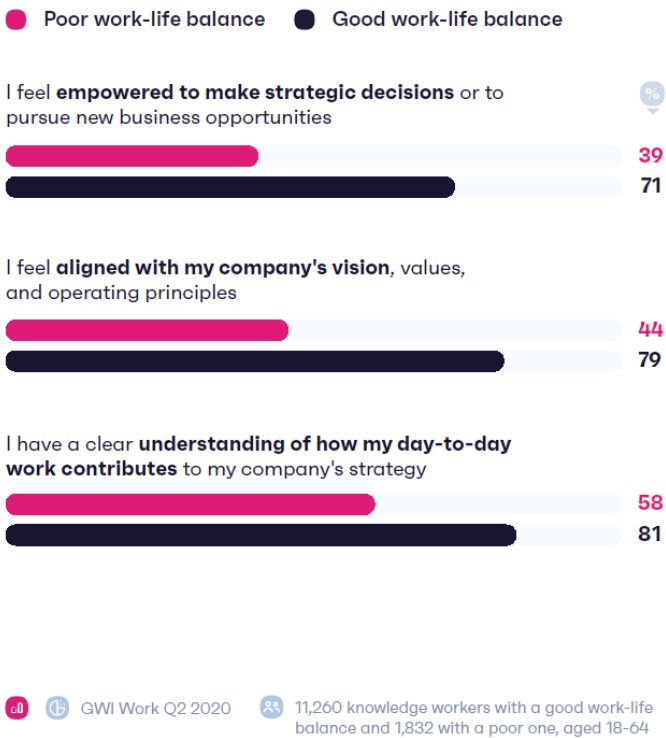
**Table 2-1: SOIP Work trends for 2019 to 2021**

No.	2019	2020	2021
10	<b>Work-Life Balance intervention</b>	Data visualisation and communication	Virtual Learning
9	Creating agile organisations	TIE! Virtual working spaces, Meaning and purposeful work	Building Cultures of Agility and Adaptability
8	Data visualisation and communication	<b>Workforce health and well-being</b>	The Changing Nature of Work
7	The changing nature of work	Algorithmic selection – validity, bias, and applicant reactions	<b>Work-Life Integration</b>
6	Automation of jobs and task	Automation of jobs and tasks	Team Effectiveness Across Virtual and Distributed Environments
5	Understanding sexual harassment	The changing nature of work	Social Justice
4	The gig economy	Working with big data	Inclusive Practices to Get, Keep and Grow Talent
3	Working the big data	“Gig economy” – contract work	Implementing Strategies and Measuring Progress on Diversity, Equity, Inclusion, and Belongingness (DEI&B)
2	Diversity, inclusion, and equity	Diversity, inclusion, and equity	<b>Employee Health, Well-Being, Wellness, and Safety</b>
1	Machine learning and AI	Artificial intelligence and machine learning	Remote Work and Flexible Working Arrangements

Workers struggle to get the balance right between work and private life. What does a work-life balance of a perfect engineer versus father and husband entail? In today’s working environment, work-life balance is becoming a priority for employees and employers.

In a report from GWI (GWI, 2021), working from home is discussed, and it is mentioned that it can be productive and that one’s work-life is part of one’s culture. When one enjoys and practises a healthy work-life balance, one feels empowered to make strategic decisions and comparing this to people without a healthy work-life balance is evident. An excellent working culture should refer to the company’s mission, principles, and vision. Research shows that 51% of people with a good work-life balance have the company’s strategic goal communicated to them regularly compared to 37% without a good balance. People are looking for transparency in leaders and want to be

part of the planning process for the future and formulated vision or goals. Employees with a balanced lifestyle are 76% more likely to say the companies' goals are communicated via online meeting software than those that do not have a balanced lifestyle. Companies that recognise achievement in real-time create a culture of care. Recognition shows that the employees' work carries weight in reaching the company's goals (GWI, 2021).



**Figure 2-1: Poor work-life balance versus good work-life balance (GWI, 2021)**

Lockwood (2003:2) mentions in an article that three factors contribute to the interest and importance of work-life balance: (1) global competition; (2) renewed interest in personal life, work-life and family values; and (3) an ageing workforce. Thus, work-life balance is reaching an equilibrium in one's life between career, family life and personal time. However, reaching equilibrium in one's life does not mean the amount of time spent at one aspect of one's life is the same spent at another.

People who have balance in their lives are satisfied with their career and home life and fulfil their responsibilities at work, home, and community without guilt and control their lives (Anhange *et al.*, 2018:32). What if one is not at home and always working away doing engineering in another country for eight weeks at a time? Does one still have control over one's life? How does one manage a balanced life as an engineer?

Work-life balance has been studied in different fields comparing careers/disciplines, healthcare professions, countries, gender-based, regions, single and married people religion, industries, ethnic and cultures as mentioned before (see par. 1.6.1). However, the work-life balance of automation engineers and engineers in general in the project world needs more in-depth studying. Therefore, this study looked at engineers in the automation industry doing work all over the globe.

Dunn classifies work-life balance into three different types, namely, (a) zero work-life balance and zero flexibility, (b) maximum work-life balance and (c) having no flexibility and maximum flexibility at the same time (Dunn, 2019:13). He also emphasises that one can choose two of the three different types of work-life balance and the third work-life balance one must earn. Work-life balance is a mindset, and it does not always have to do with the amount of time one spends on a particular activity but more the quality of time spent. In *Creating Balance?* Written by Kaiser et al. (2011:ix), four types of work-life balances are described: (a) beneficial, (b) harmful, (c) active and (d) passive.

Some authors and experts say that work-life balance is a myth and that one cannot prosper in one part of life without neglecting another (Life, 2015). Brian Tracy has a saying, "There are no shortcuts. To be a big success, start earlier, work a little bit harder, and stay a little later": He also gives tips on work-life balance, and the most important one is time management (Tracy, 2016). Brendon Burchard believes in work-life balance, a 3-time New York Times bestselling author and motivational speaker. He believes that it is possible by taking control of one's life and give pointers in achieving a work-life balance (Burchard, 2015a; Burchard, 2017b):

- One must ask oneself why a work-life balance is needed. Work-life balance applies to any career.
- What does a work-life balance mean, and how is a work-life balance being seen?
- Remove distractions that use up one's time and start time management.
- Learn to say NO.
- Improve one's health, start exercise, eat healthier, be more active.
- Be more positive toward life itself.

Work and private life are becoming more intertwined, and the boundaries are not always clear. Some groups of worker time spent at work has become less or remain the same, where professional working hours have increased (Kaiser *et al.*, 2011:vii). Professionals experience an intensification of work, and it is expected of them to perform more demanding tasks and be

available all the time because of technology. To not read and answer emails when at home is not so easy. Looking at work email, for instance, at home, is becoming a habit and not an easy one to lose.

Companies are paying more attention to work-life balance and are implementing work-life policies (Downes & Koekemoer, 2011:3). Downes and Koekemoer (2011:3) categorise the work-life balance policies into five categories: flexitime work schedule, flexi place or telecommuting, job-sharing, part-time, flexible places and sabbaticals or career breaks.

Flexitime and a work-life balance are all fine if engineering work is done in the office. However, this policy does not apply when on-site building, implementing and commissioning a new plant.

Project management focus is being in budget and on time. When projects start to fall behind schedule, management and the employees spend more time on the projects. Overtime becomes the norm, and weekends disappear. When one is busy with the project, it is easy to forget what is essential because one focuses on the task at hand. Charlotte Roger makes a statement in Engineering and Technology that engineers benefit from their jobs and enjoy their time spent at work. She also mentions, "We should work to live, not live to work" (Rogers, 2019).

### **2.3 Work-life balance dimensions**

The instrument used for the research focuses on work, nonwork interference and enhancements without being limited only to the influence of family roles. The instrument used in the research used 17 items to measure four different dimensions: work interference with personal life, personal life interference with work, work enhancement of personal life, and personal life enhancement of work. The instrument used in this research is for all workers regardless of their marital or family status (Fisher *et al.*, 2009).

According to role theory and conservation of resource theory, work interference with personal life can be a job stressor (Fisher *et al.*, 2009). The first dimension of work interference with personal life considers how the daily activities at work let the employee feel at the end of a working day. Next, the scale considers how the job drains the employees' energy so that when they get home, they do not have the energy to fulfil their duties at home or in their personal life. The second dimension, personal life interference with work-life, considers the negative impact a busy or stressed personal life can have on employee work performance. It considers how the stress in one's personal life can interfere and drain one's energy to perform at work. The third dimension, work enhancement of personal life, considers the positive influence a healthy work-life can have on the personal life and how the work-life give the employee the tools to cope with the stress and

responsibilities at home. The last and final dimension, personal life enhancement of work-life, considers how personal life helps the employee perform at its peak at work.

Previous research shows that work interference with personal is negatively related to job satisfaction, and work enhancement of personal life will be positively related to job satisfaction. The research also indicates that work interference with personal life and personal life interference with work will be negatively related to life satisfaction and work enhancement of personal life and personal life enhancement of work will positively relate to life satisfaction (Fisher *et al.*, 2009)

In the research done by Fisher, Bulger and Smith (2009), the result shows that personal life interference with work is considerably related to job fulfilment and family to work conflict does not correlate with job satisfaction. It was also concluded that work interference and personal life enhancement are correlated with measuring occupational stress.

## **2.4 Theoretical framework of Quality of work-life**

Quality of work is an employee's level of satisfaction, motivation, involvement, commitment, and individuals experience concerning their working life. In addition, quality of work is the degree to which individuals can satisfy their essential personal needs while employed by the employer and including economic rewards and benefits, security, working conditions, organisational and interpersonal relationships, and their intrinsic meaning in a person's life (Steffgen *et al.*, 2020:2).

Work quality is the worth of a job delivered by an employer or employee. Quality of work (QWL) is a concept that focuses on an employee as a person rather than just the work done by the employee (MBA Skool Team, 2021). There is an agreement between scientists that job quality refers to every aspect of a job related to an employee's well-being. Thus, quality of work refers to the ways and conditions under which work activities can affect employees' well-being and focus on the specific job context, roles, work conditions, and environment (Steffgen *et al.*, 2020). Quality of work is how employees can satisfy their needs through their working experience in a company. Its focus is on creating a work environment where employees work cooperatively and contribute to organisational objectives. Organisations have different ways of achieving quality of work. However, the most common element is providing job security, job enrichment, career growth plans, open communication, increased employee participation, flexible work timing and reward and recognition (MBA Skool Team, 2021).

Research has proved that employee well-being is affected by the physical and psychosocial work environments (Gilbreath & Karimi, 2004). Management and leadership style are among the four main psychosocial work environment issues of current concern for employee well-being and occupational health (Sparks *et al.*, 2001). With the development of positive psychology, more

emphasis is placed on healthy work, which implies promoting both psychological and physical well-being (Turner *et al.*, 2002).

Quality of work-life is when there is an equilibrium between one's health, stability in one's job and personal life and wealth. Wealth is not actual money in the bank but sufficient income to live well without stressing about where the next plate of food is coming from. An article in World Atlas in 2018 (Sen Hag, 2018) shows that Finland has the happiest people in the world, and the following reasons are given for keeping the country relatively stress-free: economic stability and security, honest government, high wages, low levels of corruption, and high literacy rates.

Research done by Razali Mat Zin (2004) investigated the quality of work of professional engineers to determine the relationship between the perceived presence of quality of work factors and organisational commitment. The conclusion was that two quality of work factors, growth and development and pay and benefit, were significant in explaining organisational commitment.

Anandh and Gunasekaran (2016) research was to construct a model to examine the impact of quality of work on the work-life balance among civil engineering from the construction industry. The study established that there is a high effect of quality of work on work-life balance. If the employees are satisfied with the quality of work, it is possible to balance their personal and professional life better.

The following theories were considered in this research: work psychology, need satisfaction, and spillover theories. First, the psychology theories explain the link between working conditions and different well-being dimensions of one's job (Steffgen *et al.*, 2020). The JD-R model was considered and discussed under occupational stress. Finally, the spillover is when one roll spill over into another role, and the need theory have to do with a person wanting to fulfil the basic need. In this research, the instrument used to bridge the gap between employment quality and job quality and how the employee sees his or her job environment and this instrument support psychology theory (Steffgen *et al.*, 2015).

Organisational and work psychology study people and their behaviour at work and how they perform their daily work activities. Work psychologists develop the psychological theory and employ the rigorous and methods of psychology to issues that are important to businesses and companies to promote and advance understanding of the individual, group, and organisational effectiveness at work and the well-being and satisfaction of people working in or assisted by the organisation. Work and organisational psychology focus on different areas, but organisational behaviour, work motivation, attitude at work, and performance management are considered in this study.

## 2.5 Quality of work dimensions

The instrument used to measure the quality of work consist of six dimensions. The dimensions are satisfaction and respect, mobbing, mental strain at work, communication and feedback, cooperation, and appraisal.

The first factor, namely satisfaction and respect evaluate an employee's satisfaction with important job characteristics, including the working environment and conditions. This factor also looks at the respect an employee enjoys at his work. The first factor is in line with the JD-R model that asks employees if they are satisfied with their work climate, if superiors respect them, and what social support they receive from their employees. Supporting factors at work is essential for being satisfied in one's work (Steffgen *et al.*, 2015:14991).

The second factor is mobbing, and mobbing is a sociological term that means bullying an individual by a group, in any context, such as peer group, as a family, workplace, school, neighbourhood, online or community. Mobbing negatively affects support at work, efficient communication and emotional support and physical assistance with coping with work tasks (Steffgen *et al.*, 2015:14994). The third factor has to do with the amount of mental strain a person experiences at work. Mental strain entails working under pressure, doing intellectually challenging work, and multitasking. Although mental strain at work comes with the territory, it can drain employees physically and psychologically. Ongoing mental strain has the counterproductive consequence that employees try to keep up with the work pace, but in the process their efficiency decreases, and some tasks may not be completed (Steffgen *et al.*, 2015:14995). The fourth factor is good and clear communication and feedback between employer and employee. The factor looks at communication at work and if employees participate in the decision-making process in the company (Steffgen *et al.*, 2015:14995). The factor also asks if the employee gets feedback from superiors and colleagues.

The fifth factor is cooperation. It considers employees' cooperation with and support by their colleagues (Steffgen *et al.*, 2015:14995). Social support and collaboration between colleagues can provide emotional support, assist in finishing a task, and work effectively. Additionally, collaboration can ease the strain of various job demands (Bakker & Demerouti, 2007). If collaboration means are high, it implies that the employee cooperates with and gets social support from others.

The sixth and last factor is appraisal at work. To be rewarded for doing their job serves as positive affirmation and motivates employees (Steffgen *et al.*, 2015:14996). When an employee considers his/her work as valued and appreciated by superiors and colleagues, they might change from a

negative to a more positive appreciation of certain aspects of their work (Bakker & Demerouti, 2007).

## **2.6 Theoretical framework of Occupational Stress**

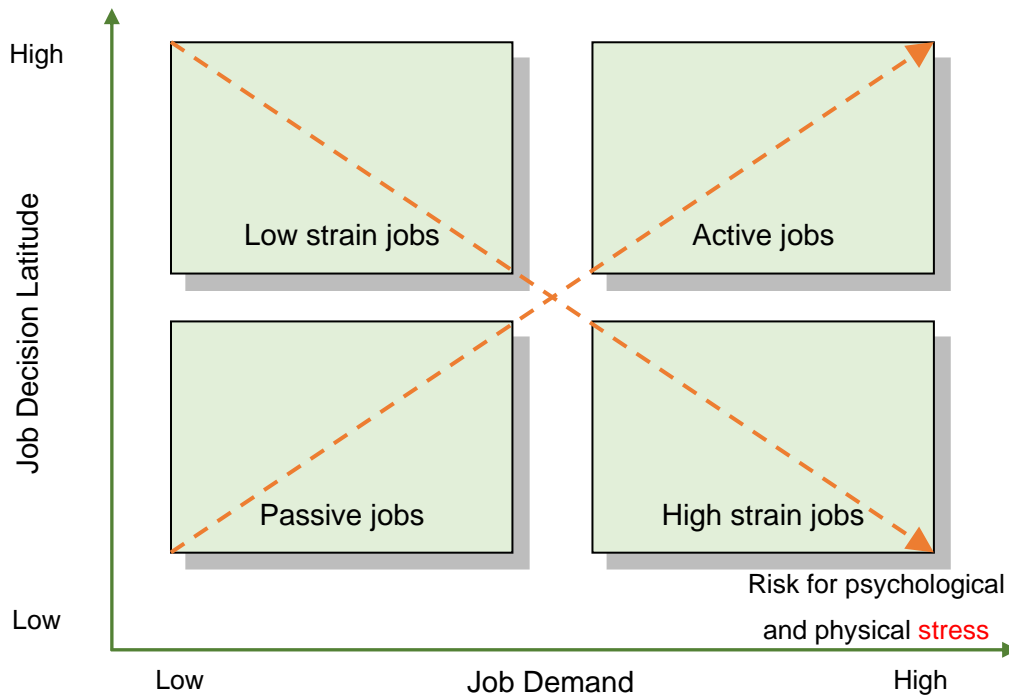
Occupational stress is a general term used to define job-related stress. Occupational stress can be defined as a "physical or psychological disorder associated with an occupational environment and manifested in symptoms such as extreme anxiety, tension, or cramps, headaches, or digestion problems" (Business Dictionary, 2020). Therefore, occupational stress is psychological stress related to one's job.

The following quote by Sinek (2021) is worth mentioning: "Working hard for something we do not care about is called stress. Working hard for something we love is called passion." Sinek also mentions that it is a right, not a privilege, to love where we work. So the question he asks is, do you love your job (Sinek, 2021)?

There are different theories of work stress and occupational stress. Cooper (1998) published a broad review of stress theories, (Cooper, 1998) including among others, the following: the transactional model of stress, personal environmental fit perspective, conservation of resources theory, and theory of work designed. The theories mentioned offers a different perspective for understanding the transaction between the individual and their work environment (Dewe *et al.*, 2012). The model developed by Palmer and Cooper (cited by Woods & West, 2015:311) and the Job Demand Control model by Karasek (cited by Mulder, 2017) will be used as bases for the research. Occupational stress is recognised globally as a significant challenge for workers and organisations. Stress employees are more likely to be unhealthy, poorly motivated, less productive and more careless at work that can be a safety risk (Leka *et al.*, 2004).

Furthermore, research done on the role theory and the conservation of resource theory indicates that work interference with personal life can lead to stress (Fisher *et al.*, 2009:445). Work-related stress is the reaction employees have when presented with the daily demand for work that does not match their ability, knowledge, and expertise. As a result, employees are continuously challenged by how they manage demand.

The figure below shows the Job Demand Control Model (JCD) developed by Robert Karasek (Mulder, 2017) in 1979. The model shows that high control of one's job has a low strain impact on one's stress levels. Conversely, high job demand and low workplace support put a high strain on a person and put a person at risk for psychological and physical stress (Bowen *et al.*:2).



**Figure 2-2: Job Demand Control model by Robert Karasek (Mulder, 2017)**

In his research, Karasek (1979) also said that one could understand the effect of stressors upon strain by investigating the balance in work between demand and control. Karasek defines control as the degree of self-sufficiency and discretion a person has using different skills (Woods & West:318). Job-related stress occurs in different circumstances, worsened by a bad working environment and lousy management. Employees can sometimes be confused by the pressure and challenges created by management or the job (WHO, 2020). The primary stressors are work pressure, lack of management support, work-related violence and bullying (Woods & West:307). A study on project managers in Australia, they experience workload, long hours and insufficient time with the family as the three most significant stressors (Bowen *et al.*:3).

The most common factors that cause stress in the environment is (Woods & West:312): physical stressors, role stressors, workload, work pace, work schedule, time rigidity, conflict at work, perceived control, emotional constraints, tasks contents and work-non-work life conflict that is sometimes called work-family conflict (lack of work-life balance)

Occupation stress put pressure on an individual, and the pressure or strain can be divided into three main categories, behavioural, psychological and physiological (Woods & West:315).

The work characteristics of the quality of work need to be in line with Job Demands-Resources Model (JD-R Model) (Steffgen *et al.*, 2015). The aim of research utilising the JD-R model is to encourage employee well-being. The JD-R model is used by management to measure employees' involvement. For example, the work stress model suggests that stress arises from the

imbalance between the requirements of the job and the resources available. The model divides the working conditions into job requirements and job resources. The model also shows that when the job resources are scarce and job requirements are high, factors such as stress and the possibility of burnout increase (Janse, 2019).

The table below is a work stress module developed by Palmer and Cooper (Woods & West, 2015:311). The model shows how hazards at work affect employees, leading to an unhealthy lifestyle.

