UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

THE EFFECT OF SELF-REGULATING TECHNOLOGY ON WORKPLACE EFFICIENCY

by

PETRUS ARNOLDUS VAN ZYL

Submitted in fulfillment of the requirements for the degree

MASTER OF COMMERCE IN INFORMATICS

in the

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES

UNIVERSITY OF PRETORIA

Supervisor: Prof. Marié Hattingh

15 November 2023

ACKNOWLEDGMENTS

The author would like to express his gratitude and appreciation to the people who made this thesis a possibility:

- My friends and family for supporting me and encouraging me to undertake this challenge.
- My Creator for giving me the knowledge, strength, and enthusiasm to enrich myself and others around me with knowledge.
- My supervisor, Prof. Marié Hattingh, for her endless support and guidance throughout this journey.
- The Faculty of Economic and Managements Sciences at the University of Pretoria for the opportunity to examine the research report submitted in fulfillment of the requitements towards the degree of Masters in Commerce.
- Ms. Lerator Krappie and Ms. Shannie Maharaj for their clear communication and timely reminders. It was a pleasure liasing with them.
- My language editor, Elizabeth Marx from Academic and Professional Editing Services (APESpro.com) for her efficiency in formatting, editing, and structuring this report.
- Finally, to the reader, thank you for lending me some of your time to analyze and hopefully enjoy my research.

Petrus Arnoldus van Zyl

DISSERTATION SUMMARY

Title: THE EFFECT OF SELF-REGULATING TECHNOLOGY ON WORKPLACE EFFICIENCY

Author: PETRUS ARNOLDUS VAN ZYL

(u16040768)

Supervisor: Prof. Marié Hattingh

Department: Department of Informatics.

Economics and Management Sciences, University of Pretoria

Degree: M.Com (Informatics)

Keywords: Self-Regulating Technology, Job Efficiency, Employee Productivity

ABSTRACT

Self-regulation technologies are applications or equipment that allow end users to govern and manage their own technology use. The research indicates that distractions in the workplace are one of the primary contributors to reduced productivity, lower task completion, and lower task success rates. Self-regulation technologies are applications or equipment that allow employees to limit distractions from technological devices and maintain a focus on job-related activities throughout the workday. According to research, electronic devices commonly used in the workplace have increased employee distractions during daily work routines. This study analyzed how self-regulating technologies can promote workplace efficiency. The study employed a mono-method approach and compared the findings obtained from seventeen employees. Qualitative data were collected through semi-structured interviews. The results enabled an understanding whether self-regulating technologies can promote workplace efficiency. The study emphasized automated technology use and its influence on workplace efficiency. The research aims to provide an understanding of automated technology and how individuals in organizations can use the technologies available to them to ensure focus and attention on their job requirements. The study established that self-regulating technologies can help employees become more efficient and less stressed and distracted in their working

environment while improving their work-life balance. Future research could expand the multitude of participants to include individuals from diverse working environments to obtain more information on the various types of self-regulating technologies being employed, whether the participants of the study deemed these technologies beneficial, and how easily these technologies can be incorporated into an average work routine. The importance of self-regulation technologies within the workplace is the various benefits observed including, improved overall effectiveness of employees, better work-life balance, improved job satisfaction, and reduced workplace stressors.

Keywords: self-regulating technology; job efficiency; employee efficiency; technology regulation; technological workplace

GLOSSARY OF TERMS

ETHICS

- **"**Ethics is about the decision-making and actions of free humans. When faced with alternative courses of action or alternative goals to pursue, ethics helps us to make the correct decision" (Laudon, 1995).
- *This study identifies and describes ethics as the core driver of actions behind human interaction; it helps a human determine and decide between right and wrong.*

TECHNOLOGY

- "Technology is the scientific means of producing goods and services and satisfying human needs beyond the point of natural capabilities" (Hooper et al., 2013).
- *This study calls technology the scientific means of satisfying human needs beyond the point of natural capabilities.*

SELF-REGULATION

- "Self-regulation is a person's ability to govern and manage their interaction with others" (Bell & Kozlowski, 2002).
- *This study refers to self-regulation from a technological standpoint and defines it as an end user's ability to govern and manage their technological interaction.*

WORKPLACE EFFICIENCY

- "The standard of quality an employee performance regarding their job specifications" (Jiang et al., 2021).
- *This study calls workplace efficiency the standard of quality an employee performs regarding job responsibilities and task assignments.*

METHODOLOGY

- "A body of methods, rules and postulates employed by discipline: a particular procedure or set of procedures" (Merriam-webster.com, 2022).
- *This study refers to methodology as the approach and guidelines used to acquire and analyze information obtained.*

DISTRACTION

- “An object that directs one’s attention away from something else” (Merriam- webster.com, 2022).
- *This study refers to distractions in the workplace as something that directs an employee’s attention from their primary job requirements and specifications.*

COGNITIVE CAPACITY

- **“**The length of time during which one (such as an individual or a group) is able to concentrate or remain interested” (Merriam-webster.com, 2022).
- *In this study, cognitive capacity is an individual’s capability to remain focused on a specific task.*

ABBREVIATIONS

AI	Artificial intelligence
APA	American Psychological Association
FOMO	Fear of missing out
HR	Human resources
NWRC	Non-work-related computing
UX	User-experience

DECLARATION REGARDING PLAGIARISM

The Department of Informatics emphasizes integrity and ethical behavior regarding the preparation of all written assignments.

Although the lecturer will provide you with information regarding reference techniques, as well as ways to avoid plagiarism, you also have a responsibility to fulfil in this regard. Should you at any time feel unsure about the requirements, you must consult the lecturer concerned before submitting an assignment.

You are guilty of plagiarism when you extract information from a book, article, web page or any other information source without acknowledging the source and pretend that it is your work. This does not only apply to cases where you quote verbatim, but also when you present someone else's work in a somewhat amended (paraphrased) format or when you use someone else's arguments or ideas without the necessary acknowledgement. You are also guilty of plagiarism if you copy and paste information directly from an electronic source (e.g., a website, email message, electronic journal article, or CD ROM), even if you acknowledge the source.

You are not allowed to submit another student's previous work as your own. You are furthermore not allowed to let anyone copy or use your work to present it as their own.

Students who are guilty of plagiarism will forfeit all credits for the work concerned. The matter will be referred to the Committee for Discipline (Students) for a ruling. Plagiarism is considered a serious violation of the University's regulations and may lead to your suspension from the University. The University's policy regarding plagiarism is available on the Internet at http: / / upetd.up.ac.za / authors / create / plagiarism / students.htm.

I (full names & surname):	Petrus Arnoldus van Zyl
Student number:	U16040768

Declare the following:

1. I understand what plagiarism entails and am aware of the University's policy in this regard.
2. I declare that this assignment is my own, original work. Where someone else's work was used (whether from a printed source, the Internet, or any other source) due acknowledgement was given and reference was made according to departmental requirements.
3. I did not copy and paste any information directly from an electronic source (e.g., a web page, electronic journal article or CD ROM) into this document.
4. I did not make use of another student's previous work and submitted it as my own.
5. I did not allow and will not allow anyone to copy my work to present it as their own. work.