**Table 2-2: Model of work stress (Woods & West, 2015:311)**

	Potential hazards		Symptoms of stress	Negative outcomes
Culture	Demand Control Support Relationship Role Change	Employers	<b>Individual symptoms</b> Raised blood pressure Sleep and gastrointestinal disturbances Substance abuse Increased irritability and negative emotions Tension in muscles	Coronary heart disease RSI (Repetitive Strain Injury) Clinical anxiety and depression Burnout
			<b>Organisational symptoms</b> Increase absenteeism Long working hours culture Increased employer turnover Reduced staff performance Reduced staff morals and loyalty Increased hostility	Increased overheads Reduced profits Increased accidents Increased litigation

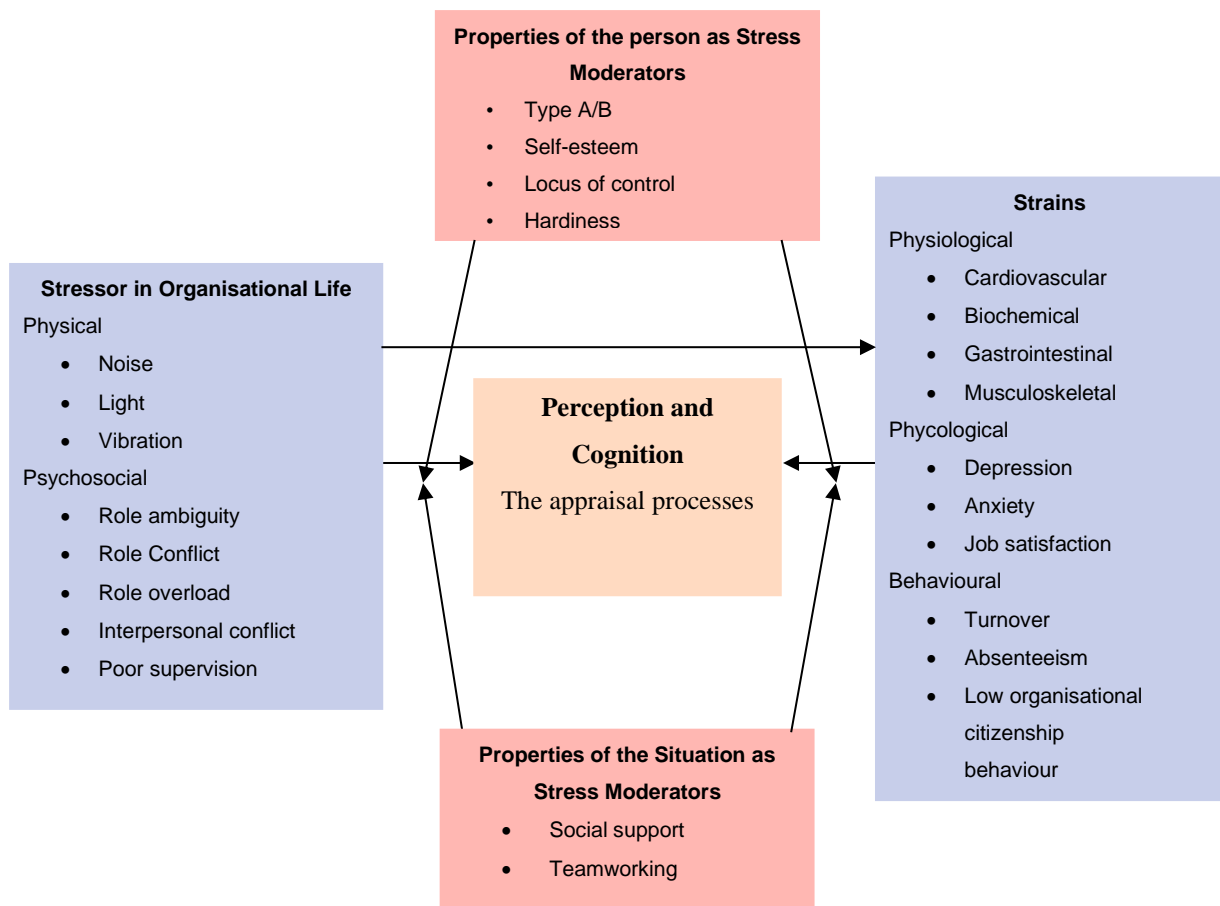
The World Health Organisation distinguishes between two stress-related hazards at work: work content and work context (WHO, 2020) as is clear in the table below.

**Table 2-3: Stress-related hazards (WHO, 2020)**

Work context includes	Job Content	Monotony Under-stimulation Meaningless tasks Lack of variety
	Workload	Too much or too little to do Work under time pressure
	Working hours	Strict or inflexible Long and unsocial Unpredictable

		Poorly designed shift systems
	Participation and control	Lack of participation in decision making Lack of control over work processes Pace, hours, methods Work environment
Work context includes	Career development	
	Status and position	Job insecurity Lack of promotion opportunities Under- or over-promotion Work of 'low social value' Piece-rate payment schemes Unclear or unfair performance evaluation systems Being over- or under-skilled for a job
	Role in the organisation	The job role is unclear or a conflicting role
	Interpersonal relationships	Inadequate Inconsiderate or unsupportive supervision Poor relationships with colleagues Bullying/harassment and violence Isolated or solitary work
	Organisational culture	Poor communication Poor leadership Lack of behavioural rule Lack of clarity about organisational objectives Structures and strategies
	Work-life balance	Conflicting demands of work and home Lack of support for domestic problems at work Lack of support for work problems at home Lack of organisational rules and policies to support work-life balance

The model below shows the process by which work stress affects the individual (Woods & West, 2015:309).



**Figure 2-3: Theoretical framework for the study of stress in an organisation (Woods & West, 2015:309)**

In summary, the following factors can impact the quality of work: attitude, environment, opportunities, nature of the job, people, stress level, career prospects, challenges, growth and development, risk involved, and reward (Mohammed Yashik P, 2014).

## 2.7 Dimensions of occupational stress

The work stress questionnaire consists of twenty-one items grouped into four dimensions: (a) interference at work; (b) indistinct organisation and conflicts; (c) individual demand and commitment; and (d) work-leisure time interference. The questionnaire does not target a specific diagnosis like other screening tools but identifies work-related stress regardless of the participant's complaints.

The question of the first two themes determines the level of stressfulness. The third theme looks at the individual and the individual's demands on him- or herself. Finally, the last item considers the balance one has between work and personal life and supports work-life balance.

The first dimension considers the influence the individual has on his/her work and work environment, for instance controlling the workload and influencing decisions at work. The second dimension measures how the individual involved is in the organisation by considering the goals, workload, task, and conflict. In addition, it looks at the level of stress these items have on the individual. The third item considers the stress individuals put on themselves to perform their daily tasks. Finally, the fourth item looks at the individual's work-life balance considering the individual's time spent at work compared to personal life.

## **2.8 Comparison of mean scores for work-life balance, quality of work, and occupational stress**

Fisher, Bulger and Smit (2009) did three separate studies to confirm the work-nonwork scale's reliability for work-life balance. The result in study two was consistent with the result in study three, namely that personal life interference with work was also highly related to job satisfaction. In study three, the results were as follows: normed = 0.94, non-normed = 0.96, comparative fit index = 0.97, with a root-mean-square-error of approximately = 0.056. The mean values of the dimensions were: WIPL = 2.78, PLIW = 2.04, WEPL = 2.74, and PLEW = 3.47.

The instrument used for measuring the quality of work has been developed by Steffgen *et al.* (2015). Their research shows that the instrument has an overall reliability with a Cronbach alpha ranging from 0.83 – 0.85. The moderately high positive correlations at item and factor level “could suggest a mediation effect between different work characteristics” (Steffgen *et al.*, 2015:page number). In the research by Steffgen *et al.* (2015), the separate regression analyses indicate that across the subsample burnout is significantly predicted by “satisfaction and respect”, “mobbing”, and “mental strain”. The questionnaire used to measure quality of work has shown potential for achieving the goal related to that specific area in this dissertation. The mean values of the different dimensions in previous research are as follows:(a) satisfaction and respect = 4.09; (b) mobbing = 4.22; (c) mental strain at work = 2.16; (d) communication and feedback = 3.45; (e) cooperation = 4.52; and (f) appraisal = 4.45 (Steffgen *et al.*, 2020).

The Work Stress Questionnaire (WSQ) aims to identify individuals at risk of being absent from work due to work-related stress. For the reliability of the WSQ questions, a test-retest analysis was performed using a rank-invariant method for analysis of paired ordered categorical data (Frantz & Holmgren, 2019). The previous research calculated the Relative Rank Variance (RV), Relative Position (RP), Relative Rank Variance, and the PA value for all the items. The PA value of the items ranges from 55% to 98%, with an average value of 77% (Frantz & Holmgren, 2019:4).

## 2.9 Relationship between work-life balance, quality of work, and occupational stress

Work or job demands will occasionally come in conflict with a person's ability, needs, and resources, and the strain someone experiences in the workplace is viewed as job stress (Leka *et al.*, 2004). In addition, stress can change how employees view their position at work and may influence if and how they pursue their personal and the company's goals, standards, and values (Koa Foundation, 2021).

Long work hours, tight deadlines, and difficulties in at work may lead to occupational job stress, bringing an imbalance in one's work-life balance. The construction and project industries are known for work-related stress (Bowen *et al.*, 2014). Most studies investigate how work interferes with personal life and how personal life interferes with work-life (Gragnano *et al.*, 2017; Hayman, 2005). A balanced lifestyle positively influences one's career and psychological well-being (Rahim *et al.*, 2020). Low job stress and a balanced lifestyle also positively influence the various domains of one's life, such as family life, leisure life, community life, and material and financial life (Lee & Sirgy, 2018).

Occupational stress has attracted researchers worldwide to research the impact of stress on workers' health and its effect on the organisation such as increased medical expenses, sick leave, and decreased workers efficiency. Occupational stress causes a change in the quality of employees' conjugal relationship quality in family life and also results in a withdrawal of personal and work-related activities (Carvalho *et al.*, 2017). If employees experience conflicting demands from two or more sources, they experience role conflict. The most common role conflict is between family and work when labour demands interfere with family and private roles (Carvalho *et al.*, 2017:1022). Research done by Kaur (2017:8487) partly showed a positive relationship between work-life balance, mental health, job satisfaction, and life in general. Compared to this, there is a positive correlation between life satisfaction and job satisfaction. Therefore, a change in one variable may lead to a change in one of the other variables.

Quality of work or job satisfaction is the positive reaction a person has toward his/her current position or job (Fisher *et al.*, 2009:445). Quality of work and work-life balance are related to each other and describe an employee's well-being. These two factors influence the job satisfaction of the employees. Employees' work performance is based on the quality of their work and their work-life balance. It plays a dominant role in most employee-essential performance areas such as employee motivation, engagement, retention, and commitment (Anandh & Gunasekaran, 2016).

Most research focuses on the overlap between work and family roles. However, Fisher *et al.* (2009) focus on work and nonwork interference and enhancement without limiting the research

to interference with family roles. Research reveals the existence of a negative relationship between work-life balance and occupational stress—when an imbalance in work-life and quality of work is present, occupational stress is also present (Bowen *et al.*, 2014). The lack of balance between work demands and private life creates severe mental and physical stress for employees (Nyati, 2012). Although occupational stress is known for its negative impact on employees' health, it also negatively impacts their productivity and satisfaction with their work performance. Thus, occupational stress negatively impacts the quality of work and work-life balance (Carvalho *et al.*, 2017).

## **2.10 Summary**

The literature review indicated a correlation between the influence work-life has on employees' personal life and vice versa. The influence can be positive or negative. Negative influence leads to stress in the workplace and personal life. The literature review also indicated that a balanced lifestyle is not equal to time spent at work compared to the time spent at home but rather the quality of time spent and the influence that one aspect of one's life has on another. When people are satisfied with their lives, their performance at work is better, and they have a more satisfying personal life.

Having a balanced lifestyle and a positive mindset about one's work and personal life is a way of life. Two very important aspects of a balanced lifestyle are time management and prioritising tasks. It is not possible to create more time than 24 hours in a day. Although it may sound like a contradiction of the latter statement, managing one's time means to spend the time available in such a way that may enable a person to have extra time at his/her disposal.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

Chapter three discusses the following topics:

- Research philosophy
- Research methodology and design
- Population sample
- Procedure of data collection
- Measuring instruments chosen and their reliability
- Statistical techniques used for data analysis
- Ethical considerations
- Concise summary.

### **3.2 Research philosophy**

Researchers need to be aware of different epistemological philosophies guiding their selection of theoretical approaches, methods for collecting data, and instruments employed for interpreting data. Broadly speaking there are two major approaches available to researchers, namely qualitative and quantitative research strategies. This dissertation draws on a quantitative research approach, which is based on a positivistic view of reality (Yilmaz, 2013).

The positivistic approach uses scientific methods from the natural sciences to study, interpret, and understand social reality (Bryman *et al.*, 2019:13). Positivism is based on the idea that reality should mainly be studied and interpreted through objective scientific methods. In her discussion of the differences between quantitative and qualitative research, Yilmaz (2013:311) define quantitative research as a type of empirical research (see par. 1.9).

This means that quantitative research does not only investigate physical and natural phenomena but also social or human circumstances such as the topic in this dissertation. Therefore, a positivist methodological approach was chosen for this study using an online opinion survey questionnaire collecting quantitative data (Bowen *et al.*, 2014:3).

One of the reasons for choosing a quantitative research method is that it analyses and interprets collected data with measuring instruments which provide the researcher the ability to reach conclusions which are measurable, more objective, and more open to testing than when a qualitative approach is used. Positivism requires research to be valid, reliable, and representative (Johnson, 2018) and quantitative research assists the researcher in this process. Although this does not mean that a positivistic quantitative approach is without error, it provides valid testing methods of research results. In addition, quantitative data provides objective information that researchers can use to make scientific assumptions.

Positivism is structured and well-defined and follows specific rules that use objective mathematical and scientific tools. Despite this, a disadvantage of positivism is that it discards human emotions. Positivists depend on the fact that one can measure everything and tend to be inflexible. They see things as they are and sometimes disregard unexplained phenomena. Positivists' inflexibility may eliminate lateral thinking. Lateral thinking aids researchers to find answers creatively and indirectly to solve a problem (Bryman *et al.*, 2019:13; Johnson, 2018).

### **3.3 Research method**

There are two main research approaches to consider: quantitative and qualitative research. Both methods have merit, but qualitative research has become more influential since 1980 (Bryman *et al.*, 2019:30). This study will use a quantitative approach to empirical deductive test theories. On the other hand, the qualitative approach has an epistemological orientation with a natural science model and vast positivism with an objective approach (Bryman *et al.*, 2019:31).

A quantitative research approach was used to determine the impact of low work-life balance on automation engineers' quality of work and occupation stress. Quantitative research emphasises quantification in the process of collecting and analysing numerical data. Quantitative research uses measurement to quantify differences in results and develop a consistency device to measure and evaluate the relationships between results (Whitley & Kite, 2013:33). Quantitative research is deductive, objective and emphasises quantifying collected data and data analysis on the influence a balanced lifestyle has on the quality of work and occupational stress. (Bryman *et al.*, 2019:41). Quantitative research strategy incorporates a natural science module of the process and is influenced by positivism (Bryman *et al.*, 2019:382).

Quantitative research has been done on work-life balance, quality of work and work stress in different fields and topics globally, as mentioned before (see par. 1.9). This research will test some theories and use existing studies to investigate automation engineers' work-life balance

working on projects globally (Bowen *et al.*, 2014). Quantitative research will focus on how engineers' experiences work-life balance and occupational stress in their everyday lives.

A quantitative approach was selected to make it possible to generalise resources of work-life balance and occupational job stress in the engineering project environment and also to compare the result to previous studies (Törnquist *et al.*, 2017). The current study will use an online questionnaire survey with a cross-sectional design to investigate the variables' correlation. The main aim of quantitative research is to describe, explain, predict and compare the investigated variable (Silverman & Marvasti, 2008:144)

### **3.4 Research design**

The research was done utilising existing well-researched instruments. This study followed a cross-sectional correlational design to answer the research questions (Bryman *et al.*, 2019). A cross-sectional study takes place at a single point in time and is therefore not a longitudinal one (Trochim & Donnelly, 2001:6). The online Microsoft Forms survey was sent to every participant simultaneously using a gatekeeper from the university, after which the results were analysed.

The research was conducted using existing literature and a combination of existing questionnaires on work-life balance, quality of work, and occupational stress. The study focused on automation engineers in the system integrators environment who was asked to complete an opinion survey questionnaire to collect the necessary data.

The study investigated the influence of work-life balance on the participants' quality of work and occupational stress. Correlation-relationship design is synchronisation between two or more variables meaning that a lack of work-life balance will increase occupational job stress (Trochim & Donnelly, 2001:6). Conversely, a healthy work-life balance will decrease occupational job stress and improve the work-life experience. The correlation design identified the relationship between the variables that were investigated

### **3.5 Population and sample**

The population is automation engineers at three system integrator companies. The participants represent the process control divisions in the system integrator company. The three systems integrated companies have offices in Midrand Johannesburg with branches in other parts of the country and the world. Their process control expertise is DCS systems, PLC programming, SCADA developing and process optimisation.

Due to the small population, a census was done on the total population. The main reason for a census is the size of the sample, cost, time, and accessibility of the sample. The survey was done

using an online questionnaire. The participants that formed part of the sample was convenient to the researcher and easily accessible (Bryman *et al.*, 2019:178) via their human resource department.

### **3.6 Procedure of data collection**

A questionnaire was designed online using Microsoft Forms. The link to the questionnaire and the people responsible for distributing the questionnaire in the different companies were provided to the university's gatekeeper. In addition, the human resource manager at Company A sent a follow-up email to all participants.

### **3.7 Measuring instruments**

The questionnaire comprised four sections. Section one covers the demographic information with five items, section two work-life balance, section three quality of work, and section four work or occupational stress.

The demographic section includes the age group, gender, years of work experience, qualification, and employer selection between companies A, B, C or others. In future research

In section 2 which consists of the work-life balance survey, the work/nonwork interference and enhancement survey questionnaire validated by Fisher *et al.* (2009:451) were used. The questionnaire consists of 17 items and four factors shown in the list below:

- Work interface with personal life (WIPL) – 5 items
- Personal life interface with work (PLIW) – 6 items
- Work enhancement of personal life (WEPL) – 3 items
- Personal life enhancement of work (PLEW) – 3 items

A five-point Likert scale was used to measure the items in the various domains. The Likert scale ranging from 1 = "Not at all" to 5 = "Almost all the time" was used to answer the questions.

The work/nonwork interference enhancement questionnaire is an assessment instrument to heighten awareness of one's work-life balance behaviours. The survey will also provide a means to rate one's collective behaviour and present a score that can give insight into one's effectiveness in achieving work-life balance(Fisher *et al.*, 2009:451).

**Section 3 consists of the quality of work index. The quality-of-work index comprises six different factors (Steffgen *et al.*, 2015) namely:**

- **Satisfaction and respect:** this factor evaluates whether employees experience respect from their employers and colleagues, as well as how satisfied they are with working for the company. The factor covers 6 items. **Mobbing:** this factor covers five items such as personal attacks by colleagues, demeaning behaviour and degrading a person's integrity, clients acting with malice towards employees, and more.
- **Mental strain:** the three items covered by this factor relate to an increase in work hours and workload as well as the demand to attend to different tasks simultaneously. **Communication and feedback:** meaningful and clear communication between employer and employee goes both ways. Therefore, this factor entails the different ways in which the company communicates their vision and expectations to employees, opportunities for employees to be included in decision-making processes, and receiving constructive feedback about their work. Two items are covered by this factor.
- **Cooperation:** a work environment in which colleagues support one another and work well together, facilitates trust and help when needed. Two items form part of this factor..
- **Appraisal:** this factor relates to an employee's inner locus of control, namely if s/he evaluates their work as worthwhile or not. This factor aggregates two items.

**Different five-point Likert scales were used to measure the following aspects:**

- A scale ranging from 1 = "not at all" to 5 = "absolutely" to measure satisfaction and respect.
- A scale ranging from 1 = "very often" to 5 = "never" to measure mobbing and mental strain at work.
- A scale ranging from 1 = "not at all" to 5 = "absolutely" to measure communication, feedback, cooperation, and appraisal.

**Section 4 consists of the work-stress questionnaire that measures perceived work-related stress. The questions were grouped into four categories:**

- Influence at work – 4 items.
- Indistinct organisation and conflicts – 7 items.
- Individual demands and commitment – 7 items.

- Work to leisure time interference – 3 items.

A four-point Likert scale ranging from 1 = "yes, always" to 4 = "no, never" was used for measuring influence at work. A three-point Likert scale "yes", "partly", or "no" was used for indistinct organisation, conflicts, individual demands, and commitment. A four-point Likert scale was used from 1 = "Yes, always" to 5 = "No, never".

Each question in the categories, indistinct organisation, conflicts, individual demands, and commitment has a supplementary question, namely "Do you perceive that as stressful?". The questions are answered "Not stressful", "Less stressful", "Stressful", or "Very stressful". Thereby, two additional categories are formed with seven items each:

- Perceived stress due to indistinct organisation and conflicts
- Perceived stress due to individual demands and commitments.

### **3.8 Reliability of measuring instruments**

In section 2, previous work/nonwork interference research, and as indicated, validated scales were used to measure the study's constructs (see par. 2.1). For example, the Cronbach's alphas for research done by Fisher *et al.* (2009) were: work interference with personal life = 0.91; personal life = 0.82; work enhancement of personal life = 0.70; personal life enhancement of work = 0.81.

In section 3, the quality-of-work index questions were used for the research (Steffgen *et al.*, 2015). The internal consistency of quality-of-work and quality-of-employment research is good, with a Cronbach's alpha of between 0.70 and 0.97 (Steffgen *et al.*, 2020). In this study, only the quality-of-work index was used. The quality-of-work questionnaire is reliable with a Cronbach's alpha of 0.84 (Steffgen *et al.*, 2015:14994)

In section 4, the work-stress questionnaire (WSQ) (Frantz & Holmgren, 2019) measures perceived work-related stress. The questions are grouped into four categories: influence at work, indistinct organisation and conflicts, individual demands and commitment, and work-to-leisure time interference. For the reliability of the WSQ questions, a test-retest analysis was performed using a rank-invariant method for analysis of paired-ordered categories (Frantz & Holmgren, 2019). Previous research calculated the Relative Rank Variance (RV), Relative Position (RP), and the PA value for all the items. The PA value of the items ranges from 55%–98%, with an average value of 77% (Frantz & Holmgren, 2019:4).

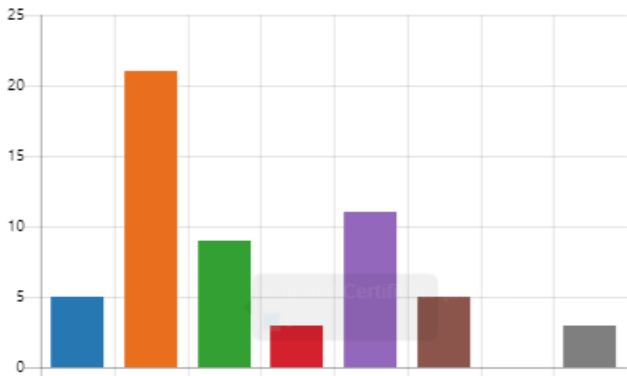
### 3.9 Statistical techniques used for data analyses

Microsoft Form will report back on nominal and ordinal measurement, and Likert Scale type of questions. In addition, the report gives one an idea of how many forms have been completed, forms still active, and the average time it takes to complete a form. Microsoft Form also generates a summary report that explains and shows the result, as in the figure below.

#### 4. Highest qualification level.

[More Details](#)

● National Certificate (Matric)	5
● National Diploma	21
● B-Tech Degree	9
● Post-Graduate Diploma	3
● Honour's Degree	11
● Master's Degree / MEng	5
● PhD	0
● Other	3



#### 5. Indicate for which company are you working.

[More Details](#)

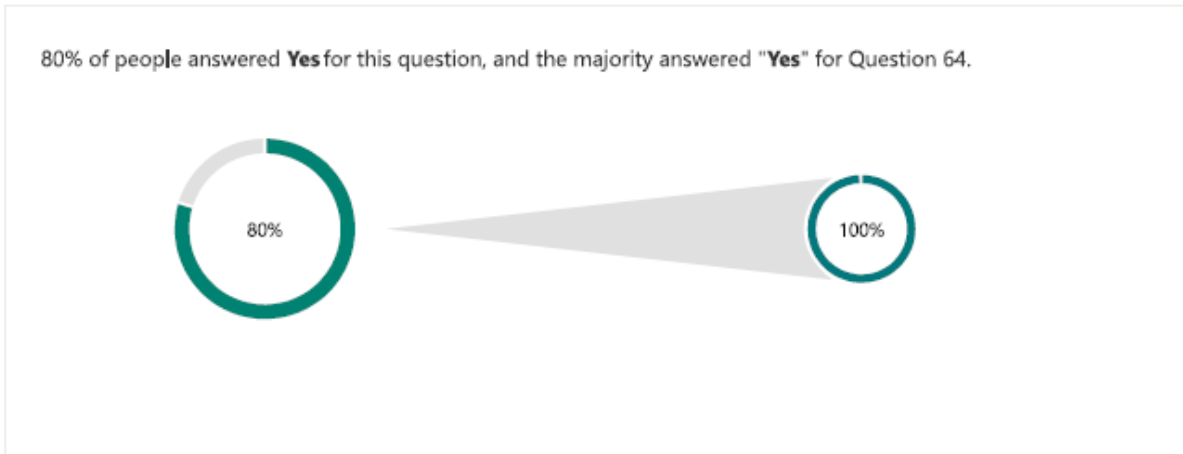
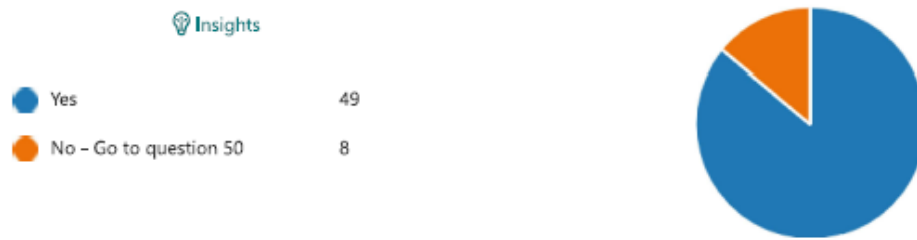
[Insights](#)

● Moore Process Control	51
● PCS Global	2
● Enviroblue	2
● Other	2



Figure 3-1: Example of Microsoft Form results

48. Has your workload increased?



**Figure 3-2: Example of Microsoft Form results with insights**

As discussed above (see par. 3.3) the study follows a quantitative approach, utilising SPSS software to analyse data, make predictions, and indicate relationships between the constructs. SPSS employs various techniques to analyse, transform, and produce patterns between different data variables. The data analysis methods and techniques will be a combination of descriptive and inferential statistics.

Spearman's rank-order correlation coefficient "ρ" measures the strength and direction of association between two variables measured on an ordinary scale (Leard Statistics, 2018). The group statistics show a comparison between males and females. The t-test result indicated that the results between the two means are significant. The p-values indicate that the result is statistically significant, with a smaller p-value than 0.05. The effect size was implemented in the study because of the size of the sample. Statistical significance tests tend to yield small p-values as the data sets' size increases. The effect size is independent of sample size and is a measure of practical significance. It can be understood as a significant enough effect in practice and is described for differences in means, the relationship in two-way frequency tables, and a multiple-regression fit. The effect size with a  $d = 0.2$  shows a small effect,  $d = 0.5$  shows a medium effect, and  $d = 0.8$  is a large effect (Steyn & Ellis, 2003).

**The following statistical techniques were used to provide answers to the research questions:**

- Descriptive statistics of the demographic characteristics of the respondents and work-life balance, quality of work-life and occupational stress mean scores, and standard deviations
- Cronbach's alphas were done to measure the reliability of the work-life balance, quality of work, and occupational stress measuring instruments
- An independent sample t-test was done to compare the mean scores of work-life balances, quality of work, and occupational stress
- To compare the mean scores between age groups, years of work experience, and qualification levels an analysis of variance was done
- A Pearson product-moment correlation was conducted to establish the relationship between work-life balance, quality of work, and occupational stress.

### **3.10 Ethical considerations**

The North-West University (NWU) has a high ethical standard and code of conduct to which one must adhere. The four main principles of the NWU are honesty, accountability, professionalism, and good stewardship (NWU, 2022). The code of conduct for research is signed and attached to the research. The code of conduct ensures that the ethical standard of NWU has been adhered to. In addition, a cover letter will be sent with the link to the online survey to each participant that explains the purpose and background of the research.

This study's sole purpose was to obtain information from automation engineers to determine the nature of their everyday experience related to the research topic. Participation was entirely voluntary and one could opt-out at any time. One could also decide not to answer specific questions. The procedure followed was a quantitative research design that entails an online survey. Necessary background information was asked, e.g. age group, gender, years of work experience, qualification, and company. The company only distinguished between companies and was referred to as 'A', 'B', and 'C' in the study. However, no personal identification information was required. The data's confidentiality was guaranteed, only the combined results were used for research and publication purposes, and the data gathered from the online survey were only used for research purposes. Permission to distribute the survey was asked from each organisation.

The completed ethics application form and SCERF form are signed and handed in with the research.

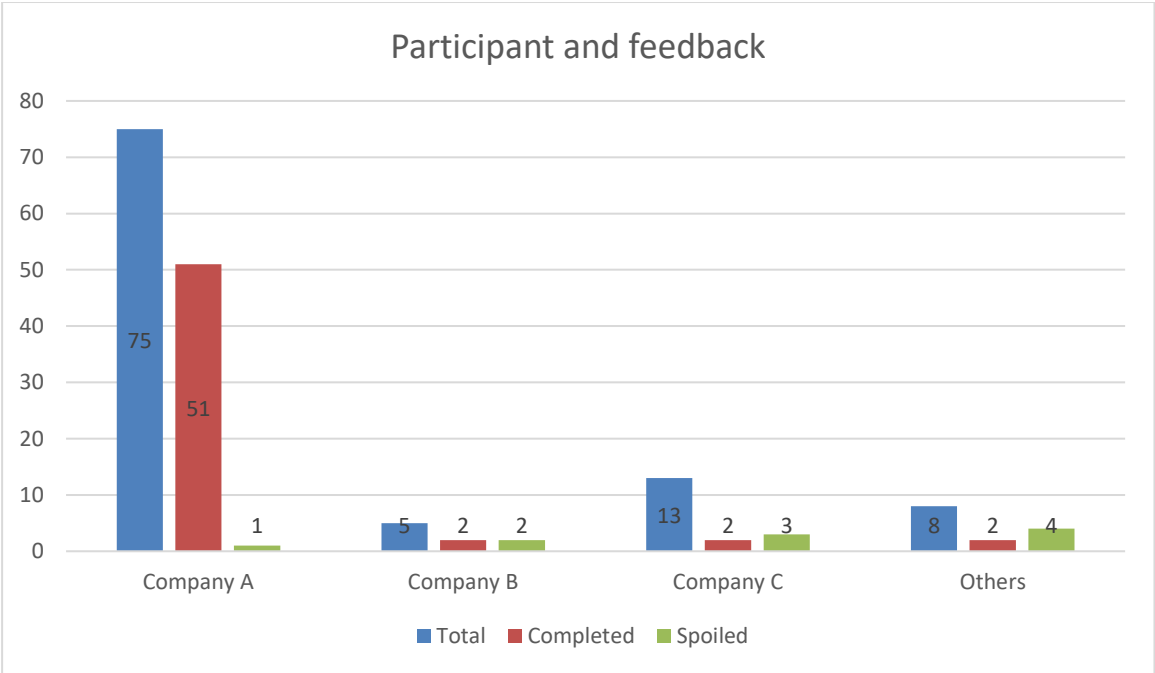
### **3.11 Summary**

The items used in this research is well-designed and evaluated, and results from the previous research show the reliability of the items. In addition, the quantitative method used in the research together with the questionnaire is well-defined.

# CHAPTER FOUR: RESULTS, DISCUSSION, AND INTERPRETATION OF FINDINGS

## 4.1 Profile of respondents

The three System Integrators companies asked to partake in the survey are not excessively big. However, only company A's participation was worthwhile. The graph below shows the participation of the companies. The graph also includes the feedback of twelve automation engineers who do not work for the companies and asked to participate.

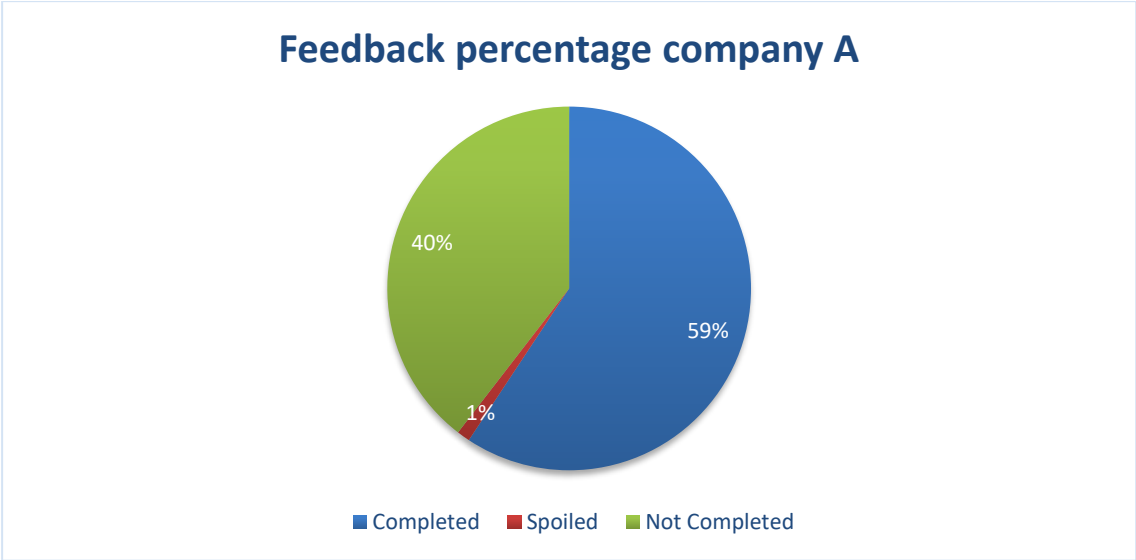


**Figure 4-1: Participants and feedback**

Survey response rate is a percentage of the returned completed survey compared to the surveys sent to participants. According to QuestionPro, email surveys have a response rate of between 25% and 35% depending on the length and information provided (QuestionPro, 2021). According to SurveyAnuplace, the return rate is 33% on average (Lindemann, 2021). Therefore, the survey return rate was above average.

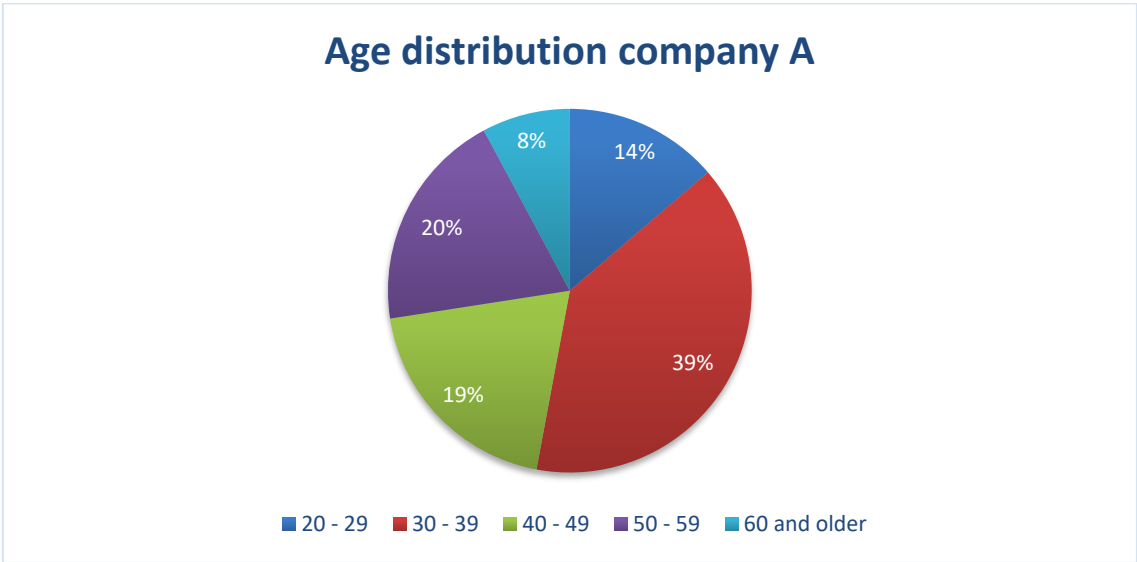
Of the questionnaires sent out, 56% were returned with 10% spoiled. Company A, initially chosen for the research return rate, was 74.3% representing engineering projects in different industries in one company. The questionnaires were sent out by a gatekeeper to only one or two persons in the company to distribute. The main factor for the high return rate from company A is that the researcher is part of the company and could follow up with the human resources manager to follow up with the employees.

A decision was made to only use the information received from company A and discard information received from companies B, C, and others. The data from the sample of 51 completed questionnaires (N = 51) were used to analyse the correlation between the descriptive statistics and the different abstracts. Therefore, the following data comprise only the data from company A.



**Graph 4-1: Feedback percentage company A**

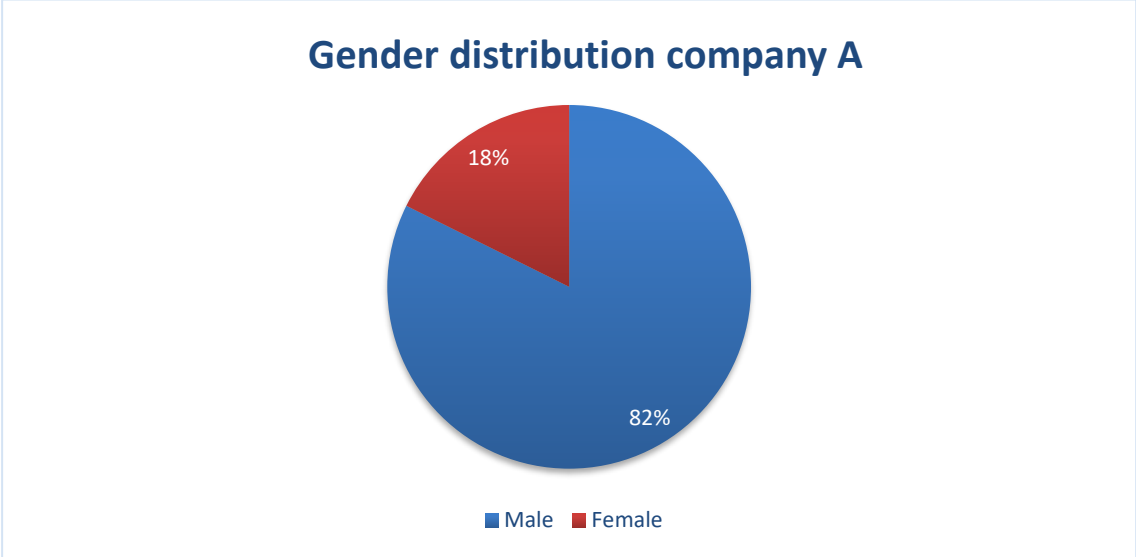
**4.2 Demographic information**



**Graph 4-2: Age distribution company A**

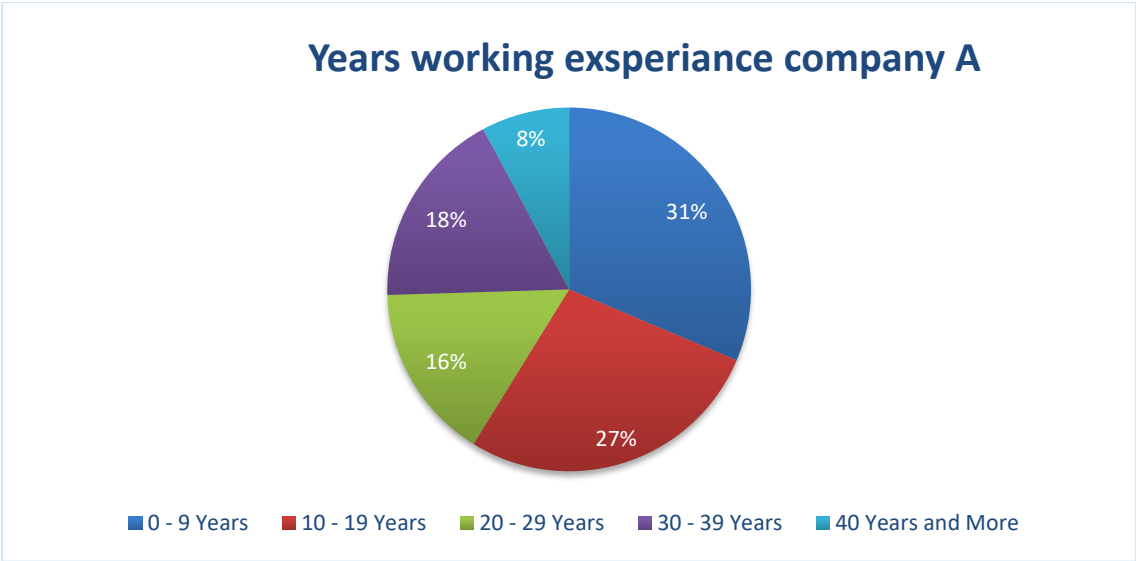
The figure above summarises the percentage of the age groups that participated in the survey for company A. The largest age group falls in the 30–39 years bracket and consists of 39% of the

results, with the age group 40–49 covering 20% of the survey results. The new (young) engineers joining the company falls in the age group 20–29, making up only 14% of the total. The ageing workforce in the company may be a disadvantage, and the company needs to adapt to make Generation Z, also known as Zoomers, feel more welcome in the company.