Signature

20/11/2023

Date

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

Technological applications, software, and equipment have become essential commodities in everyday life. Whether it be as software through which we complete work assignments, applications used to aid learning experiences, or even technologies used for commuting from one place to another, technology is everywhere (Jacobs et al., 2019). Technology can be defined as “a manner of accomplishing a task, especially using technical processes, methods or knowledge” (Merriam-webster.com, 2022), and since technology plays such an essential role in everyday lives, it should be ensured that we use it responsibly (Legault et al., 2018).

According to Jirotka and Stahl (2020), responsible technology use is the process of managing, governing, and controlling technological use in a sound, safe, and ethical manner. Jirotka and Stahl (2020) remark that how we think about technology, how we use technology, and how we shape technology is an ever-changing process where humans attempt to create, use, and innovate technological applications, software, or equipment; therefore, our derived utility from these technologies supports our flourishing as humans. Consequently, for an individual to use technology responsibly, some level of self-regulation is required.

According to Stotsny (2011) and Calkins (2004) self-regulation can be defined as the ability to manage and control your behavior; it is a psychological phenomenon involving self-control and can be subdivided into two main psychosocial categories, indicating behavioral self-regulation and emotional self-regulation.

Stotsny (2011) describes behavioral self-regulation as “the ability to act in your long-term best interest, consistent with your deepest values.” It involves pursuing your long-term goals regardless of your psychological demeanor. From Stotsny’s definition it can be concluded that behavioral self-regulation is a psychological concept that involves an individual’s ability to control their own behavior and align their decision making with their long-term goals and values, regardless of their psychological or emotional state.

Calkins (2004) describes emotional self-regulation as the “processes that serve to manage emotional arousal and support adaptive social and non-social responses.” It involves managing and controlling emotional reactions to situations. From Calkins’ definition it can be

summarized that emotional self-regulation is the process of adapting and managing your own emotional responses to social circumstances.

By breaking down self-regulation into these respective categories we gain the understanding that it is a complex psychological phenomenon, and the application thereof involves more than just harsh decision making.

Since self-regulation has been found to help improve the chances of goal attainment; numerous technologies have been created to promote this phenomenon (Vancouver & Day, 2005). These self-regulating technologies, for example, Apple Inc's Focus Mode Technology, align an individual's focus and cognitive capacities on goals and objectives, these technologies support individual goal obtainment and, when applied in an organization, might improve overall task success and workplace efficiency (Orhan et al., 2021).

Self-regulating technologies strive to foster an environment for responsible use. Technology in the workplace should be used responsibly to ensure an optimal workplace efficiency; the opposite is also true (Bondanini et al., 2020) when over-using technology. Song et al. (2019) remark that the excessive use of social media is prevalent in the workplace and causes a significant distraction to employees. Multiple applications have been created to promote self-regulation, such as *Apple Focus Mode*, *Todoist*, and *Forest*, and technological features, such as *notification blockers* and *task trackers* (Zukriyani & Azizan, 2023).

One of the most significant complications of using technology is increased workplace distractions (Mark et al., 2018). In the workplace, employees encounter technological distractions daily, such as unplanned conversations, and numerous distracting notifications from mobile devices and work equipment. Roper and Juneja (2008) categorize these distractions into two broad categories. The first is a voluntary distraction, including the conscious separation of attentional resources between visual and audio tasks, leading to cognitive resource sharing. The second is involuntary, encompassing auditory distractions, such as co-worker conversations, equipment sounds, mechanical noises, and mobile device notifications.

Self-regulating technology minimizes the distractions encountered during the workday by allowing employees to configure the applications they may use, what notifications are allowed to be displayed, and identify phone calls or messages that should be received or transferred

to automatic replies. Restricting distractions and focusing employees' attention on their specific job requirements can increase task performance success (Grinin, 2016).

Various approaches exist to restrict workplace distractions through self-regulating technologies. Mark et al. (2018) used machine learning to help users understand their main focuses and work rhythm when using technology by displaying analytics of how much time is spent on various applications, also known as screen time, thereby increasing the user's awareness of technology usage in the workplace. Orhan et al. (2021) restricted the use of applications and notifications for users during the workday, by allowing them to configure these applications which subsequently, allowed them to focus their attention on work related tasks.

However, the effectiveness of self-regulating technology in promoting workplace efficiency is still unclear. When examining self-regulating technology, a range of factors contributing to workplace efficiency are derived; these can be correlated to self-regulation technologies usage. A lack of knowledge about how limiting workplace distractions caused by technology can promote workplace efficiency and overall employee effectiveness has led to an unclear understanding of how end users can utilize the self-regulating technologies available to them to help improve their overall efficiency. For us to understand the issue at hand more clearly, the benefits of utilizing self-regulating technology such as, Apple Inc.'s or Samsung's Focus Mode, will be investigated to determine how centering a user's attention to a specific task through eliminating workplace distractions can promote workplace efficiency.

Workplace efficiency can be defined as the optimal utilization of time, effort, and resources to achieve a greater task turnaround and success rate. It involves various techniques used to streamline processes, minimize waste and in essence enhancing an individual's overall effectiveness. An efficient workplace prioritizes organizational communication, and collaboration to ensure that tasks are completed timeously (Pârjoleanu, 2020).

The following subsections will provide further background information to help understand how self-regulating technology utilization can help promote overall workplace efficiency and how the technology available helps reduce and eliminate daily distractions within the workplace to help enforce an employee's focus and drive for project success. A clear problem statement is provided to identify what the research done aims to address. The research questions, objectives, limitations, and definitions will be provided to support the findings. Within this section, the motivation behind the research is provided, along with a comprehensive description of each subsequent chapter within the study.

1.2 Background information

The following literature was evaluated to ensure a better understanding of the persistent issues regarding irresponsible technology use in the workplace and how self-regulating technology can improve workplace efficiency. Some of these studies are historic, confirming that the misuse of workplace technology is not a new phenomenon. Numerous studies were conducted to determine the effect of self-regulating technologies on individuals.

Rothstein et al. (2016) investigated how the use of self-regulation within the workplace enables an employee to respond to situations and interactions more effectively by focusing the end user to a specific task and found that by maintaining an employee's focus on their job requirements, these tasks are done at a more efficient rate. Furthermore, Kim and Christensen (2017) investigated how personal technology use at work contributes to workplace efficiency. The authors analyzed the positive and adverse implications thereof. They noted an upsurge in social media and individual application use throughout the average workday, causing employees to lose track and focus on the assigned tasks.

Lavie (2010) investigated how various workplace distractions affect workplace efficiency and employee cognitive capacity. The author established that with increased distractions, an employee encounters the risk of draining their available mental capacity. Supporting these findings Mark et al. (2018) investigated the approaches and technologies used to reduce workplace distractions by examining machine learning, formulating work rhythms, and documenting user screen time. It was found that technologies help maintain employee focus on their job requirements, ultimately ensuring workplace efficiency. Accompanying this, Lord et al. (2010) investigated how self-regulation affects organizations while providing numerous approaches to help businesses improve their processes. They conclude that self-regulation is essential for organizational success in the modern work era.

Lahza et al. (2022) studied the influence of incorporating self-regulating learning technologies and established a minor effect on learner capabilities when self-regulating learning technologies are introduced. Furthermore, Vohs and Baumeister (2016) studied the influence and development of self-regulation and how this phenomenon affects humans and noted that self-regulation is a fundamental trait that individuals need to acquire to help maintain an improved job completion rate, which can be supported through self-regulating technologies. Finally, Schmeichel et al. (2008) investigated the effect of self-regulation on cognitive abilities

and psychological well-being. They established that increased distractions could cause individuals to feel drained while struggling to refocus after being distracted.

Research on the workplace indicates that a clearer understanding of how individuals allocate voluntary and cognitive resources over multiple tasks should be presented to understand how the strain and replenishment of mental resources occurs during an ordinary workday; these mental resources are the fuel required to obtain job requirements or job-specific goals (Kanfer & Ackerman, 1996).

When evaluating how technology can be used responsibly to promote workplace efficiency, workplace efficiency and how closely these two are correlated must be incorporated. According to Jiang et al. (2021) workplace efficiency can be defined as the quality standard of an employee's performance according to their job responsibilities and assigned tasks.

Neely and Hii (1998) suggest several guidelines when measuring workplace efficiency; efficiency can be measured by obtaining employee feedback, measuring the rate of successfully achieving organizational goals and targets, monitoring the employee's work efficiency and productivity, and analyzing the employee's work quality. Efficiency metrics can be calculated with these measurement guidelines. Employee efficiency can be measured against it. By using self-regulating technology, an employee's attention is directed to their job requirements and specifications; when distractions are limited, their focus is maintained, and task progression is improved. However, how does the use of personal technology at work influence these metrics?

Vitak et al. (2011) investigated personal technology use at work and coined *Cyberslacking* or *Cyberloafing,* involving technology during work hours in non-work-related activities. They established that in professions where computer use is required, employees reported spending at least one hour a day on non-work-related activities. Personal technology use at work also contributes to job efficiency and has become increasingly common. Personal technology use holds positive and adverse implications; it is contended that by using technology irresponsibly, work efficiency decreases through distractions in the productive work time; however, the benefits derived from personal technology use can alter an employee's job satisfaction by contributing factors, such as work-life balance (Kim & Christensen, 2017).

Self-regulation technologies have been developed to promote responsible and efficient technology use. For example, Apple Inc. has introduced self-regulating technology in Focus

Mode (supported by devices using IOS 15 or higher and by Mac, iPad, and the Apple Watch). Users can configure their devices by setting up notifications, call controls, application restrictions, and automatic replies (use focus on your iPhone, iPad, or iPod touch, 2022). Similarly, Samsung has introduced the same features in their devices using Android OS Version 10 or higher (Using Focus Mode, 2022). These technologies enforce self-regulation by allowing the end user to focus on tasks without continuous distractions. Samsung and Apple devices also support Screen Time Analysis functionality; this form of self-regulation notifies the user of analytics regarding their device, creating an awareness of time allocation (Mark et al., 2018).

The rise in workplace distractions owing to the increase in technology has led to the development of self-regulating technologies. Self-regulating technology helps employees enforce a more controlled environment of distractions where only work-relevant or necessary distractions are displayed and forwarded to the employee. As workplace distractions are introduced, multitasking becomes an essential skill for employees; however, when switching between tasks, it prolongs completion and can affect the work quality owing to a lack of concentration. With limited distractions, the need for multitasking decreases, leading to monotasking. This allows employees to maintain their focus on job specifications and reduces the time costs associated with job requirements. When employees remain focused, and the need to switch their cognitive resources is limited, they feel more productive at work (Agarwal et al., 2000).

With an increase in distractions, an increase in workload can be perceived. Owing to employees becoming more distracted and having to shift their cognitive resources between tasks, the time associated with completing tasks is prolonged. This results in employees feeling less productive at work and could lead to additional stressors related to the work environment. It has been established that continuously distracted employees experience an increased workload associated with their regular work requirements (Mark et al., 2018).

Through self-regulating technology, the goal is to minimize workday distractions and only allow those critical to the end user; therefore, an employee's focus remains on their job responsibilities. For example, an end user could set work-related applications (Google Calendar, Emails, Business Calls) and personal notifications from family members. This allows the end user to customize the necessary and maintain their focus on the activities according to their job specifications. The subsequent section identifies the research purpose and the crucial information provided.

1.3 Purpose of the study

This study aimed to determine the effect of self-regulating technology on workplace efficiency. This research focused on the extent to which employees are aware of available self-regulating technologies; whether its use affects their efficiency; how they perceive the effect of these technologies on their daily work requirements; its use as a tool to minimize distractions throughout the workday. This research contributes to the scientific knowledge regarding workplace self-regulating technologies and their effects.

With the widespread, and increasing usage, of mobile/cellular devices; be it for personal or business use; invariably leads to distractions in the workplace. In an attempt to minimize these distractions, the application of self-regulating technologies allows employees to filter out or even block various types of communication-based distractions. This study holds that the effectiveness of self-regulating technology in promoting workplace efficiency is still unclear and sets out to investigate and determine the actual usage of self-regulating applications within the workplace.

1.4 Problem statement

The problem encountered is a lack of evidence depicting the effect of self-regulating technologies on workplace efficiency. The evidence established in this research is an asset to organizations in creating an environment where: employees remain focused on their job requirements; experience fewer distractions during their workday; and reduce work-related stress associated with diverse distractions during the workday.

According to the literature analyzed, by limiting distractions, employees maintain focus. Self-regulating technologies are designed to help users restrict technological distractions by allowing them to configure the settings according to their preferences. Do self-regulation technologies help employees maintain their focus on their work requirements? Do self-regulating technologies create a work environment where employees do not strain their cognitive attentional resources owing to mobile or other technological distractions? These questions confirm a divergence in the scientific body of knowledge regarding the effect of self-regulating technology on workplace efficiency.

Because of the divergence identified in the scientific body of knowledge, the following problem statement evolved: insufficient evidence exists to suggest and support the claim that self-

regulating technologies can promote workplace efficiency. This research involved supportive evidence and investigation to measure the influence of self-regulation technologies on employee efficiency and effectiveness. A clear understanding of what self-regulation technologies entail is presented; an investigation into the approaches to measuring employee efficiency is conducted. These two variables are correlated, and their relationship is explained.