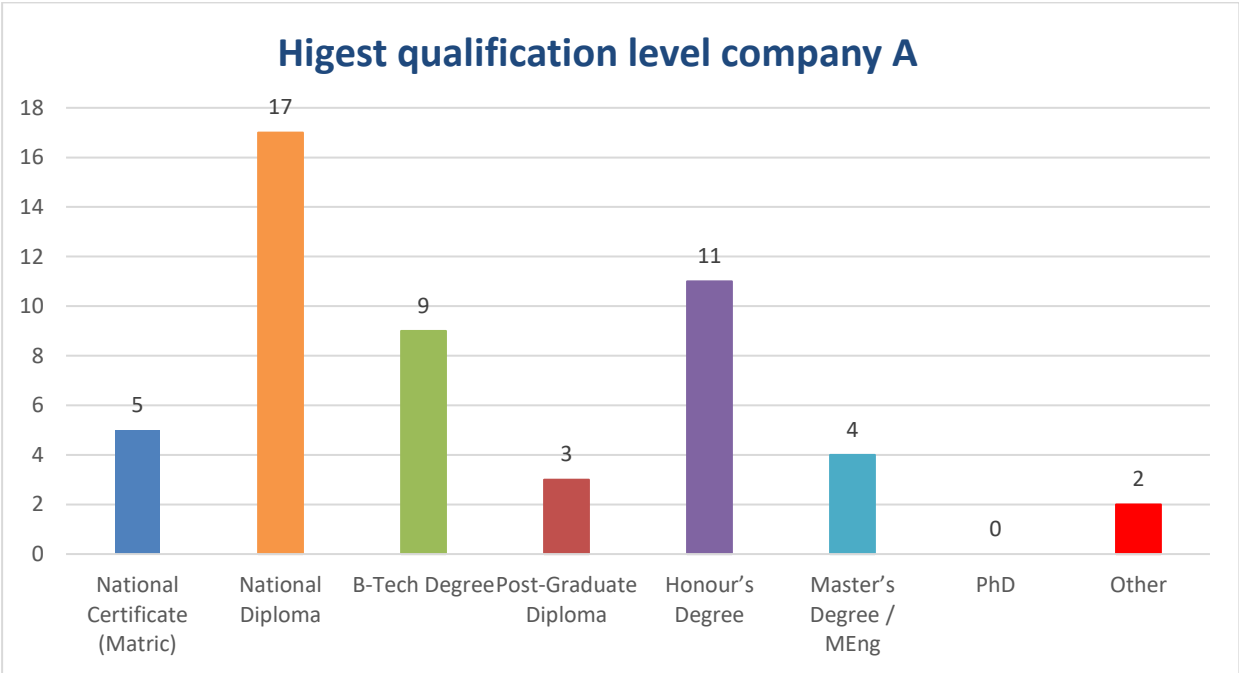
**Graph 4-3: Gender distribution company A**

In total, 62 people participated in the survey with five spoiled questionnaires. The survey consists of 84% male and 16% female participants. However, only one female survey was spoiled, and all the females are employed by company A. Therefore, the gender distribution for company A consists of 82% male and 18% female. These numbers might be an indication that gender is an issue to be addressed by the company and that automation engineering must be promoted as a viable career option for females.



**Graph 4-4: Years working in engineering industry company A**

The average work experience of engineers working for company A is 31% in the category 0–9 years. This number which makes up nearly one third of the total indicates that younger people are moving into the industry. A contributory factor for this phenomenon may be that the automation industry is technology-driven. Given the worldwide situation that young people are very competent in using technology related to the fourth industrial revolution may provide an explanation for this trend.



**Graph 4-5: Highest qualification level company A**

More than 50% of the participants in company A have obtained NQF level six and seven qualifications. In addition to that one must obtain a national diploma to work as an engineer at company A.

It is possible to divide the biographical data into two groups, one with order and one without order. The age group, years of work experience, and qualification represent order. Take the age factor, for example: the age group 20–29 carries a weight of 1, and 60 years and older a weight of 5. On the other hand, gender falls in the group without order, meaning that one is not more important or carries more weight than the other. The items in the order category can be used to require correlation. There must be normality and order in the items. If one wants to do a Spearman correlation, order is important. The Spearman rank-order was used, so there is no need to prove normalisation. The Spearman test is used for ordinal variables or continuous data that are insufficient to conduct a Pearson's product-moment correlation. Spearman's rank-order correlation calculation does not measure linear connection but is used to find a monotonic relationship. A monotonic relationship is when something tends to move in the same direction but not at a constant rate (Leard Statistics, 2018).

The small sample group only had 51 feedbacks indicating few statistically significant correlations. Considering the table below, when looking at the correlation, it is evident that the correlation coefficient is very low. This means that the biographical data do not have a big, if any, impact on the work-life balance, quality of work, and occupational stress. For this reason, the biographical data will be ignored in the rest of the discussion. There is no statistical value in the biographical values because it is so low. This result is acceptable because it indicates that nothing else is acting on the facts, e.g. age does not play a role in work-life balance. More work experience does not determine one's quality of work.

Correlations can vary between -1 and +1. Both values -1 and +1 are perfect correlations and compare with themselves. A correlation equal to 0 is not a correlation. One is all very much after string correlation, for instance, a value of -0.6.

**Table 4-1: Group statistics with biographical information**

		<b>What is your age group?</b>	<b>How many years are you working in the engineering industry?</b>	<b>Highest qualification level.</b>
WLB_WIPL	Correlation Coefficient	-0.115	-0.069	-0.003
	Sig. (2-tailed)	0.421	0.633	0.984
	N	51	51	49
WLB_PLIW	Correlation Coefficient	-0.164	-0.162	-0.055
	Sig. (2-tailed)	0.249	0.256	0.710
	N	51	51	49
WLB_WEPL	Correlation Coefficient	0.113	0.230	0.121
	Sig. (2-tailed)	0.431	0.105	0.407
	N	51	51	49
WLB_PLEW	Correlation Coefficient	0.027	0.102	0.183
	Sig. (2-tailed)	0.852	0.476	0.208
	N	51	51	49
QWS_Satisfaction	Correlation Coefficient	0.089	0.041	-0.002
	Sig. (2-tailed)	0.536	0.776	0.989
	N	51	51	49
QWS_Mobbing	Correlation Coefficient	0.012	0.000	0.055
	Sig. (2-tailed)	0.936	0.999	0.708
	N	51	51	49
QWS_Mental_Strain	Correlation Coefficient	0.104	0.139	-0.047
	Sig. (2-tailed)	0.466	0.331	0.750
	N	51	51	49
QWS_Communication	Correlation Coefficient	0.081	0.118	-0.137
	Sig. (2-tailed)	0.571	0.408	0.346
	N	51	51	49
QWS_Cooperation	Correlation Coefficient	0.047	0.097	-0.127
	Sig. (2-tailed)	0.744	0.497	0.383
	N	51	51	49

		What is your age group?	How many years are you working in the engineering industry?	Highest qualification level.
Do you consider your work to be important?	Correlation Coefficient	0.033	0.089	0.185
	Sig. (2-tailed)	0.816	0.534	0.204
	N	51	51	49
Is your work appreciated by your company?	Correlation Coefficient	0.009	-0.018	-0.017
	Sig. (2-tailed)	0.951	0.898	0.906
	N	51	51	49
WS_Influence	Correlation Coefficient	-0.132	-0.151	-0.119
	Sig. (2-tailed)	0.357	0.291	0.415
	N	51	51	49
WS_Stress_conflicts	Correlation Coefficient	-0.230	-0.152	-0.067
	Sig. (2-tailed)	0.104	0.287	0.646
	N	51	51	49
WS_Stress_commitments	Correlation Coefficient	-0.116	-0.044	0.040
	Sig. (2-tailed)	0.416	0.761	0.784
	N	51	51	49
WS_Work_Leisure	Correlation Coefficient	0.130	0.031	-0.162
	Sig. (2-tailed)	0.365	0.827	0.265
	N	51	51	49

### 4.3 Descriptive statistical data and results

The table below indicates the results of the items used in the research. The questionnaire consists of 75 questions covering work-life balance, quality of work, and occupational stress. The results shown in the table are shown under the following headings:

- The minimum and maximum values selected
- The mean value of the items
- The standard deviation. The standard deviation indicates how much variation from the means exists in the items (Hargrave, 2021).

The item with the minor standard deviation of 0.544 is the question: “Do you have time to finish your assignments?” In this case, 70.6% of the participants selected, “Yes, rather often” and no one selected “No, never.” The item with the most extensive standard deviation of 1.319 is, “The things I do at work help me deal with personal and practical issues at home”, where the selection was “Not at all” = 25.5%, “Rarely” = 21.6%, “Sometimes” = 19.6%, “Often” = 25.5% and “Almost all the time” = 7.8%.

**Table 4-2: Descriptive statistics of items**

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
I come home from work too tired to do things I would like to do.	51	1	5	3.29	1.006
My job makes it difficult to maintain the kind of personal life I would like.	51	1	5	3.06	1.066
I often neglect my personal needs because of the demands of my work.	51	1	5	3.06	1.139
My personal life suffers because of my work.	51	1	5	2.71	1.064
I have to miss out on important personal activities due to the amount of time I spend doing work.	51	1	4	2.67	0.973
My personal life drains me of the energy I need to do my job.	51	1	5	1.76	0.929
My work suffers because of everything going on in my personal life.	51	1	3	1.63	0.631
I would devote more time to work if it were not for everything I have going on in my personal life.	51	1	4	1.57	0.855
I am too tired to be effective at work because of the things I have going on in my personal life.	51	1	4	1.47	0.674
When I am at work, I worry about things I need to do outside work.	51	1	4	2.12	0.791
I have difficulty getting my work done because I am preoccupied with personal matters at work.	51	1	3	1.51	0.644
My job gives me the energy to pursue activities outside of work that is important to me.	51	1	5	2.39	1.168
Because of my job, I am in a better mood at home.	51	1	5	2.86	1.217
The things I do at work help me deal with personal and practical issues at home.	51	1	5	2.69	1.319

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
I am in a better mood at work because of everything I have going for me in my personal life.	51	1	5	3.39	1.097
My personal life gives me the energy to do my job.	51	1	5	3.67	1.071
My personal life helps me relax and feel ready for the next day's work.	51	2	5	3.63	0.958
Are you satisfied with your work?	51	1	5	3.73	0.918
Are you satisfied with your work conditions?	51	1	5	3.43	1.044
Does your company or institution respect its employees' rights?	51	2	5	4.24	0.907
Are you satisfied with your work climate?	51	1	5	3.78	0.945
If you had the choice, would you work a second time in the same company/institution?	51	1	5	3.82	1.108
Are you respected by your superior at work?	51	2	5	4.18	0.865
How often is your work criticised by your colleagues or your superior?	51	2	5	3.75	0.744
How often are you ridiculed by your colleagues or your superior in front of others?	51	2	5	4.37	0.799
How often are you ignored at work by your colleagues or your superior?	51	1	5	4.00	1.039
How often does your superior assign you duties that seem absurd?	51	2	5	3.94	0.968
How often do you have conflicts with colleagues or other people with whom you are in contact at work?	51	1	5	4.00	0.825
How often do you have to concentrate on several diverse activities at once?	51	1	5	2.18	0.932
How often is your work intellectually demanding (for instance: having to concentrate for a long time)?	51	1	5	1.84	0.880
How often do you work under pressure?	51	1	3	1.80	0.749
Do you participate in the decisions made by your company?	51	1	5	2.86	1.184
Are you informed of the internal decisions, changes, and development plans of your company?	51	1	5	3.33	1.178

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
Do you receive feedback regarding your work from your superior or from your colleagues?	51	1	5	3.24	0.992
Do you cooperate with your colleagues at work?	51	2	5	4.43	0.755
Do your colleagues support you at work?	51	3	5	4.14	0.722
Do you consider your work to be important?	51	3	5	4.49	0.674
Is your work appreciated by your company?	51	2	5	4.08	0.868
Do you have time to finish your assignments?	51	1	3	2.06	0.544
Do you have the possibility to influence decisions at work?	51	1	4	2.27	0.723
Does your supervisor consider your views?	51	1	3	1.90	0.608
Can you decide on your work pace?	51	1	4	2.31	0.735
If question 48 is "yes": Do you perceive your increased workload as stressful?	46	1	4	2.83	0.739
If question 50 is "partly" or "no": Do you perceive unclear goals as stressful?	25	1	4	2.92	0.759
If question 52 is "partly" or "no": Do you perceive not knowing which assignments your work tasks include as stressful?	16	1	4	2.69	0.873
If question 54 is "partly" or "no": Do you perceive not knowing who is making decisions concerning your workplace as stressful?	9	1	3	2.56	0.726
If question 56 is "yes": Do you perceive conflict at work as stressful?	26	1	4	2.81	0.801
If question 58 is "yes": Do you perceive involvement in conflict at work as stressful?	16	1	4	2.50	0.966
Do you put high demands on yourself at work?	21	1	4	2.86	0.854
If question 62 is "yes": Do you perceive putting high demand on yourself as stressful?	44	1	4	2.93	0.625
If question 64 is "yes": Do you perceive engagement in your work as stressful?	50	1	4	2.34	0.745

	N	Minimum	Maximum	Mean	Std. Deviation
If question 66 is “yes” or “partly”: Do you perceive thinking of work after a workday as stressful?	49	1	4	2.51	0.794
If question 68 is “yes” or “partly”: Do you perceive not setting limits to assignments as stressful?	40	1	4	2.78	0.768
If question 70 is “yes”: Do you perceive taking on more responsibility as stressful?	37	1	4	2.68	0.709
If question 72 is “yes” or “partly”: Do you perceive working after hours as stressful?	49	1	4	2.45	0.709
If question 74 is “yes” or “partly”: Do you perceive hard to sleep as stressful?	31	1	4	3.03	0.983
Due to work, do you find it hard to find time to be with your nearest?	50	1	4	2.68	0.913
Due to work, do you find it hard to find time to be with your friends?	51	1	4	2.69	0.836
Due to work, do you find it hard to find time for your recreational activities?	51	1	4	2.55	0.832

#### 4.4 Reliability of data gathered

With each item Cronbach’s alpha was measured and the mean value of the inter-item correlation is indicated in the table below. Where the scale has a small number of items, e.g. less than ten items it is sometimes difficult to get a decent Cronbach’s alpha value. Therefore, one may report the mean inter-item correlation (Pallant & Manual, 2010). In this research, the inter-item correlation was reported with Cronbach’s Alpha.

Items 42 and 43, “Do you consider your work to be important?” and “Is your work appreciated by your company?” were removed from the results because they were found not to be reliable items with a Cronbach’s alpha of 0.066 and a mean value of 0.035. The two items are part of the quality of work questions and fall under the appraisal's category. At item 42, 31.4% of the participants selected “Often” and 58.8% selected “Always”. At item 43, 37.3% selected “Often” and 37.3% selected “Always”.

In general, a Cronbach’s alpha value of 0.8 is appropriate for cognitive tests such as intelligence tests. For ability tests the cut-off point of 0.7 is appropriate. However, when dealing with psychological constructs values below 0.7 can be seen as realistic because of the measured constructs' diversity (Field, 2009:821).

The rest of the items have a high Cronbach's alpha of >0.7 except for item QWS\_Communication and QWS\_Cooperation, but they have a high mean value that makes it significant. For example, QWS\_Communication has a Cronbach's alpha of 0.644, but its inter-item correlation equals 0.388. QWS\_Cooperation has a Cronbach's alpha of 0.678, but its inter-item correlation equals 0.513.

**Table 4-3: Descriptive statistics of instruments**

		<b>Cronbach's alpha</b>	<b>Mean Item Correlation (Inter-Item Correlations)</b>	<b>Mean</b>	<b>Std. Deviation</b>
Work-life balance	WLB_WIPL (WIPL – Work interference with personal life)	0.910	0.668	2.96	0.90
	WLB_PLIW (PLIW – Personal life interference with work)	0.725	0.327	1.68	0.49
	WLB_WEPL (Work enhancement of personal life)	0.811	0.592	2.65	1.05
	WLB_PLEW (Personal life enhancement of work)	0.832	0.624	3.56	0.90
Quality of work	QWS_Satisfaction (Satisfaction and respect)	0.904	0.611	3.86	0.80
	QWS_Mobbing	0.720	0.336	4.01	0.61
	QWS_Mental_Strain (Mental strain at work)	0.815	0.606	1.94	0.73
	QWS_Communication (Communication and feedback)	0.644	0.388	3.14	0.86
	QWS_Cooperation	0.678	0.513	4.28	0.64
Work stress	WS_Influence (Influence at work)	0.735	0.399	2.14	0.49
	WS_Stress_conflicts (Indistinct organisation and conflicts)	1.000	1.000	2.79	0.66
	WS_Stress_commitments (Individual demands and commitment)	0.906	0.605	2.60	0.63
	WS_Work_Leisure (Work-to-leisure-time interference)	0.931	0.820	2.64	0.81

The ideal range of inter-item correlation is between 0.15 and 0.50. If the value is less than this, the item is not well-correlated and does not measure the same construct accurately. On the other hand, when the value is more than 0.50 the items tend to move towards the ideal state (Clark & Watson, 1995).

Considering the mean value of the descriptive statistics in the table above under the construct “work-life balance” the means that is the highest at 3.56 (WLB\_PLEW, personal live enhancement of work) shows a positive impact which indicates a positive situation. On the other hand, the work interference with personal life (WLB\_WIPL) with a mean value of 2.96 is high, indicating that the work does harm the personal life of the participants working in the company. The results also show that work enhances the participants’ personal life but that their personal life does not play a significant role in their work-life.

Under the construct “quality of work” the highest means is cooperation (QWS Cooperation) with a value of 4.28. This high mean value is positive and indicates that company A's cooperation between management and colleagues is outstanding. The second item, “mobbing” (QWS Mobbing) is also above average with a value of 4.01, indicating that bullying is not a problem in the company. For the question “How often does your superior assign your duties that seem absurd?” only 9.8% of the participants selected “Often”, which is the most negative construct of mobbing in the workplace. In general, the participants view their work quality as between moderate and very satisfied and the communication in the company as average. A big concern for the company should be work strain with a low means of 1.94. Most of the participants consider their work to have a mental strain on them by considering work pressure and a demanding job. Mental strain is a state of worry and tension caused by a situation like a job (Collins Dictionary, 2021).

In the construct “work stress”, the means value is low and a closer look at the item is considered in the table below. The item with the highest mean value is “indistinct organisation and conflicts” (WS\_Stress\_conflicts) with 2.79. In the table below, the negative items can be used to lessen the stress at work.

**Table 4-4: Insight into work stress questions**

Question asked in work stress questionnaire		Insight into answers to questions
44	Do you have time to finish your assignments?	<b>Positive</b> - 76.6% of the participants selected “Often” and above.
45	Do you have the possibility to influence decisions at work?	<b>Positive</b> – 70.6% of the participants selected “Yes, rather often.”
46	Does your supervisor consider your views?	<b>Positive</b> – 62.7% of participants selected “Yes, rather often.”
47	Can you decide on your work pace?	<b>Positive</b> – 49% of participants selected “Yes, rather often”.
48	Has your workload increased?	<b>Negative</b> – 88% of participants selected “Yes”. However, 100% of the participants that selected “Yes” also selected “Yes” in question 64, “Do you often get engaged in your work” and 98% selected “Yes” in

Question asked in work stress questionnaire		Insight into answers to questions
		question 62 that states, "Do you put high demand on yourself at work?"
49	Do you perceive your increased workload as stressful?	<b>Negative</b> – 63% of participants selected "Stressful".
51	Do you perceive unclear goals as stressful?	<b>Negative</b> – 68% of participants selected "Stressful".
53	Do you perceive not knowing which assignments your work tasks include as stressful?	<b>Negative</b> – 63% of participants selected "Stressful" and 12.5% selected "Very stressful".
55	Do you perceive not knowing who is making decisions concerning your workplace as stressful?	<b>Negative</b> – 66.7% of participants selected "Stressful."
57	Do you perceive conflict at work as stressful?	<b>Negative</b> – 57.7% of participants selected "Stressful" and 15.4% selected "Very stressful."
59	Do you perceive involvement in conflict at work as stressful?	<b>Negative</b> – 43.8% of participants selected "Stressful" and 12.5% selected "Very stressful."
62	Do you put high demands on yourself at work?	<b>Negative</b> – 94% of participants selected "Yes". However, 95% that selected "Yes" also selected "Yes" in question 64, "Do you often get engaged in your work?".
63	Do you perceive putting high demand on yourself as stressful?	<b>Negative</b> – 68.2% of participants selected "Stressful" and 13.6% selected "Very stressful".
65	Do you perceive engagement in your work as stressful?	<b>Positive</b> – 14% of participants selected "Not stressful" and 40% selected "Less stressful".
67	Do you perceive thinking of work after a workday as stressful?	<b>Negative</b> – 44.9% of participants selected "Stressful" and 8.2% selected "Very stressful".
69	Do you perceive not setting limits to assignments as stressful?	<b>Negative</b> – 52.5% of participants selected "Stressful" and 15% selected "Very stressful".
71	Do you perceive taking on more responsibility as stressful?	<b>Negative</b> – 56.8% of participants selected "Stressful" and 8.1% selected "Very stressful".
72	Do you work after ordinary working hours to finish your assignments?	<b>Negative</b> – 65% of participants selected "Yes" and 31% selected "Often".
73	Do you perceive working after hours as stressful?	<b>Positive</b> – 8.2% of participants selected "Not stressful" and 42.9% selected "Less stressful."
75	Do you perceive hard to sleep as stressful?	<b>Negative</b> – 35.5% of participants selected "Stressful" and 38.7% selected "Very stressful".
76	Due to work, do you find it hard to find time to be with your nearest?	<b>Positive</b> – 38% of participants selected "No, seldom" and 20% selected "No, never".

Question asked in work stress questionnaire		Insight into answers to questions
77	Due to work, do you find it hard to find time to be with your friends?	<b>Positive</b> – 51% of participants selected “No, seldom” and 13.7% selected “No, never”.
78	Due to work, do you find it hard to find time for your recreational activities?	<b>Positive</b> – 41.2% of participants selected “No, seldom” and 11.8% selected “No, never”.

#### 4.5 Comparison with biographical data

Two types of biographical variables are present in the research, namely ordinal and nominal. Ordinal data has order and consists of age, work experience, and qualification. The ordinal data was discussed in detail under demographical data (see par. 4.2). Nominal data do not have order, meaning one variable is not more important than the other and are analysed as a group.

The statistical significance test (t-test) shows that the results of a sample are significant by calculating the difference between the mean values. For example, the t-test shows the significance between males and females in the table below. The p-value is a criterion of the t-test giving the probability that the obtained value could be obtained under the assumption that no difference between the population mean value is valid. A small p-value, less than 0.05 indicates that the results are statistically significant. However, the small p-value does not imply that the result is vital in practice as the results tend to yield to a small p-value as the size of the data sets increase (Steyn & Ellis, 2003).

The table indicates that the p-values are more significant than 0.05 except for “QWS\_Mental\_Strain” with a value of 0.018 and “WS\_Influence” of 0.038. For a p-value to have statistical meaning it must be smaller than 0.05. A p-value smaller than 0.05 means we are making a smaller than 5% mistake. The t-test (p-value) cannot be used to generalize, meaning the results do not apply to all automation engineers in South Africa. Although the p-values are reported, one cannot generalize because this is only applicable to one company that completed the questionnaire. Therefore, the p-value is only reported for the sake of completeness and the effect sizes are used to interpret the results.

A typical way to comment on the practical significance of the results is to use the standard difference between two populations’ mean values by dividing the difference by the estimated standard deviation. Steyn (2003) introduces another measure called the effect size which makes the difference independent of the units and sample size and relates it with the spread of the data.

Cohen (cited by Steyn & Ellis, 2003) gives the guidelines as follows for the interpretation of the effect size:

- Small effect  $d = 0.2$ ,
- Medium effect  $d = 0.5$
- Large effect  $d = 0.8$  (Steyn & Ellis, 2003)

Data with  $d = \geq 0.8$  is considered practically significant since the result of the difference has a large effect.

For correlations, the magnitude of the correlation itself is a measure of the importance of the relationship in practice:

- Small effect  $r = 0.1$
- Medium effect  $r = 0.3$
- Large effect  $r = 0.5$

A relationship with  $r = \geq 0.5$  is considered practically significant (Steyn & Ellis, 2003).

Suppose one takes WLB\_PLIW in the table below and compare male to female. This case shows that males have a mean value of 1.64 and females of 1.83, and a standard deviation of 0.48 and 0.55 respectively, indicating the influence is more significant of females than males. The effect size  $d = 0.39$  which is between small and medium. The effect size result with large and medium effect size is used for interpretation. Table 4.5 shows all the results for the biographical data for males and females and table 4.6 only looks at the ones with a medium and large effect size.

**Table 4-5: Nominal group statistics**

Indicate your gender.		N	Mean	Std. Deviation	t-test p-value	Effect size
WLB_WIPL	Male	42	3.00	0.92	0.508	0.24
	Female	9	2.78	0.86		
WLB_PLIW	Male	42	1.64	0.48	0.359	0.39
	Female	9	1.83	0.55		
WLB_WEPL	Male	42	2.76	0.99	0.162	0.63
	Female	9	2.11	1.21		
WLB_PLEW	Male	42	3.69	0.83	0.072	0.84
	Female	9	2.96	1.02		
QWS_Satisfaction	Male	42	3.85	0.84	0.821	0.07
	Female	9	3.91	0.59		
QWS_Quality_Work	Male	42	4.02	0.60	0.869	0.07
	Female	9	3.98	0.68		

Indicate your gender.		N	Mean	Std. Deviation	t-test p-value	Effect size
QWS_Mental_Strain	Male	42	2.03	0.75	0.018	0.72
	Female	9	1.52	0.47		
QWS_Communication	Male	42	3.15	0.76	0.930	0.05
	Female	9	3.11	1.28		
QWS_Cooperation	Male	42	4.21	0.62	0.143	0.63
	Female	9	4.61	0.70		
Do you consider your work to be important?	Male	42	4.48	0.67	0.769	0.12
	Female	9	4.56	0.73		
Is your work appreciated by your company?	Male	42	4.05	0.91	0.516	0.20
	Female	9	4.22	0.67		
WS_Influence	Male	42	2.07	0.48	0.038	0.79
	Female	9	2.44	0.43		
WS_Stress_conflicts	Male	42	2.76	0.65	0.546	0.25
	Female	9	2.93	0.73		
WS_Stress_commitments	Male	42	2.59	0.68	0.804	0.06
	Female	9	2.63	0.35		
WS_Work_Leisure	Male	42	2.59	0.79	0.357	0.37
	Female	9	2.89	0.87		

Considering WEPL (work enhancement of personal life), the effect size is medium with a value of 0.63. The mean value for males = 2.76, and for female = 2.11. Considering the question 17 to 19 it is evident that males' jobs influence their personal lives more positively than it does for females.

Considering PLEW (personal life enhancement of work), the effect size is large with a value of 0.84. The mean value for males = 3.69 and for female = 2.96. Considering questions 20–22, it is evident that males' personal lives influence their work lives more positively than with females. However, the female mean value is also high, suggesting that females' personal lives also positively influence their work life.

Quality of work mental strain the effect size = 0.72. The effect size is between medium and large, and questions 34–36 is negative. The fact that it is negative indicate males are taking more mental strain at work and females are managing the strain better, or it influences them less.

Quality of work cooperation is high for males and females which is positive and shows that the cooperation between management and colleagues is positive. This was also highlighted in the descriptive statistics (see par. 4.4).

The work stress influence effect size = 0.79, which is high in this case the mean value of females is larger than the males. Therefore, the mean value shows that females experience more stress at work than males.

One must still consider that the sample is small, and that there were only nine females compared to 42 male participants.

**Table 4-6: Nominal group statistics reported**

Indicate your gender.		N	Mean	Std. Deviation	t-test p-value	Effect size
WLB_WEPL	Male	42	2.76	0.99	0.162	0.63
	Female	9	2.11	1.21		
WLB_PLEW	Male	42	3.69	0.83	0.072	0.84
	Female	9	2.96	1.02		
QWS_Mental_Strain	Male	42	2.03	0.75	0.018	0.72
	Female	9	1.52	0.47		
QWS_Cooperation	Male	42	4.21	0.62	0.143	0.63
	Female	9	4.61	0.70		
WS_Influence	Male	42	2.07	0.48	0.038	0.79
	Female	9	2.44	0.43		

**4.6 Correlation between instruments**

Table 4-8 shows all the correlations between work-life balance, quality of work, and work stress. Items 42 and 43 were excluded from the correlation because their reliability could not be proven. In the next section, the correlation between the abstracts will be discussed.

Hypotheses one and two, as stated in chapter one read as follows:

$H1_n$  = There is no statistical relationship between automation engineers' perceived work-life balance, quality of work, and occupational stress.

$H1_a$  = There is a statistical relationship between automation engineers' perceived work-life balance, quality of work, and occupational stress.

The research shows that hypothesis  $H1_a$  was proven correct for company A. The rest of this section discusses the influence and relationship between the abstracts. If the correlation value is 0.1, the correlation is small and there is no practically-visible relationship. If the correlation is 0.3, the correlation is medium which shows a practically-visible relationship. Finally, if the correlation

is 0.8 the correlation is high which indicates that there exists a practically-significant relationship between the factors.

**Table 4-7: Correlation between all three instruments**

		WLB WIPL	WLB PLIW	WLB WEPL	WLB PLEW	QWS Satisfaction	QWS Quality Work	QWS Mental Strain	QWS Com - munication	QWS Cooperation	WS Influence	WS Stress conflicts	WS Stress com - mitments	WS Work Leisure
WLB WIPL	Correlation Coefficient	1.000	.346*	-.384**	-.427**	-.620**	-.388**	0.063	0.211	0.153	.417**	.452**	.573**	-.748**
	Sig. (2-tailed)		0.013	0.005	0.002	0.000	0.005	0.662	0.138	0.285	0.002	0.001	0.000	0.000
WLB PLIW	Correlation Coefficient	.346*	1.000	-.533**	-.583**	-.641**	-.421**	-.404**	0.144	-0.069	.518**	0.239	.395**	-0.191
	Sig. (2-tailed)	0.013		0.000	0.000	0.000	0.002	0.003	0.312	0.629	0.000	0.091	0.004	0.179
WLB WEPL	Correlation Coefficient	-.384**	-.533**	1.000	.696**	.540**	.324*	0.272	0.137	0.011	-.544**	-0.236	-.409**	0.138
	Sig. (2-tailed)	0.005	0.000		0.000	0.000	0.020	0.053	0.339	0.939	0.000	0.096	0.003	0.333
WLB PLEW	Correlation Coefficient	-.427**	-.583**	.696**	1.000	.578**	.298*	0.248	-0.019	-0.078	-.513**	-.280*	-.451**	0.261
	Sig. (2-tailed)	0.002	0.000	0.000		0.000	0.034	0.080	0.892	0.586	0.000	0.046	0.001	0.064
QWS Satisfaction	Correlation Coefficient	-.620**	-.641**	.540**	.578**	1.000	.612**	0.174	-0.004	0.091	-.581**	-0.195	-.504**	.532**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.222	0.975	0.525	0.000	0.170	0.000	0.000
QWS Quality Work	Correlation Coefficient	-.388**	-.421**	.324*	.298*	.612**	1.000	0.078	-0.037	0.093	-.571**	-.383**	-0.235	.281*
	Sig. (2-tailed)	0.005	0.002	0.020	0.034	0.000		0.585	0.798	0.518	0.000	0.006	0.097	0.046
QWS Mental Strain	Correlation Coefficient	0.063	-.404**	0.272	0.248	0.174	0.078	1.000	0.099	0.165	-0.223	-0.124	-0.183	-0.115
	Sig. (2-tailed)	0.662	0.003	0.053	0.080	0.222	0.585		0.490	0.246	0.116	0.384	0.199	0.421
QWS Communication	Correlation Coefficient	0.211	0.144	0.137	-0.019	-0.004	-0.037	0.099	1.000	.336*	-0.006	0.112	0.100	-0.223
	Sig. (2-tailed)	0.138	0.312	0.339	0.892	0.975	0.798	0.490		0.016	0.969	0.433	0.485	0.115
QWS Cooperation	Correlation Coefficient	0.153	-0.069	0.011	-0.078	0.091	0.093	0.165	.336*	1.000	-0.004	-0.022	-0.070	-0.178
	Sig. (2-tailed)	0.285	0.629	0.939	0.586	0.525	0.518	0.246	0.016		0.976	0.879	0.623	0.211
WS Influence	Correlation Coefficient	.417**	.518**	-.544**	-.513**	-.581**	-.571**	-0.223	-0.006	-0.004	1.000	.475**	.334*	-0.146
	Sig. (2-tailed)	0.002	0.000	0.000	0.000	0.000	0.000	0.116	0.969	0.976		0.000	0.017	0.305
WS Stress conflicts	Correlation Coefficient	.452**	0.239	-0.236	-.280*	-0.195	-.383**	-0.124	0.112	-0.022	.475**	1.000	.445**	-0.225
	Sig. (2-tailed)	0.001	0.091	0.096	0.046	0.170	0.006	0.384	0.433	0.879	0.000		0.001	0.113
WS Stress commitments	Correlation Coefficient	.573**	.395**	-.409**	-.451**	-.504**	-0.235	-0.183	0.100	-0.070	.334*	.445**	1.000	-.498**
	Sig. (2-tailed)	0.000	0.004	0.003	0.001	0.000	0.097	0.199	0.485	0.623	0.017	0.001		0.000
WS Work Leisure	Correlation Coefficient	-.748**	-0.191	0.138	0.261	.532**	.281*	-0.115	-0.223	-0.178	-0.146	-0.225	-.498**	1.000
	Sig. (2-tailed)	0.000	0.179	0.333	0.064	0.000	0.046	0.421	0.115	0.211	0.305	0.113	0.000	

\*\*Correlation is significant at the 0.01 level (2-tailed).

\*Correlation is significant at the 0.05 level (2-tailed).

Most factors in the sample correlate with each other positively or negatively.

#### 4.6.1 Work-life balance and quality of work

This section discusses the correlation between the abstracts. A correlation of 1 means the two variables are linked positively. In contrast, if the correlation coefficient is 0 there is no correlation between two variables, and if the correlation is -1 the two variables are linked negatively. For example, a correlation of -0.620 means 62% of the variance in one variable, namely WLB\_WIPL

(Work-life balance – Work interference with personal life) is accounted for by the second variable which is QWS\_Satisfaction and the two items are negatively correlated.

The correlation between QWS\_Satisfaction (Quality of work satisfaction) and WLB\_WIPL (Work-life balance – Work interference with personal life) has a value of -0.620. If the QWS\_Satisfaction (a high mean value implying very satisfied) increases it means one is more satisfied with the work environment, which further entails that WLB\_WIPL will decrease showing a negative correlation. WLB\_PLIW and WLB\_WIPL denote negative aspects of work-life balance. The high correlation coefficient indicates that QWS\_Satisfaction influences WLB\_WIPL, while the same is true for QWS\_Satisfaction and WLB\_PILW.

On the other hand, if the QWS\_Satisfaction increases the WLB\_WEPL increases, showing a positive correlation. If a person is more satisfied with their job the work enhancement of his/her personal life is more positive. The correlation is the same for QWS\_Satisfaction and WLB\_PLEW (Work-life – Personal enhancement of work-life). Therefore, both WLB\_WEPL and WLB\_PLEW are positive items.

QWS\_Mobbing is a negative aspect in the work environment. Mobbing is a psychological term which comprises bullying. A high mean value for mobbing means that this aspect is not a problematic area in the company. The influence of QWS\_Mobbing on work-life balance shows a negative medium correlation between QWS\_Mobbing, WLB\_WIPL and WLB\_PLIW. The mean value of WQS\_Mobbing is high, indicating that there is not much mobbing taking place in company A, which is positive for employees and the employer. As the QWS\_Mobbing mean value increases, it positively correlates with WLB\_WEPL and WLB\_PLEW. The result indicates that if mobbing is not present personal life and work-life enhancement increase.

QWS\_Mental\_Strain correlates positively with WLB\_WIPL, namely 0.063. This close-to-zero correlation indicates that if WIPL increases, one's mental strain increases, although the influence is not very significant. If one experiences strain at work, it will negatively influence WLB\_PLIW. The negative effect can be seen in the literature review (see par. 2.9) that work or job demands will conflict with one's ability, needs and resources, and the strain put on a person which manifests as job stress (Leka *et al.*, 2004). The mean value of QWS\_Mental\_Strain is low, which indicates a negative correlation. Because of the negativity of mental strain on a person a positive correlation exists between enhancement of work and personal life, which means as mental strain increases work-life and personal enhancement decrease. Mental strain also harms personal life, meaning that as the strain at work becomes more, it will have a more significant influence on personal life, interfering with work-life.

The JD-R model shows that communication between employer and employee is an essential resource in the workplace (Steffgen *et al.*, 2015). The correlation between communication is small for all the work-life factors. Furthermore, the correlation is positive except for WLB\_PLEW, with a correlation value of -0.019, close to zero, indicating no significant correlation.

The correlation between the QWS\_Cooperation and work-life factor is small, with WLB\_WIPL and WLB\_WEPL being positive, while WLB\_PLIW and WLB\_PLEW have a negative correlation.

**Table 4-8: Correlation between work-life balance and quality of work**

Work-life balance correlation to the quality of work		WLB_WIPL	WLB_PLIW	WLB_WEPL	WLB_PLEW
QWS_Satisfaction	Correlation Coefficient	-.620**	-.641**	.540**	.578**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	51	51	51	51
QWS_Quality_ Work - Mobbing	Correlation Coefficient	-.388**	-.421**	.324*	.298*
	Sig. (2-tailed)	0.005	0.002	0.020	0.034
	N	51	51	51	51
QWS_Mental_ Strain	Correlation Coefficient	0.063	-.404**	0.272	0.248
	Sig. (2-tailed)	0.662	0.003	0.053	0.080
	N	51	51	51	51
QWS_ Communication	Correlation Coefficient	0.211	0.144	0.137	-0.019
	Sig. (2-tailed)	0.138	0.312	0.339	0.892
	N	51	51	51	51
QWS_Cooperation	Correlation Coefficient	0.153	-0.069	0.011	-0.078
	Sig. (2-tailed)	0.285	0.629	0.939	0.586
	N	51	51	51	51

#### 4.6.2 Work-life balance and occupational stress

The employees' influence on work is a positive aspect with an above-average mean value. The WS\_Influence correlates positively with a medium value to WLB\_WIPL and WLB\_PLIW. When the influence of employees becomes more significant at work, they have better control over their job and task. The WS\_Influence has a negative medium correlation to WLB\_WEPL and WLB\_PLEW. If the influence and control on deciding and finishing a task are low, the work enhancement of personal life and personal life enhancement of work-life are negatively

influenced. Lack of control in the workplace negatively influences job and personal life enhancement.

In item 48, 88% of the participants in company A indicated that their workload has increased, which is a negative factor. Most of the participants who said their workload increased also indicated putting high demand on themselves. All of them indicated that they often get engaged in their work. WS\_Stress\_Conflict is positively correlated to WLB\_WIPL with a correlation coefficient of 0.452 which is above average. In practice this means that if the conflict at work becomes more intense, the influence of work on personal life become more intense. The same is true for WLB\_PLIW, although the correlation is not very high. WS\_Stress\_conflicts are negatively correlated to WLB\_WEPL and WLB\_PLEW with a low correlation coefficient.

When the conflict at work is high, it means that the enhancement of one's personal life and work life is low. When the workload increases goals become unclear, uncertainty related to assignments increases, conflict intensifies, and more stress is put on the individual. In this case, the influence that work has on the personal life is negative and the job does not enhance one's personal life.

WS\_Stress\_Commitment is a negative factor, and 73% of the participants indicated that they take up more responsibility at work than they ought to. However, they also indicated that the workload has increased, the demand they put on themselves was high, and they got engaged in their work. The high job demand and responsibility were found to be stressful.

WS\_Stress\_Commitment is positively correlated to WLB\_WIPL and WLB\_PLIW. Both are negative factors. The correlation is medium and indicates that if the commitment at work becomes more and one gets more engaged in work, the influence the job has on personal life is becoming more, and that is negative. WS\_Stress\_Commitment correlated negatively to WLB\_WEPL and WLB\_PLEW with a medium correlation of -0.49 and -0.45. The correlation indicates that if stress increases at work, the enhancement of work on people's personal lives decreases. A balanced lifestyle means a person's job needs to support and enhance one's personal life and vice versa.