1.5 Research questions and objectives

The main research question is as follows:

What impact does the daily use of self-regulating technology have on employee workplace efficiency?

The main research question encapsulates both topics solicited, indicating business and technology adoption. It specifies what self-regulating technology is examined and its relationship to business processes; therefore, it provides a clear goal for the research. It is scoped to a specific technology to resolve workplace efficiency.

From this main research question, the following supportive sub-questions are identified and will help support the main question in their objectives:

Research Question 1 (RQ1): *What is the effect of workplace distractions on workplace efficiency?*

This sub-question aims to identify and explain the effect of device distractions on an employee's attentional and cognitive resources and overall workplace efficiency.

Research Question 2 (RQ2): *How do self-regulation applications help employees maintain focus by limiting distractions?*

This sub-question aims to identify and explain how limiting distractions through self-regulation technologies can help employees maintain their focus on job-specific activities.

The main research question and sub-questions guide the research in a general direction while regulating the divergence identified in the scientific body of knowledge regarding business and self-regulatory technologies.

1.6 Limitations, delimitations, and critical assumptions

The following are the limitations identified and areas that this study omitted:

- This study focused on self-regulating technologies readily available to employees and organizations.
- This study focused on how self-regulating technology can promote workplace efficiency by eliminating distractions and how this alters employee efficiency.
- This study focused on research, including 2022, as the source of information for responsible technology use in various communities.
- The study focused on the self-regulating technologies readily available and relies on data gathered from seventeen semi-structured interviews with Software Engineers working in the South African consulting, financial services, and retail industries. The data was gathered in the second semester of the year 2023.

1.7 Research motivation

As reported previously, no supportive evidence supports that self-regulating technology can improve workplace efficiency; however, positive, and adverse implications of using self-regulation technology are established. Since technology continually expands and evolves, an apparent understanding of how to use technology responsibly through self-regulation should be determined according to how this can promote workplace efficiency. The motivation for the research is to assess the effect of self-regulating technologies on workplace efficiency and how they can decrease employee distractions while improving their focus on job requirements.

1.8 Research contribution

This research focused on providing a better understanding of how self-regulating technology can affect workplace efficiency. This chapter clarifies that no definitive evidence exists that self-regulation technology can improve workplace efficiency.

This research aimed to provide a clearer understanding of what self-regulatory technology encompasses, how its use can limit distractions encountered by employees, and how it can improve workplace efficiency.

1.9 Chapter overview

Chapter 1: INTRODUCTION AND BACKGROUND

This chapter presents the introduction, background information, purpose, problem statement, questions and objectives, limitations, delimitations, critical assumptions, research motivation, and chapter overviews. The information portrays a general understanding of the research area, which will present a better understanding of the problem identified and how it will give a more explicit resolution thereof. The objectives and sub-questions for the study are also provided, which will help the reader understand what supporting documentation and information is required to know how the primary goal of the research can be achieved. An overview and a chapter map of the research are also provided.

Chapter 2: LITERATURE REVIEW

This chapter presents credible sources obtained to guide the main topic of the research. This supports the research objectives and sub-questions to align the investigation toward a conclusion. How the information is obtained and used is identified.

Chapter 3: THEORETICAL

This section of the research presents the theoretical support, factors affecting self-regulation and workplace efficiency, the relationships between these factors, and a proposed theoretical framework. This section helps the research understand what the relationships between the various facets of self-regulation and workplace efficiency entail. It enables the study to identify the correlations between diverse phenomena and will serve as the guidelines for creating a proposed theoretical framework based on the evidence obtained.

Chapter 4: RESEARCH METHODOLOGY

This chapter explains the methodology used. The research philosophy and strategy used to obtain information supporting the research are identified. The supporting research documentation analysis process is described in this section of the research, and any ethical concerns with the study are concluded.

Chapter 5: DATA ANALYSIS AND RESULTS **and results**

This chapter presents the analysis of the data collected and captured and a discussion regarding the analysis results. This chapter aims to use the information obtained to guide the primary goal of the research.

Chapter 6: SUMMARY

This chapter presents a summary of the findings and a conclusion of the contributions to the research. This chapter also provides additional potential future research that could be experienced to support the main goal and findings of the research.