WS\_Work\_Leisure is a positive factor—the items were mainly answered positively. However, WS\_Work\_Leisure is negatively correlated to WLB\_WIPL and WLB\_PLIW with a correlation factor of -0.748 and -0.191. It is clear that the correlation for WS\_Work\_Leisure to WLB\_WIPL is remarkably high and is the strongest correlation between the two items in the research. The implication is that when there is less time to spend with family and friends, work-life interferes more and more with time for leisure. This correlation shows that less time for leisure presents a substantial interference and indicates the need to work towards a more balanced lifestyle.

Although the positive correlation between WS\_Work\_Leisure, WLB\_WEPL and WLB\_PLEW is relatively low, it shows that decreasing time spent at/with work and deliberately spend more time with family and friends can enhance one's personal life and work life.

**Table 4-9: Correlation between work-life balance and occupational stress**

Work-life balance correlation to occupation stress		WLB_WIPL	WLB_PLIW	WLB_WEPL	WLB_PLEW
WS_Influence	Correlation Coefficient	.417**	.518**	-.544**	-.513**
	Sig. (2-tailed)	0.002	0.000	0.000	0.000
	N	51	51	51	51
WS_Stress_Conflicts	Correlation Coefficient	.452**	0.239	-0.236	-.280*
	Sig. (2-tailed)	0.001	0.091	0.096	0.046
	N	51	51	51	51
WS_Stress_Commitments	Correlation Coefficient	.573**	.395**	-.409**	-.451**
	Sig. (2-tailed)	0.000	0.004	0.003	0.001
	N	51	51	51	51
WS_Work_Leisure	Correlation Coefficient	-.748**	-0.191	0.138	0.261
	Sig. (2-tailed)	0.000	0.179	0.333	0.064
	N	51	51	51	51

**4.6.3 Quality of work and occupational stress**

The correlation between quality of work and work stress shows 80% negative correlation between the items. Table 4.10 is a summary of the correlation results from table 4.11.

**Table 4-10: Correlation between quality of work and occupation stress compared with each other**

Factors		Correlation	Correlation Coefficient	Small, medium, or high correlation	Remarks – What happens in practice?
Work Stress Influence	QWS Satisfaction	Negative	-0.581	Medium	The more substantial the influence is on an individual's work, the more satisfied the individual is with his or her job.

Factors		Correlation	Correlation Coefficient	Small, medium, or high correlation	Remarks – What happens in practice?
	QWS Mobbing	Negative	-0.571	Medium	When influence decreases, mobbing or bullying has the potential to increase.
	QWS Mental Strain	Negative	-0.223	Small	Although the correlation is low, it can put more mental strain on the individual.
	QWS Communication	Negative	-0.006	Very small, almost zero	The correlation between influence at work, communication, and cooperation is almost zero, meaning the abstracts do not influence each other.
	QWS Cooperation	Negative	-0.004		
Work Stress Conflict	QWS Satisfaction	Negative	-0.195	Small	If the conflict at work increases, it will decrease satisfaction with the job.
	QWS Mobbing	Negative	-0.383	Medium	Conflict is related to mobbing because conflict can lead to bullying at work. This can become a detrimental issue at work. However, in the company used for the research conflict and mobbing are very low, which is positive.
	QWS Mental Strain	Negative	-0.124	Small	Conflict at work will put more mental strain on the individual.
	QWS Communication	Positive	0.112	Small	Conflict can lead to a lack of communication in the workplace.

Factors		Correlation	Correlation Coefficient	Small, medium, or high correlation	Remarks – What happens in practice?
	QWS Cooperation.	Negative	-0.022	Very small, almost zero	The correlation between conflict at work and cooperation is almost zero meaning the abstracts do not influence each other.
Work Stress Commitment	QWS Satisfaction	Negative	-0.504	Medium	This measurement shows that 63% of the participants see the increased workload as stressful and 13% as very stressful. If workload increases, the satisfaction with the job goes down.
	QWS Mobbing	Negative	-0.235	Small	Commitment has a minor influence on mobbing in the workplace.
	QWS Mental Strain	Negative	-0.183	Small	A lack of commitment can lead to more mental strain.
	QWS Communication	Positive	0.10	Small	Commitment can lead to a lack of communication in the workplace.
	QWS Cooperation	Negative	-0.070	Very small, almost zero	The correlation between commitment to work and cooperation is almost zero meaning the abstracts do not influence each other
	QWS Satisfaction	Positive	0.532	Medium	If there is time to spend with family and friends, it positively influences work satisfaction and prevent mobbing in the workplace.
QWS Mobbing	Positive	0.281	Small		

Factors		Correlation	Correlation Coefficient	Small, medium, or high correlation	Remarks – What happens in practice?
	QWS Mental Strain	Negative	-0.115	Small	Lack of balance related to time management puts more mental strain on the individual and lowers communication and cooperation in the organisation.
	QWS Communication	Negative	-0.223	Small	
	QWS Cooperation	Negative	-0.178	Small	

**Table 4-11: Correlation between quality of work and occupational stress**

Quality of work correlation to work stress		QWS_Satisfaction	QWS_Quality_Work - Mobbing	QWS_Mental Strain	QWS_Communication	QWS_Cooperation
WS_Influence	Correlation Coefficient	-.581**	-.571**	-0.223	-0.006	-0.004
	Sig. (2-tailed)	0.000	0.000	0.116	0.969	0.976
	N	51	51	51	51	51
WS_Stress_Conflicts	Correlation Coefficient	-0.195	-.383**	-0.124	0.112	-0.022
	Sig. (2-tailed)	0.170	0.006	0.384	0.433	0.879
	N	51	51	51	51	51
WS_Stress_Commitments	Correlation Coefficient	-.504**	-0.235	-0.183	0.100	-0.070
	Sig. (2-tailed)	0.000	0.097	0.199	0.485	0.623
	N	51	51	51	51	51
WS_Work_Leisure	Correlation Coefficient	.532**	.281*	-0.115	-0.223	-0.178
	Sig. (2-tailed)	0.000	0.046	0.421	0.115	0.211
	N	51	51	51	51	51

#### 4.7 SUMMARY

The results indicate that biographical information such as age and work experience do not influence balancing work and non-work life. The main reason for this may be that the engineers work in the same industry, in the same company, and under the same circumstances. However, this needs to be researched further to make an informed decision.

Considering the results, it is clear that engineers in company A experience work stress. However, in general they are satisfied with the company's working environment. The questionnaire lends itself to be used in other companies to measure the employees' satisfaction in a company.

## **CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS**

### **5.1 Conclusions from the study**

The literature that was used for the research investigated the validity and reliability of the three instruments. The instruments have proven reliable and its influence on one another was significant even if the sample group was small.

According to the research, a work-life balance can be positive and reachable if one sets goals, manages time, schedules, plans, and works according to a well-developed plan. It takes time and insight to condition oneself in the situation (Steffgen *et al.*, 2015:14991). The fact is that while busy with a project in the field, it is not always possible. Most of the time engineers are busy with projects for a certain period which makes it impossible to manage work-life balance due to the timeframe and deadline of the project. However, engineers are not always busy in the field with projects, during which time it is possible to balance their work and lives better. It is important for engineers to pay attention to their physical health because certain symptoms can be indicative of a lack of work-life balance.

### **5.2 The research objective**

The research objective was to indicate and prove a relationship between work-life balance, quality of work, and occupational stress. The research has practical implications because companies have work-life, quality of work, and occupational stress programmes implemented but do not have a validated measuring instrument to understand and manage the company's position and its employees. This research shows that the instruments are reliable even if the sample is small. Using the instruments, the company can get a good idea of its standing related to the different dimensions.

### **5.3 Recommendation and practical implementations**

The workforce age entering the companies (ages between 20 and 29) leaves an age gap, and there is a shortage of young engineers with experience in the field. Therefore, practical training and keeping new engineers in the company is essential for the company's survival. In addition, training new engineers to manage time and maintain a healthy balance between work and personal life is vital. The balance between males and females is essential to consider for the future.

The company and employees can work together to schedule the workload and improve the environment to support a better work-life balance and improve productivity and health.

#### **5.4 Areas of future study**

Additional research in the work non-work area is needed to measure the interference or balance between work and non-work activities that focus not only on family responsibilities. Well-being must also be looked at from the perspective of job satisfaction or job quality and its influence on a balanced lifestyle. Working conditions can also influence the quality of work and a balanced lifestyle therefore it will be worthwhile to include this aspect in future studies.

According to SPSS software, the reliability of two items could not be proven (questions 42 “Do you consider your work to be important?” and 43 “Is your work appreciated by your company?”). However, these two questions can be asked differently but not necessarily excluded from the research.

The questions in the work stress questionnaire where the respondent must indicate if he is not answering a question positively and then move on to another question or continuous with the second part can be reformulated to lessen the confusion with answering the questions.

#### **5.5 Limitations of the study**

Firstly, the two appraisal items in the quality of work questionnaire, namely “Do you consider your work to be important?” and “Is your work appreciated by your company?” are not as reliable as desired. The research that validated the instrument showed the same results (Steffgen *et al.*, 2015).

Secondly, the study focused on one engineering field in one company. It will be interesting to include more engineering fields from companies involved in big projects and engineering personnel in the manufacturing sector, as was mentioned throughout the manuscript. Thirdly, the study's sample population was small; therefore, future studies must be done on larger sample sizes. Finally, the study is a cross-sectional study that only focuses on the engineers. It will be an excellent exercise to include co-workers or family perspectives in the future.

#### **5.6 Conclusion**

The study sought to evaluate the worth of three instruments developed to assess employees' work-life balance, quality of work, and occupational stress within the automation engineering work setting. As a result, the three instruments were found to have acceptable validity and reliability. This indicates that the instruments can provide the company's management team with a valuable tool for determining the working environment and employees' perception of the quality of work.

A better understanding for attaining best practices can help the human resources department manage the working environment so that it may limit occupational stress under employees. In addition, the research can help determine the boundaries between work and life in general and help the employee and the employer manage the balance better.

To balance one's personal life, work-life will not happen independently. It is the individual's responsibility to spend quality time on all aspects of life, not only quantity time in one aspect. A balanced lifestyle that promotes and maintains stress management should become routine for employees and employers in today's busy career-driven environment.

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# ANNEXURES A EMC-REC FEEDBACK



NORTH-WEST UNIVERSITY  
YUNIBESITHI YA BOKONE-BOPHIRIMA  
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom  
South Africa 2520

Tel: 018 299-1111/2222  
Web: <http://www.nwu.ac.za>

Economic and Management Sciences Research  
Ethics Committee (EMS-REC)

11 August 2021

Prof PA Botha  
*Per e-mail*  
Dear Prof Botha

**EMS-REC FEEDBACK: 28052021(Round Robin Appeal)**  
**Student: Pretorius, JN (33464154)(NWU-00862-21-A4)**  
**Applicant: Prof PA Botha - MBA**

Your ethics application on, *Investigating the influence of work-life balance on the quality of life and occupational stress of automation engineers*, which served Round Robin, refers.

**Outcome:**

Approved as a minimal risk study. A number **NWU-00862-21-A4** is given for one year of ethics clearance.

Please note that the ethics approval of this application is subject to the Covid-19 protocols.


Kind regards,

**Prof Mark Rathbone**  
**Chairperson: Economic and Management Sciences Research Ethics Committee**  
**(EMS-REC)**

# ANNEXURES B PERMISSION LETTERS TO USE QUESTIONNAIRES

## Section 2 - Permission to use Work / Nonwork Scale instrument

NWU CORONA VIRUS: <http://www.nwu.ac.za/coronavirus/>  
Vrywaringsklousule / Disclaimer: <http://www.nwu.ac.za/it/gov-man/disclaimer.html>




\\\"Fisher,Gwen\\\" &lt;Gwen.Fisher@colostate.edu&gt;  
3/1/2021 5:57 PM

I am on sabbatical during the Spring 2021 semester and therefore not engaged in department happenings or university committees. Thank you for your patience if you are awaiting a response.

Thank you,

Gwen



\\\"Fisher,Gwen\\\" &lt;Gwen.Fisher@colostate.edu&gt;  
3/6/2021 7:31 AM

Thank you so much for your interest in this scale. You are most welcome to use this measure for your research. Please cite the attached paper.

Best regards,

Gwen

 [Fisher Bulger Smith 2009.pdf](#)

### Section 3 - Permission to use quality of work instrument

**johanpretorius48@yahoo.com**

---

**From:** Petrus Botha <Petrus.Botha@nwu.ac.za>  
**Sent:** Wednesday, 23 June 2021 11:04  
**To:** Georges STEFFGEN; johanpretorius48@yahoo.com  
**Subject:** RE: Permission to use your quality of work instrument

Dear Prof Steffgen. Thank you so much. Will you be so kind to send us the instrument with the scoring instructions. Thank you

>>> Georges STEFFGEN <georges.steffgen@uni.lu> 6/23/2021 10:49 AM >>>

Dear Professor Botha,

Thank you very much for your interest in our research.  
We feel honored that your team will use our questionnaires.  
Could I ask you to send us the findings of your planned study?  
Thank you in advance.

Best regards from Luxembourg,  
Georges Steffgen

---

**From:** Petrus Botha <Petrus.Botha@nwu.ac.za>  
**Sent:** Wednesday, June 23, 2021 10:27 AM  
**To:** Georges STEFFGEN <georges.steffgen@uni.lu>; johanpretorius48@yahoo.com  
**Subject:** Permission to use your quality of work instrument

Dear Professor Steffgen

One of my MBA students, Mr Johan Pretorius, investigates the influence of work-life balance on the quality of work-life and occupational stress of automation engineers Will you be so kind to permit us to use your quality of work questionnaire in his study?

Thank you for your kind attention and consideration.

Yours sincerely

Professor PA Botha

Professor P.A. Botha  
North-West University  
Faculty of Economic and Management Sciences  
North-West Business School  
Palmer Cresant  
Leopard Park  
Mmabatho 2735  
Tel: 018 3892089  
Cell: 0833268542  
Email: [petrus.botha@nwu.ac.za](mailto:petrus.botha@nwu.ac.za)

## Section 4 - Permission to use work stress instrument

**johanpretorius48@yahoo.com**

---

Subject: FW: VB: The Work stress Questionnaire  
Attachments: Franz et al 2019.pdf; Holmgren\_BMC.pdf; Holmgren\_Early ID 2013.pdf; Holmgren\_women.pdf; Holmgren\_WSQ-development.pdf; WSQ score\_Holmgren.pdf; Botha, Petrus.vcf

NWU CORONA VIRUS: <http://www.nwu.ac.za/coronavirus/>  
Vrywaringsklousule / Disclaimer: <http://www.nwu.ac.za/it/gov-man/disclaimer.html>  
>>> Kristina Holmgren <[kristina.holmgren@neuro.gu.se](mailto:kristina.holmgren@neuro.gu.se)> 5/31/2021 10:00 AM >>>

Yes, you are welcome to use the Work Stress Questionnaire (WSQ) in your thesis as long as you make references to our published papers.

We also look forward to take part of your research! More information on our research you will find on the webpage: <https://www.gu.se/forskning/tidas>

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3. Holmgren K, Dahlin Ivanoff S, Bjorkelund C, Hensing G. The prevalence of work-related stress, and its association with self-perceived health and sick-leave, in a population of employed Swedish women. BMC Public Health. 2009 Mar 2;9:73.
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5. Holmgren K, Dahlin Ivanoff S. Women on sickness absence--views of possibilities and obstacles for returning to work. A focus group study. Disabil Rehabil 2004;26(4):213-2.

All the best,

---

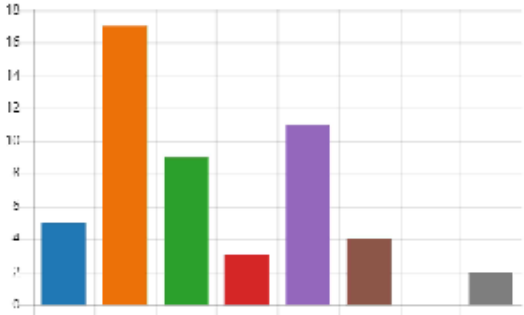
Kristina Holmgren, professor  
Department of Health and Rehabilitation  
Institute of Neuroscience and Physiology  
Sahlgrenska Academy  
University of Gothenburg  
Box 455  
S-405 30 Gothenburg  
Tel +46766-185726  
Email [kristina.holmgren@neuro.gu.se](mailto:kristina.holmgren@neuro.gu.se)  
Hemsida <https://www.gu.se/forskning/tidas>

# ANNEXURES C COPY OF QUESTIONNAIRES AND SUMMARY OF RESULTS

The questionnaire and the results from Microsoft Forms questions. The document is inserted as a PDF. To open the complete document, double click on the pdf below.

### 4. Highest qualification level.

National Certificate (Metric)	5
National Diploma	17
B-Tech Degree	9
Post-Graduate Diploma	3
Honour's Degree	11
Master's Degree / MEng	4
PhD	0
Other	2



### 5. Indicate for which company are you working.

Moore Process Control	51
PCS Global	0
Enviroblue	0
Other	0



100% of people answered Moore Process Control for this question, and the majority answered "Yes" for Question 54.



# ANNEXURES D STATISTICAL DATA RELIABILITY

Reliability - Section 2 Art 19 Work-Life Balance Survey							
Notes							
Output Created	20-OCT-2021 07:27:23						
Comments							
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	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
Syntax	RELIABILITY /VARIABLES=v6 v7 v8 v9 v10 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.						
Resources	Processor Time	00:00:00,00					
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.910	0.910	5					
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.668	0.490	0.774	0.283	1.578	0.008	5
<b>Item-Total Statistics - Work Interference with Personal Life</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
I come home from work too tired to do things I would like to do	11.49	14.335	0.649	0.458	0.914		
My job makes it difficult to maintain the kind of personal life I would like.	11.73	12.683	0.852	0.729	0.872		
I often neglect my personal needs because of the demands of my work.	11.73	12.643	0.785	0.638	0.888		
My personal life suffers because of my work.	12.08	12.794	0.837	0.708	0.876		
I have to miss out on important personal activities due to the amount of time I spend doing work.	12.12	13.946	0.743	0.597	0.896		

Notes							
Output Created	20-OCT-2021 07:28:47						
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	N of Rows in Working Data File	51					
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
Syntax	RELIABILITY /VARIABLES=v11 v12 v13 v14 v15 v16 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.						
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.725	0.745	6					
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.327	0.106	0.598	0.492	5.630	0.020	6
<b>Item-Total Statistics - Personal Life Interference with Work</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
My personal life drains me of the energy I need to do my job	8.29	6.012	0.426	0.394	0.705		
My work suffers because of everything going on in my personal life.	8.43	6.570	0.571	0.482	0.662		
I would devote more time to work if it were not for everything I have going on in my personal life.	8.49	6.655	0.325	0.205	0.732		
I am too tired to be effective at work because of the things I have going on in my personal life.	8.59	6.687	0.481	0.289	0.683		
When I am at work, I worry about things I need to do outside work.	7.94	6.416	0.443	0.333	0.693		
I have difficulty getting my work done because I am preoccupied with personal matters at work.	8.55	6.413	0.610	0.459	0.651		

**Reliability - Section 2 Art 19 Work-Life Balance Survey**

Notes							
Output Created		20-OCT-2021 07:30:30					
Comments							
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
			N	%			
Cases	Valid		51	100.0			
	Excluded <sup>a</sup>		0	0.0			
	Total		51	100.0			
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items				
	0.811	0.813	3				
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.592	0.523	0.644	0.121	1.231	0.003	3
<b>Item-Total Statistics - Work Enhancement of Personal Life</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
My job gives me the energy to pursue activities outside of work that is important to me.	5.55	5.173	0.648	0.442	0.755		
Because of my job, I am in a better mood at home.	5.08	4.714	0.716	0.516	0.684		
The things I do at work help me deal with personal and practical issues at home.	5.25	4.674	0.625	0.399	0.783		

Notes							
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Comments							
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Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
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Syntax	RELIABILITY /VARIABLES=v20 v21 v22 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.						
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
Cases		N	%				
	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.832	0.834	3					
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.625	0.503	0.715	0.211	1.420	0.010	3
<b>Item-Total Statistics - Personal Life Enhancement on Work</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
I am in a better mood at work because of everything I have going for me in my personal life.	7.29	3.532	0.632	0.436	0.831		
My personal life gives me the energy to do my job.	7.02	3.180	0.789	0.630	0.666		
My personal life helps me relax and feel ready for the next day's work.	7.06	3.896	0.667	0.513	0.794		

Reliability - Section 3 Art 22 Quality of Work							
<b>Notes</b>							
Output Created	20-OCT-2021 07:31:06						
Comments							
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	50	98.0				
	Excluded <sup>a</sup>	1	2.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics - Satisfaction and Respect</b>							
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items	N of Items				
0.904		0.904	6				
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.611	0.443	0.787	0.344	1.776	0.012	6
<b>Item-Total Statistics</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Are you satisfied with your work?	19.62	15.098	0.804	0.700	0.876		
Are you satisfied with your work conditions?	19.92	14.402	0.775	0.664	0.881		
Does your company or institution respect its employees' rights?	19.08	16.320	0.670	0.520	0.896		
Are you satisfied with your work climate?	19.54	14.784	0.860	0.771	0.868		
If you had the choice, would you work a second time in the same company/institution?	19.48	14.785	0.727	0.565	0.889		
Are you respected by your superior at work?	19.16	16.790	0.595	0.400	0.906		

**Reliability - Section 3 Art 22 Quality of Work**

Notes							
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Comments							
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	Matrix Input						
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<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
Cases		N	%				
	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.720	0.717	5					
<b>Summary Item Statistics - Mobbing</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.336	0.078	0.560	0.483	7.219	0.023	5
<b>Item-Total Statistics -</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
How often is your work criticised by your colleagues or your superior?	7.69	7.460	0.286	0.223	0.737		
How ofthe are you ridiculed by your colleagues or your superior in front of others?	8.31	6.340	0.546	0.344	0.650		
How often are you ignored at work by your colleagues or your superior?	7.94	5.256	0.596	0.505	0.621		
How often does your superior assign you duties that seem absurd?	7.88	5.946	0.486	0.324	0.671		
How often do you have conflicts with colleagues or other people with whom you are in contact at work?	7.94	6.416	0.498	0.348	0.667		

**Reliability - Section 3 Art 22 Quality of Work**

Notes								
Output Created		20-OCT-2021 07:57:49						
Comments								
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	Matrix Input							
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.						
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.						
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[DataSet9] C:\Pretorius_Johan_Okt21\PretoriusJ.sav								
<b>Scale: ALL VARIABLES</b>								
<b>Case Processing Summary</b>								
		N		%				
Cases	Valid	51		100.0				
	Excluded <sup>a</sup>	0		0.0				
	Total	51		100.0				
a. Listwise deletion based on all variables in the procedure.								
<b>Reliability Statistics</b>								
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items		N of Items				
0.815		0.822		3				
<b>Summary Item Statistics</b>								
		Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations		0.606	0.567	0.681	0.114	1.201	0.003	3
<b>Item-Total Statistics - Mental strain at work</b>								
		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
How often do you have to concentrate yourself on several diverse activities at once?		8.35	2.233	0.620	0.385	0.804		
How often is your work intellectually demanding (for instance: having to concentrate for a long time)?		8.02	2.220	0.699	0.514	0.712		
How often do you work under pressure?		7.98	2.580	0.702	0.510	0.726		

**Reliability - Section 3 Art 22 Quality of Work**

Notes							
Output Created	20-OCT-2021 08:00:05						
Comments							
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	Weight	<none>					
	Split File	<none>					
	N of Rows in Working Data File	51					
	Matrix Input						
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
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Resources	Processor Time	00:00:00,00					
	Elapsed Time	00:00:00,00					
<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.644	0.655	3					
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.388	0.263	0.548	0.285	2.083	0.017	3
<b>Item-Total Statistics - Communication and Feedback</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Do you participate in the decisions made by your company?	6.57	3.650	0.345	0.131	0.701		
Are you informed of the internal decisions, changes, and development plans of your company?	6.10	3.210	0.477	0.306	0.515		
Do you receive feedback regarding your work from your superior or from your colleagues?	6.20	3.521	0.566	0.347	0.417		

**Reliability - Section 3 Art 22 Quality of Work**

Notes							
Output Created	20-OCT-2021 08:00:24						
Comments							
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	N of Rows in Working Data File	51					
	Matrix Input						
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
Syntax	RELIABILITY /VARIABLES=v40 v41 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.						
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	Elapsed Time	00:00:00,00					
<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	51	100.0				
	Excluded <sup>a</sup>	0	0.0				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
0.678	0.678	2					
<b>Summary Item Statistics</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.513	0.513	0.513	0.000	1.000	0.000	2
<b>Item-Total Statistics - Cooperation</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Do you cooperate with your colleagues at work?	4.14	0.521	0.513	0.263			
Do your colleagues support you at work?	4.43	0.570	0.513	0.263			

Reliability -Section 4 Art 20 Work Stress								
<b>Notes</b>								
Output Created		20-OCT-2021 08:00:37						
Comments								
Input	Data	C:\Pretorius_Johan_Okt21\Pre toriusJ.sav						
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	Weight	<none>						
	Split File	<none>						
	N of Rows in Working Data File	51						
	Matrix Input							
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.						
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.						
Syntax	RELIABILITY /VARIABLES=v42 v43 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.							
Resources	Processor Time	00:00:00,00						
	Elapsed Time	00:00:00,00						
<b>Scale: ALL VARIABLES</b>								
<b>Case Processing Summary</b>								
		N		%				
Cases	Valid	51		100.0				
	Excluded <sup>a</sup>	0		0.0				
	Total	51		100.0				
a. Listwise deletion based on all variables in the procedure.								
<b>Reliability Statistics</b>								
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items		N of Items				
0.066		0.069		2				
<b>Summary Item Statistics - Appraisal</b>								
		Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations		0.035	0.035	0.035	0.000	1.000	0.000	2
<b>Item-Total Statistics</b>								
		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Do you consider your work to be important?		4.08	0.754	0.035	0.001			
Is your work appreciated by your company?		4.49	0.455	0.035	0.001			

Reliability - Section 3 Art 20 Work Stress								
<b>Notes</b>								
Output Created	20-OCT-2021 08:04:52							
Comments								
Input	Data	C:\Pretorius_Johan_Okt21\Pre toriusJ.sav						
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	Split File	<none>						
	N of Rows in Working Data File	51						
	Matrix Input							
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.						
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.						
Syntax	RELIABILITY /VARIABLES=v44 v45 v46 v47 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.							
Resources	Processor Time	00:00:00,00						
	Elapsed Time	00:00:00,01						
<b>Scale: ALL VARIABLES</b>								
<b>Case Processing Summary</b>								
		N		%				
Cases	Valid	51		100.0				
	Excluded <sup>a</sup>	0		0.0				
	Total	51		100.0				
a. Listwise deletion based on all variables in the procedure.								
<b>Reliability Statistics</b>								
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items		N of Items				
0.735		0.726		4				
<b>Summary Item Statistics - Influence at Work</b>								
		Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations		0.399	0.060	0.608	0.548	10.172	0.042	4
<b>Item-Total Statistics</b>								
		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Do you have time to finish your assignments?		6.49	3.055	0.263	0.176	0.796		
Do you have the possibility to influence decisions at work?		6.27	2.163	0.548	0.462	0.664		
Does your supervisor consider your views?		6.65	2.273	0.659	0.460	0.603		
Can you decide on your work pace?		6.24	1.944	0.669	0.447	0.582		

**Reliability - Section 3 Art 20 Work Stress**

Notes							
Output Created	20-OCT-2021 08:05:18						
Comments							
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	Weight	<none>					
	Split File	<none>					
	N of Rows in Working Data File	51					
	Matrix Input						
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
Syntax	RELIABILITY /VARIABLES=v49 v51 v53 v55 v57 v59 v61 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.						
Resources	Processor Time	00:00:00,00					
	Elapsed Time	00:00:00,00					
<b>Warnings</b>							
The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.							
<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
Cases		N	%				
	Valid	2	3.9				
	Excluded <sup>a</sup>	49	96.1				
		Total	51				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items					
1.000	1.000	7					
<b>Summary Item Statistics - Organisation and Conflict</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	1.000	1.000	1.000	0.000	1.000	0.000	7
<b>Item-Total Statistics</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
If question 48 was yes : Do you perceive your increased workload as stressful?	9.00	18.000	1.000		1.000		
If question 50 is partly or no: Do you perceive unclear goals as stressful?	9.00	18.000	1.000		1.000		
If question 52 is partly or no: Do you perceive not knowing which assignments your work tasks include as stressful?	9.00	18.000	1.000		1.000		
If question 54 is partly or no: Do you perceive not knowing who is making decisions concerning your workplace as stressful?	9.00	18.000	1.000		1.000		
If question 56 is yes: Do you perceive conflict at work as stressful?*	9.00	18.000	1.000		1.000		
If question 58 is yes: Do you perceive involvement in conflict at work as stressful?	9.00	18.000	1.000		1.000		
Do you put high demands on yourself at work?	9.00	18.000	1.000		1.000		

**Reliability - Section 3 Art 20 Work Stress**

Notes							
Output Created	20-OCT-2021 08:07:00						
Comments							
Input	Data	C:\Pretorius_Johan_Okt21\Pre toriusJ.sav					
	Active Dataset	DataSet9					
	Filter	<none>					
	Weight	<none>					
	Split File	<none>					
	N of Rows in Working Data File	51					
	Matrix Input						
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.					
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.					
Syntax	<pre> RELIABILITY /VARIABLES=v63 v65 v67 v69 v71 v73 v75 /SCALE(ALL VARIABLES) ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.                     </pre>						
Resources	Processor Time	00:00:00,00					
	Elapsed Time	00:00:00,00					
<b>Scale: ALL VARIABLES</b>							
<b>Case Processing Summary</b>							
		N	%				
Cases	Valid	22	43.1				
	Excluded <sup>a</sup>	29	56.9				
	Total	51	100.0				
a. Listwise deletion based on all variables in the procedure.							
<b>Reliability Statistics</b>							
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items	N of Items				
0.906		0.915	7				
<b>Summary Item Statistics - Individual demand and commitment</b>							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	0.605	0.316	0.796	0.480	2.520	0.017	7
<b>Item-Total Statistics</b>							
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
If question 62 is yes: Do you perceive putting high demand on yourself as 3?	15.91	15.134	0.838	0.773	0.882		
If question 64 is yes: Do you perceive engagement in your work as 3?	16.32	15.561	0.610	0.585	0.904		
If question 66 is yes or partly: Do you perceive thinking of work after a workday as 3?	16.09	14.658	0.819	0.864	0.881		
If question 68 is yes or partly: Do you perceive not setting limits to assignments as 3?	16.27	14.494	0.808	0.785	0.882		
If question 70 is yes: Do you perceive taking on more responsibility as 3?	16.09	15.706	0.694	0.665	0.895		
If question 72 is yes or partly: Do you perceive working after hours as 3?	16.23	15.136	0.768	0.601	0.888		
If question 74 is yes or partly: Do you perceive hard to sleep as 3?	16.00	14.095	0.614	0.655	0.913		

Reliability - Section 3 Art 20 Work Stress								
<b>Notes</b>								
Output Created		20-OCT-2021 08:07:18						
Comments								
Input	Data	C:\Pretorius_Johan_Okt21\Pre toriusJ.sav						
	Active Dataset	DataSet9						
	Filter	<none>						
	Weight	<none>						
	Split File	<none>						
	N of Rows in Working Data File	51						
	Matrix Input							
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.						
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.						
Syntax	RELIABILITY /VARIABLES=v76 v77 v78 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /SUMMARY=TOTAL CORR.							
Resources	Processor Time	00:00:00,00						
	Elapsed Time	00:00:00,00						
<b>Scale: ALL VARIABLES</b>								
<b>Case Processing Summary</b>								
		N		%				
Cases	Valid	50		98.0				
	Excluded <sup>a</sup>	1		2.0				
	Total	51		100.0				
a. Listwise deletion based on all variables in the procedure.								
<b>Reliability Statistics</b>								
Cronbach's Alpha		Cronbach's Alpha Based on Standardized Items		N of Items				
0.931		0.932		3				
<b>Summary Item Statistics</b>								
		Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations		0.820	0.790	0.844	0.054	1.068	0.001	3
<b>Item-Total Statistics - Work to Leisure Time Interference</b>								
		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted		
Due to work, do you find it hard to find time to be with your nearest?		5.22	2.583	0.855	0.740	0.905		
Due to work, do you find it hard to find time to be with your friends?		5.22	2.747	0.883	0.780	0.881		
Due to work, do you find it hard to find time for your recreational activities?		5.36	2.847	0.841	0.713	0.914		

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
I come home from work too tired to do things I would like to do	51	1	5	3.29	1.006
My job makes it difficult to maintain the kind of personal life I would like.	51	1	5	3.06	1.066
I often neglect my personal needs because of the demands of my work.	51	1	5	3.06	1.139
My personal life suffers because of my work.	51	1	5	2.71	1.064
I have to miss out on important personal activities due to the amount of time I spend doing work.	51	1	4	2.67	0.973
My personal life drains me of the energy I need to do my job	51	1	5	1.76	0.929
My work suffers because of everything going on in my personal life.	51	1	3	1.63	0.631
I would devote more time to work if it were not for everything I have going on in my personal life.	51	1	4	1.57	0.855
I am too tired to be effective at work because of the things I have going on in my personal life.	51	1	4	1.47	0.674
When I am at work, I worry about things I need to do outside work.	51	1	4	2.12	0.791
I have difficulty getting my work done because I am preoccupied with personal matters at work.	51	1	3	1.51	0.644
My job gives me the energy to pursue activities outside of work that is important to me.	51	1	5	2.39	1.168
Because of my job, I am in a better mood at home.	51	1	5	2.86	1.217
The things I do at work help me deal with personal and practical issues at home.	51	1	5	2.69	1.319
I am in a better mood at work because of everything I have going for me in my personal life.	51	1	5	3.39	1.097
My personal life gives me the energy to do my job.	51	1	5	3.67	1.071
My personal life helps me relax and feel ready for the next day's work.	51	2	5	3.63	0.958
Are you satisfied with your work?	51	1	5	3.73	0.918
Are you satisfied with your work conditions?	51	1	5	3.43	1.044
Does your company or institution respect its employees' rights?	51	2	5	4.24	0.907
Are you satisfied with your work climate?	51	1	5	3.78	0.945
If you had the choice, would you work a second time in the same company/institution?	51	1	5	3.82	1.108
Are you respected by your superior at work?	51	2	5	4.18	0.865
How often is your work criticised by your colleagues or your superior?	51	2	5	3.75	0.744
How often are you ridiculed by your colleagues or your superior in front of others?	51	2	5	4.37	0.799
How often are you ignored at work by your colleagues or your superior?	51	1	5	4.00	1.039
How often does your superior assign you duties that seem absurd?	51	2	5	3.94	0.968
How often do you have conflicts with colleagues or other people with whom you are in contact at work?	51	1	5	4.00	0.825
How often do you have to concentrate yourself on several diverse activities at once?	51	1	5	2.18	0.932
How often is your work intellectually demanding (for instance: having to concentrate for a long time)?	51	1	5	1.84	0.880

How often is your work intellectually demanding (for instance: having to concentrate for a long time)?	51	1	5	1.84	0.880
How often do you work under pressure?	51	1	3	1.80	0.749
Do you participate in the decisions made by your company?	51	1	5	2.86	1.184
Are you informed of the internal decisions, changes, and development plans of your company?	51	1	5	3.33	1.178
Do you receive feedback regarding your work from your superior or from your colleagues?	51	1	5	3.24	0.992
Do you cooperate with your colleagues at work?	51	2	5	4.43	0.755
Do your colleagues support you at work?	51	3	5	4.14	0.722
Do you consider your work to be important?	51	3	5	4.49	0.674
Is your work appreciated by your company?	51	2	5	4.08	0.868
Do you have time to finish your assignments?	51	1	3	2.06	0.544
Do you have the possibility to influence decisions at work?	51	1	4	2.27	0.723
Does your supervisor consider your views?	51	1	3	1.90	0.608
Can you decide on your work pace?	51	1	4	2.31	0.735
If question 48 was yes : Do you perceive your increased workload as stressful?	46	1	4	2.83	0.739
If question 50 is partly or no: Do you perceive unclear goals as stressful?	25	1	4	2.92	0.759
If question 52 is partly or no: Do you perceive not knowing which assignments your work tasks include as stressful?	16	1	4	2.69	0.873
If question 54 is partly or no: Do you perceive not knowing who is making decisions concerning your workplace as stressful?	9	1	3	2.56	0.726
If question 56 is yes: Do you perceive conflict at work as stressful?*	26	1	4	2.81	0.801
If question 58 is yes: Do you perceive involvement in conflict at work as stressful?	16	1	4	2.50	0.966
Do you put high demands on yourself at work?	21	1	4	2.86	0.854
If question 62 is yes: Do you perceive putting high demand on yourself as stressful?	44	1	4	2.93	0.625
If question 64 is yes: Do you perceive engagement in your work as stressful?	50	1	4	2.34	0.745
If question 66 is yes or partly: Do you perceive thinking of work after a workday as stressful?	49	1	4	2.51	0.794
If question 68 is yes or partly: Do you perceive not setting limits to assignments as stressful?	40	1	4	2.78	0.768
If question 70 is yes: Do you perceive taking on more responsibility as stressful?	37	1	4	2.68	0.709
If question 72 is yes or partly: Do you perceive working after hours as stressful?	49	1	4	2.45	0.709
If question 74 is yes or partly: Do you perceive hard to sleep as stressful?	31	1	4	3.03	0.983
Due to work, do you find it hard to find time to be with your nearest?	50	1	4	2.68	0.913
Due to work, do you find it hard to find time to be with your friends?	51	1	4	2.69	0.836
Due to work, do you find it hard to find time for your recreational activities?	51	1	4	2.55	0.832
Valid N (listwise)	2				
DESCRIPTIVES VARIABLES=WLB_WIPL WLB_PLIW WLB_WEPL WLB_PLEW QWS_Satisfaction QWS_Quality_Work				Min Standard Deviation	0.544
QWS_Mental_Strain QWS_Communication QWS_Cooperation WS_Influence WS_Stress_conflicts				Max Standard Deviation	1.319

Descriptives				
<b>Notes</b>				
Output Created	20-OCT-2021 08:32:35			
Comments				
Input	Data	C:\Pretorius_Johan_Okt21\Pre toriusJ.sav		
	Active Dataset	DataSet9		
	Filter	<none>		
	Weight	<none>		
	Split File	<none>		
	N of Rows in Working Data File	51		
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.		
	Cases Used	All non-missing data are used.		
Syntax	<pre> DESCRIPTIVES VARIABLES=WLB_WIPL WLB_PLIW WLB_WEPL WLB_PLEW QWS_Satisfaction QWS_Quality_Work   QWS_Mental_Strain QWS_Communication QWS_Cooperation WS_Influence WS_Stress_conflicts   WS_Stress_commitments WS_Work_Leisure /STATISTICS=MEAN STDDEV MIN MAX. </pre>			
Resources	Processor Time	00:00:00,00		
	Elapsed Time	00:00:00,00		

#### Descriptive Statistics

	Cronbach's Alpha	Mean Item Correlation (Inter-Item Correlations)	Mean	Std. Deviation
WLB_WIPL	0.910	0.668	2.96	0.90
WLB_PLIW	0.725	0.327	1.68	0.49
WLB_WEPL	0.811	0.592	2.65	1.05
WLB_PLEW	0.832	0.624	<b>3.56</b>	0.90
QWS_Satisfaction	0.904	0.611	3.86	0.80
QWS_Mobbing	0.720	0.336	4.01	0.61
QWS_Mental_Strain	0.815	0.606	1.94	0.73
QWS_Communication	0.644	0.388	3.14	0.86
QWS_Cooperation	0.678	0.513	4.28	0.64
WS_Influence	0.735	0.399	2.14	0.49
WS_Stress_conflicts	1.000	1.000	2.79	0.66
WS_Stress_commitments	0.906	0.605	2.60	0.63
WS_Work_Leisure	0.931	0.820	2.64	0.81

Valid N (listwise)

# ANNEXURES E STATISTICAL DATA COMPARE

Frequencies						
Notes						
Output Created	20-OCT-2021 08:36:27					
Comments						
Input	Data	C:\Pretorius_Johan_Okt21\Pre torius.J.sav				
	Active Dataset	DataSet9				
	Filter	<none>				
	Weight	<none>				
	Split File	<none>				
	N of Rows in Working Data File	51				
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.				
	Cases Used	Statistics are based on all cases with valid data.				
Syntax	FREQUENCIES VARIABLES=v1 v2 v3 v4 v5 /ORDER=ANALYSIS.					
Resources	Processor Time	00:00:00,02				
	Elapsed Time	00:00:00,00				
Statistics						
	What is your age group?	Indicate your gender.	How many years are you working in the engineering industry?	Highest qualification level.	Indicate for which company are you working.	
N	Valid	51	51	51	51	51
	Missing	0	0	0	0	0
Frequency Table						
What is your age group?						
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	20 - 29	7	13.7	13.7	13.7	
	30 - 39	20	39.2	39.2	52.9	
	40 - 49	10	19.6	19.6	72.5	
	50 - 59	10	19.6	19.6	92.2	
	60 and older	4	7.8	7.8	100.0	
	Total	51	100.0	100.0		
Indicate your gender.						
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Female	9	17.6	17.6	17.6	
	Male	42	82.4	82.4	100.0	
	Total	51	100.0	100.0		
How many years are you working in the engineering industry?						
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	0 - 9 Years	16	31.4	31.4	31.4	
	10 - 19 Years	14	27.5	27.5	58.8	
	20 - 29 Years	8	15.7	15.7	74.5	
	30 - 39 Years	9	17.6	17.6	92.2	
	40 Years and More	4	7.8	7.8	100.0	
	Total	51	100.0	100.0		
Highest qualification level.						
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	B-Tech Degree	9	17.6	17.6	17.6	
	Honour's Degree	11	21.6	21.6	39.2	
	Master's Degree / MEng	4	7.8	7.8	47.1	
	National Certificate (Matric)	5	9.8	9.8	56.9	
	National Diploma	17	33.3	33.3	90.2	
	Other	2	3.9	3.9	94.1	
	Post-Graduate Diploma	3	5.9	5.9	100.0	
Total	51	100.0	100.0			