1.10 Chapter map

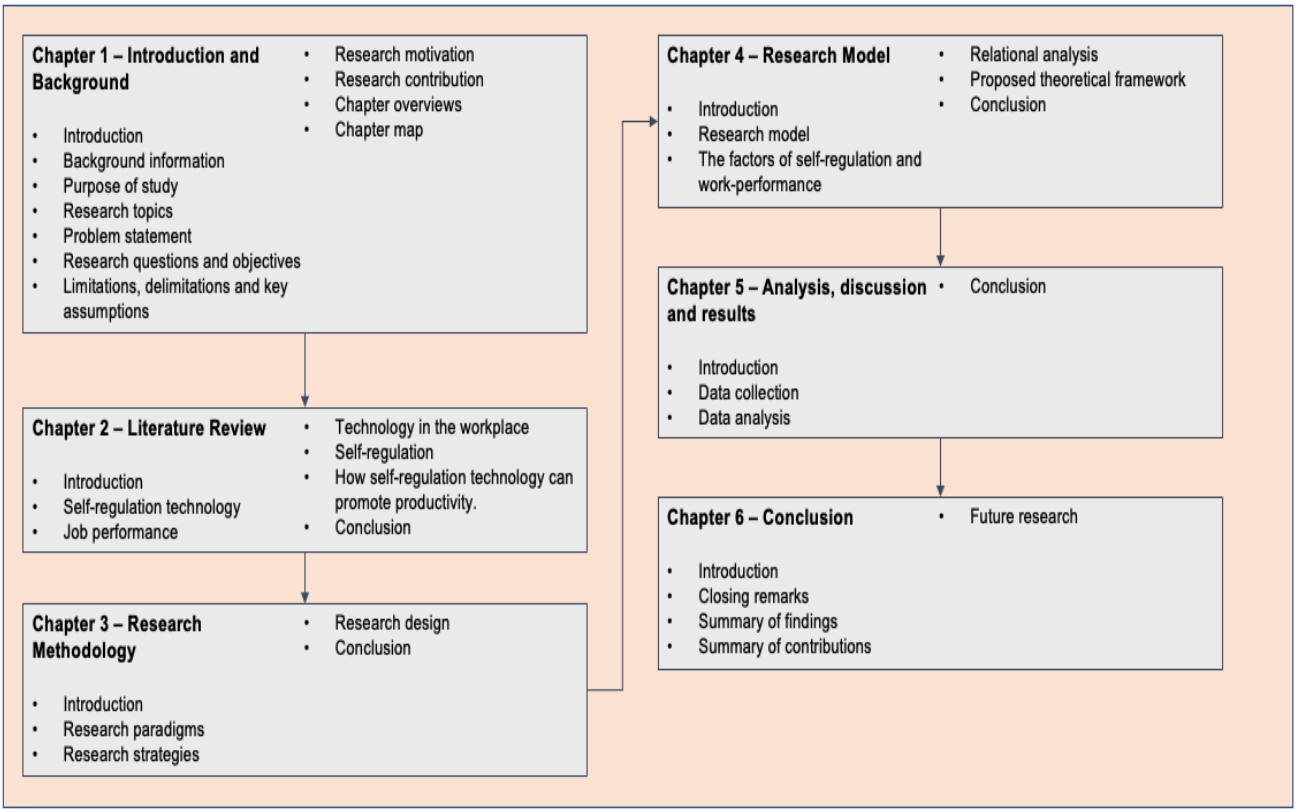


Figure 1-1: Chapter map

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this research section, a comprehensive literature review examines the scientific body of knowledge surrounding self-regulation technology and evaluating workplace efficiency. Knopf's (2006) analysis and explanation of what a literature review entails include several benefits of creating literature on a specific body of knowledge:

- A general overview of a body of research, which you are unfamiliar with, is provided.
- It reveals what research has been conducted on a specific topic.
- It can inspire innovative ideas in an individual's research.
- It can help identify flaws in the knowledge surrounding a specific topic.
- It enables you to put your research in a larger context.

The following chapter and its relevant subsections provide information from credible sources to form the literature review of this study; the data obtained presents the needed information to grasp the concepts of how self-regulatory technology can promote workplace efficiency and forms the foundation for research. The literature review also includes the divergences identified between the correlation between self-regulatory technology and workplace efficiency. The literature review provides crucial information and foundational information to answer the main research question.

2.2 Self-regulation

Self-regulation, in its entirety, is a concept that has been studied since the earliest days of psychology. James et al. (1890) remarked that "there is, accordingly, no better known or more generally useful precept in the moral training of youth, or one's self-discipline, than that which bids us pay primary attention to what we do and express, and not to care too much for what we feel," This statement indicated that, self-regulation is one of the critical factors of moral psychology and that self-control should be strived for in any circumstance; therefore, your own emotions do not overtrump your actions.

Halfon et al. (2018) noted a set of critical skills attributed to self-regulation, relating to developing control over one's attention, inhibitory control, and working memory. From this, the

intent behind self-regulation is to maintain, govern, and control one's own behavior in any circumstance and centers around one's own cognition.

According to Vancouver and Day (2005), self-regulation is the "processes involved in attaining and maintaining goals, where goals are internally represented desired states". From this definition, self-regulation is a phenomenon that entails governing, controlling, and maintaining an individual's attention and aligning it to attaining a specific goal. Self-regulation is a supportive action; it helps us focus on what is essential, and as remarked by Lord et al. (2010), has become a crucial skill for the modern-day work environment.

Self-regulation can, therefore, be observed as a psychological phenomenon that involves self-control and can be subdivided into two main psychosocial categories: behavioral self-regulation and emotional self-regulation. Stotsny (2011) describes behavioral self-regulation as "the ability to act in your long-term best interest, consistent with your deepest values." It involves pursuing your long-term goals regardless of your psychological state. Emotional self-regulation, as described by Calkins (2004), is the "process that serves to manage emotional arousal and support adaptive social and non-social responses". It involves managing and controlling one's emotional reactions to situations around you. From the psychological concept of self-regulation, numerous studies have been conducted to determine its effect on various world views, environments, and situations.

Self-regulation is a user's ability to govern and manage their technological interactions and is regarded as one of the critical factors of responsible technology use. It involves self-management and self-awareness (Bell & Kozlowski, 2002). Self-regulation can be divided into two main categories: self-monitoring and self-awareness. The prior refers to an individual's ability to allocate their attention to a specific task and maintain a focus on the consequences of this behavior. The latter refers to comparing individuals' performance with their desired goals (Kanfer & Ackerman, 1996). Thus self-regulatory technology allows end users to become more self-aware and monitor their technological use.

Nikkelen et al. (2014) investigated the influence of technology and media use on child development; it was established that an increase in media and technological use at a young age resulted in a decrease in developing self-regulatory skills, which led to attention-deficit-disorder-like behaviors (Nikkelen et al., 2014).

From a work environment, Lord et al. (2010) established that self-regulation concerning work requirements and goal setting has become a crucial skill employees need to have in the modern work era. Since there is an ever-increasing rate of workplace distractions through the introduction of new technological devices, employees should adhere to self-regulatory guidelines to ensure that their focus remains on work-specific activities. Sitzmann (2009) noted that there are various strategies to promote self-regulation through technology in the workplace, and it is an essential tool for managing the proportion of cognitive resources used on task performance. By applying self-regulation, it can be assumed that the cognitive strain perceived by an end user is minimized and that focus is asserted on task requirements.

Technology has created an environment of unprecedented convenience, access to information, and connectivity for its users; however, accompanied by this technological revolution, numerous challenges have been made and identified, for example, the challenge for individuals to manage their interactions with these technological apparatuses responsibly in an ever increasingly complex digital landscape (Oulasvirta et al., 2012).

From the literature obtained, a clearer understanding of what self-regulation entails is depicted. It can also be observed that self-regulation is a psychological phenomenon that has been researched in certain scientific bodies of knowledge; however, understanding how self-regulation and the technology that supports it can benefit employees has not been investigated comprehensively. These sections display further investigation into workplace efficiency measurements and how it relates to self-regulation, and ways technology can support these interactions. The following subsections investigate past research on self-regulation to understand what this psychological phenomenon entails and how it affects us as end users.

2.2.1 Self-regulation literature

Self-regulation is the ability to manage, control, and govern your behavior. Self-regulation is almost a synonym for self-control (Bell, 2017). It is a psychological field of study that has received abundant attention in recent years and is a crucial contributor to various outcomes.

With regards to self-regulation, the following literature investigated its impact on adolescents. Evans et al. (2012) investigated the influence of self-regulation on obesity tendencies. They established that with greater self-regulation, a decrease in obesity exists since greater control over the individual's eating habits was established, resulting in consuming healthier foods. Accompanied with this Romer et al. (2010) investigated the influence self-regulation has on

academic achievement in adolescence and determined that with an increase in self-regulation and supporting variables, a greater tendency to flourish academically existed. Furthermore, Blair (2010) investigated self-regulation and stress development in relation to child development and noted that early life stress, more frequently observed in children raised in poverty, would reduce self-regulatory skills.