Indicate for which company are you working.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moore Process Control	51	100.0	100.0	100.0
-----					
DATASET ACTIVATE DataSet9.					
SAVE OUTFILE='C:\Pretorius_Johan_Okt21\PretoriusJ.sav'					
/COMPRESSED.					
DATASET ACTIVATE DataSet9.					
SAVE OUTFILE='C:\Pretorius_Johan_Okt21\PretoriusJ.sav'					
/COMPRESSED.					
DATASET ACTIVATE DataSet9.					
SAVE OUTFILE='C:\Pretorius_Johan_Okt21\PretoriusJ.sav'					
/COMPRESSED.					
T-TEST GROUPS=v2('Male' 'Female')					
/MISSING=ANALYSIS					
/VARIABLES=WLB WIPL WLB_PLIW WLB_WEPL WLB_PLEW QWS_Satisfaction QWS_Quality_Work					
QWS_Mental_Strain QWS_Communication QWS_Cooperation WS_Influence WS_Stress_conflicts					
WS_Stress_commitments WS_Work_Leisure					
/ES_DISPLAY(TRUE)					
/CRITERIA=CI(.95).					
T-TEST GROUPS=v2('Male' 'Female')					
/MISSING=ANALYSIS					
/VARIABLES=WLB WIPL WLB_PLIW WLB_WEPL WLB_PLEW QWS_Satisfaction QWS_Quality_Work					
QWS_Mental_Strain QWS_Communication QWS_Cooperation v42 v43 WS_Influence WS_Stress_conflicts					
WS_Stress_commitments WS_Work_Leisure					
/ES_DISPLAY(TRUE)					
/CRITERIA=CI(.95).					
<b>T-Test</b>					
<b>Notes</b>					
Output Created		20-OCT-2021 08:49:26			
Comments					
Input	Data	C:\Pretorius_Johan_Okt21\PretoriusJ.sav			
	Active Dataset	DataSet9			
	Filter	<none>			
	Weight	<none>			
	Split File	<none>			
	N of Rows in Working Data File	51			
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.			
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.			
Syntax	T-TEST GROUPS=v2('Male' 'Female') /MISSING=ANALYSIS /VARIABLES=WLB_WIPL WLB_PLIW WLB_WEPL WLB_PLEW QWS_Satisfaction QWS_Quality_Work QWS_Mental_Strain QWS_Communication QWS_Cooperation v42 v43 WS_Influence WS_Stress_conflicts WS_Stress_commitments WS_Work_Leisure /ES_DISPLAY(TRUE) /CRITERIA=CI(.95).				
Resources	Processor Time	00:00:00,02			
	Elapsed Time	00:00:00,01			

Group Statistics						
Indicate your gender.		N	Mean	Std. Deviation	t-test p-value	Effect size
WLB_WIPL	Male	42	3.00	0.92	0.508	0.24
	Female	9	2.78	0.86		
WLB_PLIW	Male	42	1.64	0.48	0.359	0.39
	Female	9	1.83	0.55		
WLB_WEPL	Male	42	2.76	0.99	0.162	0.63
	Female	9	2.11	1.21		
WLB_PLEW	Male	42	3.69	0.83	0.072	0.84
	Female	9	2.96	1.02		
QWS_Satisfaction	Male	42	3.85	0.84	0.821	0.07
	Female	9	3.91	0.59		
QWS_Quality_Work	Male	42	4.02	0.60	0.869	0.07
	Female	9	3.98	0.68		
QWS_Mental_Strain	Male	42	2.03	0.75	0.018	0.72
	Female	9	1.52	0.47		
QWS_Communication	Male	42	3.15	0.76	0.930	0.05
	Female	9	3.11	1.28		
QWS_Cooperation	Male	42	4.21	0.62	0.143	0.63
	Female	9	4.61	0.70		
Do you consider your work to be important?	Male	42	4.48	0.67	0.769	0.12
	Female	9	4.56	0.73		
Is your work appreciated by your company?	Male	42	4.05	0.91	0.516	0.20
	Female	9	4.22	0.67		
WS_Influence	Male	42	2.07	0.48	0.038	0.79
	Female	9	2.44	0.43		
WS_Stress_conflicts	Male	42	2.76	0.65	0.546	0.25
	Female	9	2.93	0.73		
WS_Stress_commitments	Male	42	2.59	0.68	0.804	0.06
	Female	9	2.63	0.35		
WS_Work_Leisure	Male	42	2.59	0.79	0.357	0.37
	Female	9	2.89	0.87		

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
WLB_WIPL	Equal variances assumed	0.213	0.647	0.653	49	0.517	0.21746	0.33284	-0.45142	0.88634
	Equal variances not assumed			0.682	12.248	0.508	0.21746	0.31868	-0.47533	0.91025
WLB_PLIW	Equal variances assumed	0.291	0.592	-1.049	49	0.299	-0.19048	0.18159	-0.55540	0.17445
	Equal variances not assumed			-0.959	10.765	0.359	-0.19048	0.19671	-0.62900	0.24805
WLB_WEPL	Equal variances assumed	0.694	0.409	1.715	49	0.093	0.65079	0.37943	-0.11170	1.41329
	Equal variances not assumed			1.505	10.424	0.162	0.65079	0.43256	-0.30771	1.60930
WLB_PLEW	Equal variances assumed	0.102	0.750	2.284	49	0.027	0.72751	0.31855	0.08737	1.36766
	Equal variances not assumed			2.001	10.417	0.072	0.72751	0.36351	-0.07806	1.53309
QWS_Satisfaction	Equal variances assumed	2.106	0.153	-0.183	49	0.856	-0.05423	0.29640	-0.64987	0.54141
	Equal variances not assumed			-0.230	15.934	0.821	-0.05423	0.23575	-0.55417	0.44570
QWS_Quality_Work	Equal variances assumed	0.068	0.795	0.184	49	0.855	0.04127	0.22472	-0.41032	0.49286
	Equal variances not assumed			0.168	10.793	0.869	0.04127	0.24515	-0.49956	0.58210
QWS_Mental_Strain	Equal variances assumed	0.405	0.527	1.961	49	0.056	0.51323	0.26169	-0.01266	1.03912
	Equal variances not assumed			2.618	17.855	0.018	0.51323	0.19604	0.10113	0.92533
QWS_Communication	Equal variances assumed	4.219	0.045	0.125	49	0.901	0.03968	0.31794	-0.59924	0.67860
	Equal variances not assumed			0.090	9.239	0.930	0.03968	0.44250	-0.95738	1.03674
QWS_Cooperation	Equal variances assumed	0.019	0.891	-1.714	49	0.093	-0.39683	0.23148	-0.86200	0.06835
	Equal variances not assumed			-1.580	10.844	0.143	-0.39683	0.25111	-0.95048	0.15683
Do you consider your work to be important?	Equal variances assumed	0.003	0.957	-0.317	49	0.752	-0.079	0.250	-0.562	0.423
	Equal variances not assumed			-0.301	11.123	0.769	-0.079	0.263	-0.658	0.500
Is your work appreciated by your company?	Equal variances assumed	1.205	0.278	-0.544	49	0.589	-0.175	0.321	-0.820	0.471
	Equal variances not assumed			-0.664	15.180	0.516	-0.175	0.263	-0.734	0.385
WS_Influence	Equal variances assumed	0.042	0.838	-2.143	49	0.037	-0.37302	0.17410	-0.72288	-0.02315
	Equal variances not assumed			-2.314	12.738	0.038	-0.37302	0.16120	-0.72200	-0.02404
WS_Stress_conflicts	Equal variances assumed	0.060	0.808	-0.674	49	0.504	-0.16323	0.24225	-0.65005	0.32360
	Equal variances not assumed			-0.623	10.871	0.546	-0.16323	0.26201	-0.74074	0.41429
WS_Stress_commitments	Equal variances assumed	4.742	0.034	-0.169	49	0.867	-0.03934	0.23322	-0.50802	0.42933
	Equal variances not assumed			-0.252	23.146	0.804	-0.03934	0.15635	-0.36267	0.28398
WS_Work_Leisure	Equal variances assumed	0.121	0.729	-1.020	49	0.313	-0.30159	0.29561	-0.89563	0.29246
	Equal variances not assumed			-0.962	11.057	0.357	-0.30159	0.31349	-0.99115	0.38797

Independent Samples Effect Sizes					
		Standardizer <sup>a</sup>	Point Estimate	95% Confidence Interval	
				Lower	Upper
WLB_WIPL	Cohen's d	0.90615	0.24	-0.483	0.960
	Hedges' correction	0.92032	0.24	-0.475	0.945
	Glass's delta	0.85700	0.25	-0.484	0.976
WLB_PLIW	Cohen's d	0.49438	0.39	-1.107	0.341
	Hedges' correction	0.50211	-0.38	-1.090	0.335
	Glass's delta	0.55277	-0.34	-1.073	0.404
WLB_WEPL	Cohen's d	1.03298	0.63	-0.104	1.357
	Hedges' correction	1.04914	0.62	-0.102	1.337
	Glass's delta	1.21335	0.54	-0.243	1.287
WLB_PLEW	Cohen's d	0.86724	0.84	0.096	1.574
	Hedges' correction	0.88080	0.83	0.095	1.549
	Glass's delta	1.01986	0.71	-0.102	1.493
QWS_Satisfaction	Cohen's d	0.80694	0.07	-0.787	0.653
	Hedges' correction	0.81956	-0.07	-0.775	0.643
	Glass's delta	0.58991	-0.09	-0.810	0.632
QWS_Quality_Work	Cohen's d	0.61179	0.07	-0.653	0.787
	Hedges' correction	0.62136	0.07	-0.643	0.775
	Glass's delta	0.68150	0.06	-0.662	0.779
QWS_Mental_Strain	Cohen's d	0.71244	0.72	-0.017	1.451
	Hedges' correction	0.72359	0.71	-0.017	1.428
	Glass's delta	0.47467	1.08	0.171	1.948
QWS_Communication	Cohen's d	0.86557	0.05	-0.674	0.766
	Hedges' correction	0.87911	0.05	-0.664	0.754
	Glass's delta	1.28019	0.03	-0.690	0.750
QWS_Cooperation	Cohen's d	0.63020	0.63	-1.357	0.104
	Hedges' correction	0.64005	-0.62	-1.336	0.102
	Glass's delta	0.69722	-0.57	-1.324	0.216
Do you consider your work to be important?	Cohen's d	0.681	0.12	-0.836	0.604
	Hedges' correction	0.691	-0.11	-0.823	0.595
	Glass's delta	0.726	-0.11	-0.828	0.616
Is your work appreciated by your company?	Cohen's d	0.874	0.20	-0.920	0.522
	Hedges' correction	0.888	-0.20	-0.906	0.514
	Glass's delta	0.667	-0.26	-0.985	0.477
WS_Influence	Cohen's d	0.47397	0.79	-1.520	-0.047
	Hedges' correction	0.48139	-0.77	-1.496	-0.046
	Glass's delta	0.42898	-0.87	-1.683	-0.017
WS_Stress_conflicts	Cohen's d	0.65952	0.25	-0.968	0.475
	Hedges' correction	0.66983	-0.24	-0.953	0.468
	Glass's delta	0.72701	-0.22	-0.946	0.510
WS_Stress_commitments	Cohen's d	0.63493	0.06	-0.782	0.658
	Hedges' correction	0.64486	-0.06	-0.770	0.648
	Glass's delta	0.34909	-0.11	-0.831	0.613
WS_Work_Leisure	Cohen's d	0.80477	0.37	-1.097	0.351
	Hedges' correction	0.81736	-0.37	-1.080	0.345
	Glass's delta	0.86603	-0.35	-1.077	0.401

a. The denominator used in estimating the effect sizes.  
Cohen's d uses the pooled standard deviation.  
Hedges' correction uses the pooled standard deviation, plus a correction factor.  
Glass's delta uses the sample standard deviation of the control group.

		Correlations																	
		What is your age group?	How many years are you working in the engineering industry?	Highest qualification level	WLB_WPL	WLB_PLW	WLB_WEP	WLB_PLEW	OWS_Satisfaction	OWS_Quality_of_work	OWS_Mental_Health	OWS_Communication	OWS_Cooperation	Do you consider your work to be important?	Is your work appreciated by your company?	WS_Influence	WS_Stress_conflicts	WS_Stress_commitments	WS_Work_Leisure
WLB_WPL	Correlation Coefficient	<b>-0.115</b>	<b>-0.069</b>	<b>-0.043</b>	1.000	.346*	-.364*	-.427*	-.620*	-.388*	0.063	0.211	0.153	0.195	-.417*	.417*	.452*	.573*	-.748*
	Sig. (2-tailed)	0.421	0.633	0.384		0.013	0.005	0.002	0.000	0.005	0.862	0.138	0.285	0.170	0.002	0.002	0.001	0.000	0.000
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WLB_PLW	Correlation Coefficient	<b>-0.164</b>	<b>-0.162</b>	<b>-0.055</b>	.346*	1.000	-.493*	-.483*	-.691*	-.417*	0.144	-0.069	0.044	-.524*	.518*	.518*	.518*	.518*	-.131
	Sig. (2-tailed)	0.249	0.256	0.710	0.013		0.000	0.000	0.002	0.003	0.312	0.629	0.759	0.000	0.000	0.001	0.004	0.004	0.179
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WLB_WEP	Correlation Coefficient	<b>0.113</b>	<b>0.229</b>	<b>0.121</b>	-.364*	-.493*	1.000	.896*	.540*	.324	0.272	0.137	0.011	0.097	.481*	-.544*	-.628*	-.409*	0.138
	Sig. (2-tailed)	0.451	0.105	0.407	0.005	0.000		0.000	0.000	0.020	0.063	0.339	0.959	0.497	0.000	0.000	0.006	0.003	0.283
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WLB_PLEW	Correlation Coefficient	<b>0.027</b>	<b>0.162</b>	<b>0.183</b>	-.427*	-.483*	.896*	1.000	.576*	.298*	0.248	-0.019	-0.078	0.128	.492*	-.513*	-.287*	-.451*	0.281
	Sig. (2-tailed)	0.852	0.478	0.358	0.002	0.000		0.000	0.000	0.034	0.080	0.892	0.586	0.372	0.000	0.000	0.048	0.001	0.064
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
OWS_Satisfaction	Correlation Coefficient	<b>0.089</b>	<b>0.041</b>	<b>-0.042</b>	-.620*	-.641*	-.540*	1.000	.812*	0.174	-0.004	0.091	0.002	.797*	.517*	-.419*	-.504*	-.532*	0.000
	Sig. (2-tailed)	0.336	0.778	0.389	0.000	0.000	0.000		0.000	0.222	0.975	0.525	0.521	0.000	0.000	0.170	0.000	0.000	0.000
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
OWS_Quality_of_Work	Correlation Coefficient	<b>0.012</b>	<b>0.006</b>	<b>0.005</b>	-.388*	-.417*	.298*	.812*	1.000	0.078	-0.037	0.003	-0.023	.367*	-.517*	-.387*	-.226*	.281*	0.000
	Sig. (2-tailed)	0.906	0.900	0.708	0.005	0.002	0.020	0.034		0.000	0.585	0.758	0.518	0.875	0.009	0.000	0.006	0.007	0.048
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
OWS_Mental_Health	Correlation Coefficient	<b>0.104</b>	<b>0.139</b>	<b>-0.047</b>	0.063	-.404*	0.272	0.248	0.174	0.078	1.000	0.009	0.185	0.098	.278*	-0.223	-0.124	-0.183	-0.115
	Sig. (2-tailed)	0.466	0.201	0.780	0.482	0.003	0.003	0.080	0.222	0.365		0.900	0.078	0.603	0.048	0.116	0.384	0.199	0.401
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
OWS_Communication	Correlation Coefficient	<b>0.081</b>	<b>0.118</b>	<b>-0.137</b>	0.211	0.144	0.137	-0.019	-0.004	-0.037	0.009	1.000	.336*	.033*	-0.159	-0.006	0.112	0.100	-0.223
	Sig. (2-tailed)	0.571	0.428	0.346	0.138	0.312	0.339	0.802	0.975	0.708	0.490		0.016	0.000	0.366	0.969	0.433	0.485	0.115
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
OWS_Cooperation	Correlation Coefficient	<b>0.047</b>	<b>0.007</b>	<b>-0.127</b>	0.153	-0.089	0.011	-0.078	0.091	0.003	0.165	.336*	1.000	.496*	0.143	-0.004	-0.022	-0.070	-0.178
	Sig. (2-tailed)	0.744	0.497	0.303	0.285	0.629	0.939	0.586	0.525	0.518	0.248	0.076		0.000	0.318	0.976	0.879	0.623	0.211
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
Do you consider your work to be important?	Correlation Coefficient	<b>0.093</b>	<b>0.049</b>	<b>0.185</b>	0.170	0.199	0.497	0.372	0.521	0.875	0.503	0.000	0.000	1.000	0.048	1.000	-.525*	-.081*	-.542*
	Sig. (2-tailed)	0.351	0.698	0.186	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.368	0.018		0.000	0.070	0.000	0.012
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
Is your work appreciated by your company?	Correlation Coefficient	<b>-0.132</b>	<b>-0.151</b>	<b>-0.119</b>	-.417*	-.518*	-.544*	-.513*	-.581*	-.571*	-.223	-0.006	-0.004	0.008	-.525*	1.000	.475*	.334*	-0.146
	Sig. (2-tailed)	0.167	0.201	0.415	0.002	0.000	0.000	0.000	0.000	0.000	0.116	0.969	0.976	0.964	0.000		0.000	0.017	0.305
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WS_Influence	Correlation Coefficient	<b>-0.230</b>	<b>-0.130</b>	<b>-0.087</b>	.402*	0.239	-0.238	-.280*	-.195	-.387*	-.134	0.112	-0.022	.307*	-.081*	.457*	1.000	.445*	-0.225
	Sig. (2-tailed)	0.104	0.287	0.646	0.001	0.001	0.006	0.046	0.170	0.006	0.384	0.433	0.879	0.022	0.670	0.000		0.001	0.113
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WS_Stress_conflicts	Correlation Coefficient	<b>-0.116</b>	<b>-0.044</b>	<b>0.040</b>	.573*	.395*	-.409*	-.451*	-.504*	-.225*	-0.183	0.100	-0.070	0.049	-.542*	.354*	.445*	1.000	-.498*
	Sig. (2-tailed)	0.416	0.761	0.784	0.000	0.004	0.000	0.001	0.000	0.007	0.189	0.485	0.653	0.726	0.000	0.017	0.001		0.000
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
WS_Stress_commitments	Correlation Coefficient	<b>0.130</b>	<b>0.031</b>	<b>-0.162</b>	-.748*	-0.191	0.138	0.261	.532*	.281*	-.115	-0.223	-0.178	-0.137	.350*	-.146	-0.225	-.498*	1.000
	Sig. (2-tailed)	0.385	0.827	0.285	0.000	0.179	0.333	0.044	0.000	0.048	0.421	0.115	0.211	0.338	0.012	0.305	0.113	0.000	
	N	51	51	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## ANNEXURES F LANGUAGE EDITING



THIS CERTIFIES THAT

Philip Nolte

HAS SUCCESSFULLY PASSED

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03/06/2021

DATE





25 February 2022

**TO WHOM IT MAY CONCERN**

**RE: LANGUAGE AND COPY-EDITING DECLARATION**

This document is to declare that I, Dr Philip Nolte, have completed the language and copy-editing of the MBA mini-dissertation by Mr. Johan Pretorius (33464154) as part of fulfilling the requirements for the MBA degree at the North-West University (NWU). The title of the dissertation is *Investigating the influence of work-life balance on the quality of work and occupational stress of automation engineers*.

Kind regards.

Dr Philip Nolte

Freelance Copy-Editor

084 209 1924 / stephanusnolte@gmail.com