With regards to self-regulation, the following literature investigated its impact on individuals with regards to their workplace efficiency. Rubinstein et al. (2001) investigated the influence of executive control on cognitive processes in task switching. They established that task-switching interference effects contribute significantly to time costs. With self-regulating technologies, people can reduce the cognitive costs of multitasking. Accompanied with this, Lord et al. (2010) investigated the influence self-regulation has on employee efficiency and created various measurement techniques and tools to determine the influence of self-regulation on workplace efficiency. Furthermore, Schmeichel et al. (2008) studied the effect self-regulation has on the cognitive abilities of individuals and how this affects our psychological demeanor and remarked that the cognitive ability and capacity of an individual significantly affect their ability to control and self-regulate their emotions. Finally, Vohs and Baumeister (2016) studied the influence and development of self-regulation and how this phenomenon affects humans and remarked that self-regulation can significantly influence several attributes of an individual and how we respond to society.

2.3 Workplace efficiency

In today's overly competitive and highly dynamic work environment, an efficient employee is a crucial resource for an organization's success. In recent studies (Smith, 2018; Kim & Christensen, 2019), it is emphasized that optimizing workplace efficiency directly contributes to a working environment with increased productivity, accompanied by better job satisfaction. With the increased dependency on technology in the workplace, recent studies (Grant & Parker, 2019; Malik et al., 2020) indicate that understanding what enables an employee to be efficient and how to foster an environment with increased efficiency is fundamental to an organization and that it should be incorporated into the corporate strategies of organizations.

Workplace efficiency refers to the standard of quality an employee performs according to their job specifications and requirements and involves numerous metrics and measurement guidelines. It requires employee activities and performance standards (Jiang et al., 2021).

Organizations use metrics combined with efficiency evaluations and management systems to ensure that their organization cultivates a productive environment. Efficiency in an office environment has been documented, and various approaches to the measurement thereof have been made. A dominant paradigm in the early days of business efficiency measurement in an office environment was scientific management. Taylor (1911) proposed a methodology in which some remarked that if a time and motion study is undertaken, the most efficient way of task efficiency can be identified (Taylor, 1911). With this methodology, the optimal way of performing a task was identified and resulted in constructing a standardized working method and working environment.

Since a standardized working method and environment is more of a conceptual idea rather than something genuinely obtainable, numerous studies support the claims made by Taylor. Roethlisberger and Dickson (1939), for example, studied the changes in human behavior in various working environments and strived to determine what effects an employee's working environment has on their efficiency, and found that an employee's overall efficiency is very determent on their working environment (Roethlisberger & Dickson, 1939).

Since the environment in which an employee performs their job requirements has been established to contribute to the efficiency of an employee, further investigation into what productivity entails was needed. Sink (1985) suggests that an organization's productivity comprises several factors, these being:

- The effectiveness of the employee (the work quality, the quantity of work, and meeting targets).
- The efficiency of the employee (the ratio of expected resources to be consumed by the employee).
- The quality of the employee (the assessment of the work quality for the employee).
- The profitability of the employee (the ratio of total revenues contrasted to the total costs of the employee).
- The productivity of the employee (the ratio outputs compared to inputs).
- The employee's work-life quality (the psychosocial aspects and social responses to the organization).
- The employee's innovative aspirations.

Sink (1985) suggests that these efficiency factors are the building blocks of an efficient organization (Sink, 1985).

Supporting the claims by Sink (1985), Groen et al. (2017) stated measurement metrics are more valid and credible when the employees better understand their operational requirements. Measurement metrics are the quantitative expressions of how well job requirements are met. From this, a significant approach to creating measurement metrics would be to include employee participation. Efficiency measurement metrics implemented by management are sensitive to employee actions and result directly from their work quality. It is challenging for organizations to create meaningful metrics, and it should be ensured that they are according to the organization's goals and desires (Groen et al., 2017).

Neely and Hii (1998) suggest that to quantify employee efficiency and create measurement metrics these guidelines, employee efficiency can be measured through employee feedback, measuring the rate of reaching organizational goals and targets, monitoring an employee's work efficiency and productivity, and by analyzing the employee's work quality (Neely & Hii 1998).

Mawson (2002) suggests an apparent problem with the measurement of employee efficiency and remarks that "Efficiency is comparatively easy to understand and measure in a manufacturing economy, but as our economies have migrated from manufacturing to service and on to knowledge-based, so the whole issue of assessing efficiency has become less clear." (Mawson, 2002). From this statement, Taylor's statement can be supported: the environment where an employee performs their job requirements needs to be understood and can significantly affect how we perceive efficiency.

2.4 Technology in the workplace

The reshaping of an organization's working dynamics results directly from integrating technology into the modern-day workplace. Recent studies by Brynjolfsson and McAfee (2017) and Davenport et al. (2018) emphasize the transformative influence on organizations owing to the ever-changing technological landscape the working environment has morphed into. With the continuous innovation of more efficient ways of conducting business, it is fundamental for organizations to understand the implications and benefits of correctly using technology in the workplace, which can benefit an organization's strategies.

With technology becoming ever more prevalent in the workplace, the subsequent section presents a historical investigation into the technological revolution in the working environment.

2.4.1 The historical impact of technology in the workplace

Historically, according to Emad (2010), the modern-day workplace has experienced significant changes owing to innovative technological advances. These technological advantages strive to create a work environment where efficiency and effectiveness are a top priority. These new technological advantages have also significantly changed how job requirements and specifications are performed, as automation and technology have sometimes eradicated human interactions and streamlined organizational activities (Emad, 2010).

As mentioned in the *workplace efficiency* Section 2.3 of the literature review, extensive research has revealed that an employee's work environment can significantly affect their efficiency (Sink, 1985). Accompanied by these changes to the workplace, comprehensive studies have investigated the influence of technological changes and advancements on workplace efficiency. Brynjolfsson and Hitt (1996) used a micro-analysis of technological use in the workplace and established a positive relationship between computer use and employee efficiency. Kreuger (1993) established that knowledge-based workers using computers were paid 15% more than those without (Kreuger, 1993). Lowe (1997) investigated the influence computer use has on workplace efficiency, job requirements, and income distribution; it was established that the technological advantages in the workplace, even though it represented a threat in the sense of automation in production industries, allowed a development environment for skill acquisition (Lowe, 1997).

Technology in the workplace is no longer limited to computer use; mobile phones also play a significant role in the modern work era. Townsend and Batchelor (2005) studied how using mobile phones in the workplace has changed how businesses operate. This study established that mobile devices are a crucial contributor to work-life balance issues since this technology has significantly improved how employees communicate; simultaneously, it also created an environment where work-related stressors flourished. Since a clear line, distinguishing work and non-work-related activities has become fuzzy (Townsend & Batchelor, 2005).

Unfortunately, accompanied by these technological advancements, a new threat to work productivity has protruded—cyberslacking. Cyberslacking is a term coined to identify the personal use of Internet and mobile technology during work hours (Bock, 2009). Recent

studies established that cyberslacking is a phenomenon that significantly deteriorates workplace efficiency and estimated more than $1 billion is annually lost as a result (Miltsov, 2019). Cyberslacking involves personal technology use during work hours and includes a wide range of activities, such as online shopping, social media, blogging, and gaming; however, even though these activities are leisure activities, Garret and Danziger (2008) identified that neither job-related stress nor job satisfaction were related to the time spent using technology at work for personal use (Garret & Danziger, 2008).

Miltsov (2019) examined computers in human behavior, where the cause for cyberslacking was attempted to be identified. With this study, various aspects of work-related characteristics were discussed, and a conclusion was achieved that cyberslacking was a habit and that organizations need to create an environment where adverse practices could be eradicated to ensure optimized workplace efficiency (Miltsov, 2011).

2.4.2 Technology in the workplace today

One of the critical innovations of today's modern work environment is the increased collaboration tools available. In the current working environment, numerous studies (Grant & Parker, 2019; Leonardi, 2020) on collaborative technologies and tools such as, *Microsoft Teams, Slack and Discord,* have been investigated to determine their fundamental influence on business procedures. It was established that with these collaboration tools, a new, refined approach to how teams interact and coordinate with each other has been created.

Grant and Parker (2019) investigated the influence collaboration tools have on a team's efficiency and advocate for its ability to foster greater communication, knowledge sharing, and task coordination among team members; however, as indicated by Leesakul et al. (2022), the over-reliance and improper utilization of these tools could lead to information overload, resulting in a decreased efficiency for specific individuals.

From the literature analyzed, an apparent problem can be observed. Even though technology significantly improves organizational communications and can be a platform for customer engagement, a threat to employee performance has been introduced. To optimize workplace efficiency, it is necessary to create, use, and enforce a mechanism to govern and manage threats; self-regulation can play a crucial role. The subsequent section explains self-regulation technology and how these technologies can improve employee efficiency.

2.5 Self-regulation technology

There are several ways technology can make users more self-aware of their technological interactions. One example would be machine learning to collect information about the end user's technological interaction, such as application usage and time spent (this is known as screen time). The second would allow the end user to customize the applications, notifications, call controls, and automatic replies through self-regulatory configuration (Mark et al., 2018).

Self-regulation technologies in the form of *focus* applications are an example of technologies that help end users maintain their focus on tasks. *Focus* technologies are applications developed to minimize distractions and enforce an environment where the end users' goals are prioritized (Le et al., 2021). These applications are configurable per end users and strive to improve an individual's productivity.

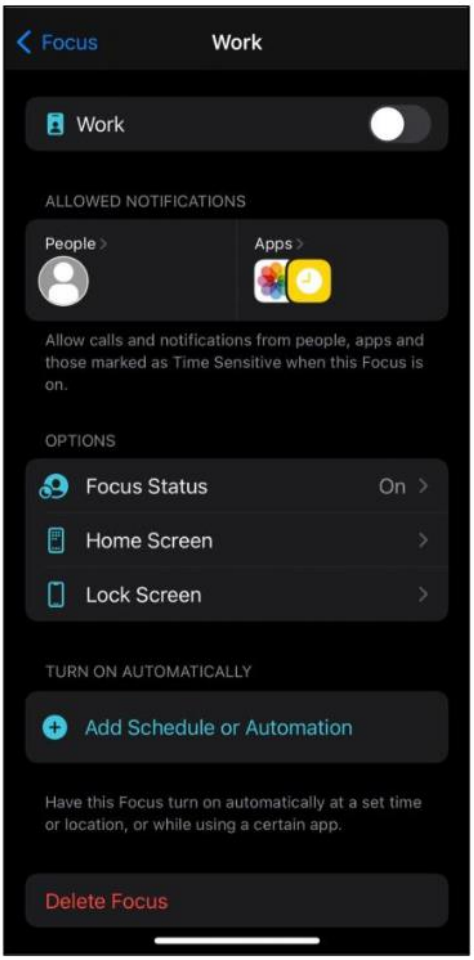


Figure 2-1: Apple Focus Mode

As an example, Error! Reference source not found. depicts *Apple Inc's Focus Mode Technology*; in this, users can configure schedules; in these schedules, users can configure what people may contact them, what applications they are allowed to use, what notifications may be displayed, and what time frame this focus session should occur in. This empowers employees to tailor their work schedule, control who can contact them during work hours, decide which apps they can use on their mobile device, and determine when these limitations should be enforced. An end user can make a behavioral change through this technology, which can help align attentional and cognitive resources on task performance.

Self-regulation technologies encompass various tools and applications created to help individuals manage and improve their cognitive and emotional behavioral interactions with technology. These technologies are developed based on principles established in psychology, HCI (Human-Computer Interaction), and data sciences to promote healthier interactions with technologies in time management, goal acquisition, stress reduction, and technological addiction management. Self-regulation technologies were created as a proactive response to the ever-changing technological landscape, with technology constantly expanding its grasp on everyday lives (Orben & Przybylski, 2019).

With mobile devices, be it smartphones, tablets, or smartwatches, becoming increasingly present in our daily lives, with Deloitte (2017) estimating that approximately 78% of the world's population owns a smartphone, 50% or more have tablets and roughly 10% own smartwatch devices (Deloitte, 2017) people have access to an abundance of applications, and one category of applications which is becoming increasingly popular is those of device usage analytic applications.

A device usage analytic application is software applications that help and support users to produce and create things, such as documents, databases, graphs, worksheets, and presentations (Wigmore, 2022). These applications have become increasingly popular in the modern work era since they accommodate an environment where workplace efficiency can flourish by diminishing the distractions an employee encounters during their workday. A distraction can be defined as an object or interaction directing an individual's attention away (Merriam-Webster.com, 2022). Regarding workplace distractions, numerous approaches are suggested to control distractions, including scheduling and timing the presentation of interruptions, and shutting off notifications from devices and social media applications. It is contended that switching off notifications and asserting an individual's attention to job

requirements can be beneficial; however, enabling these notifications and distractions could also contribute to the replenishment of mental resources (Mark et al., 2018).

Distractions in the workplace, such as social media usage, online shopping, and other online applications, form a way of escaping the demands and requirements of work and are stimuli to mental health; however, managing these distractions to breaks and specific times is a way of ensuring that the cognitive processes used by an employee during the workday are well balanced on job specifications and mental health replenishment (Le et al., 2021). When distractions are blocked, an employee's focus is maintained on specific tasks, and work engagement is promoted. Studies have indicated that individuals have a limited capacity of attentional resources, and during these distractions, this cognitive resource becomes strained. Since employees must shift their attention between distractions and job requirements, information stored in their short-term or work memory can become lost or corrupted (Loaiza, 2019).

Workplace distractions also harm team productivity. Work specifications and tasks interrupted by distractions take a longer time to complete and can have a decrease in the work quality performed. When these distractions are minimized, teams in organizations feel more productive, since their work time allocation is spent more efficiently (Loaiza, 2019). Workplace distractions affect an individual's cognitive attentional resources. When they must switch their attention from one subject to another, these cognitive attentional resources become depleted. When an individual's cognitive attentional resources are depleted, they cannot maintain focus on their job requirements. This results in an individual taking longer to perform specific tasks and could alter the individual's work quality (Loaiza, 2019).

It has been established that a negative correlation exists between workplace efficiency and distractions perceived in the workplace. This indicates that with an increase in distractions, a decrease in workplace efficiency can be expected; however, vice versa is also true. A reduction in distractions will lead to an increase in employee efficiency, since employees can maintain their focus on their job requirements and increase their productivity in the workplace (Wu et al., 2020). Distractions can also be a way of refreshing and maintaining mental health during the workday. When taking a break from work-related activities through social media or other technological platforms, employees' mental health improves, and the stress related to work requirements is momentarily reduced (Wu et al, 2020).

Employee mental health and job satisfaction are intricately linked. If an employee has complete job satisfaction, their mental health directly improves. Job satisfaction is the extent to which employees are content with their job requirements and specifications. Work-related stressors, such as the burnout syndrome, directly affect an employee's mental health. This results in an employee losing interest in performing their work requirements most optimally. When distractions are perceived, momentary enlightenment from work requirements is introduced. This results in an employee escaping from their work momentarily and replenishing their cognitive resources, therefore improving their job satisfaction by limiting and reducing the various work-related stressors perceived in the workplace; however, when work productivity is diminished owing to these distractions, employees can also become disdained and could lead to a decrease in job satisfaction. From this, a fine line exists between when distractions can positively or adversely affect job satisfaction (Hailoo et al., 2013).

Various technologies are developed to improve self-regulation; self-regulation begins when an action goal is chosen (Carver et al., 2001). These technologies all strive to achieve greater productivity from the end user. A clearer understanding of what self-regulation technology entails has been examined. How self-regulating technology can promote workplace productivity is discussed next.

2.6 Ways where self-regulating technology can promote workplace efficiency

Regarding workplace distractions, it should be identified whether fewer workplace distractions improve work efficiency and how self-regulating technology can limit the distractions an employee encounters during the workday. When analyzing distractions and how they affect an individual, cognitive capacity and capability should also be considered. An individual's cognitive ability encompasses remaining focused on a task while maintaining interest. Studies have established that an individual has limited cognitive attentional resources, and when distractions are introduced, these resources are drained because they must switch their cognitive resources between tasks (Loaiza, 2019).

As distractions are introduced in the workplace, multitasking becomes an essential skill; however, when switching between tasks, it prolongs the time to complete and can affect the work quality if concentration is not maintained. When distractions are limited, the need for multitasking decreases and monotasking occurs. This allows individual employees to maintain their focus on job specifications and decreases the time costs associated with job

requirements. When employees remain focused on a task and the need to switch their cognitive resources is limited, they feel more productive (Kaur et al., 2020).

With an increase in distractions, an increase in workload can be perceived. Owing to employees becoming more distracted and having to shift their cognitive resources between tasks, the time associated with completing tasks is prolonged. This results in employees feeling less productive at work and could lead to additional stressors related to the work environment. It has been established that employees continuously distracted in the workplace feel an increased workload associated with their regular work requirements (Orhan et al., 2021).

Regarding distractions and workplace efficiency, with an increase in distractions, a decrease in efficiency can be perceived, resulting in an adverse correlation between workplace distractions and efficiency.

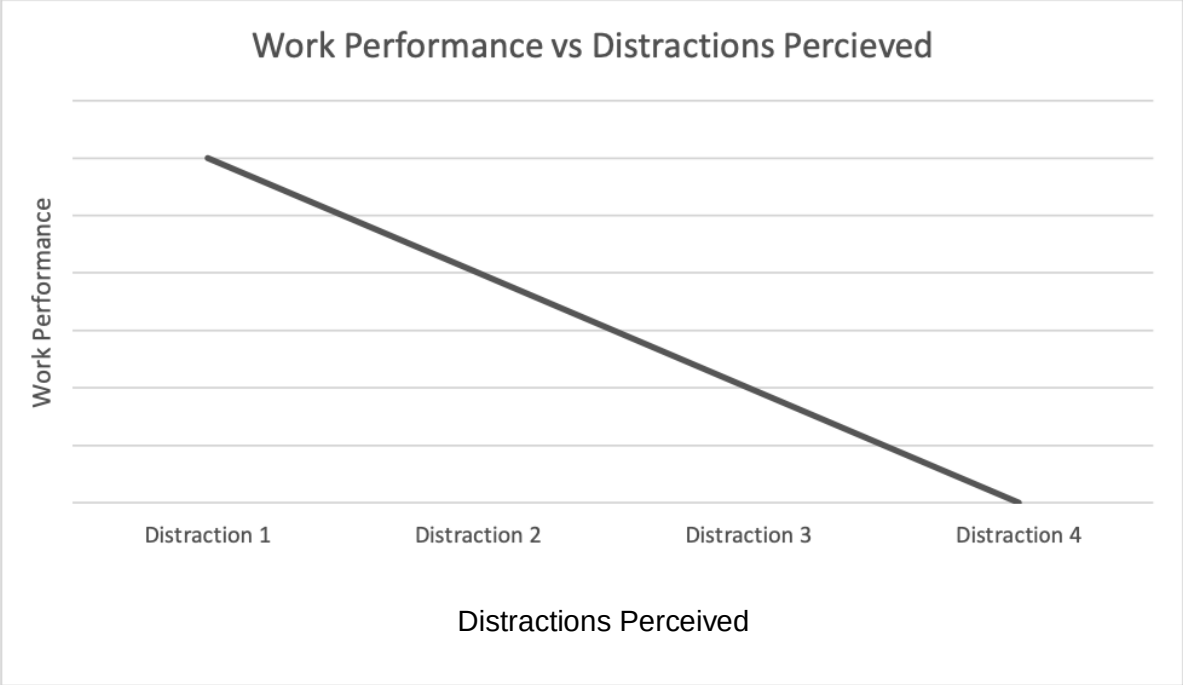


Figure 2-2: Work efficiency against distractions (Orhan et al., 2021)

Self-regulating technology allows end users to minimize the distractions perceived through their devices in specific periods. With technology, such as *Apple Inc.'s* or *Samsung's Focus Mode,* users can institute work schedules. These work schedules allow the user to set specific

times they are in the workplace and want their attention to be focused on work requirements. In these work schedules, there are more limitations and configurations available.

The end user of the self-regulating technology can set the various notifications they may get in their work schedule. The end user can configure who may phone them or send instant messages, and the end user is enabled to manage and govern the various applications they may use in the specific period.

When we examine the various configurations available to the end user by using the self-regulating technologies available, we can determine that the number of distractions received in a provided period can be limited. This limitation on their technological devices allows them to stay focused on job requirements by eliminating unwanted distractions.

Self-regulating technology can reduce the distractions perceived during the workday; when distractions are reduced, an employee's attentional cognitive resources are devoted to their job requirements. When an employee's complete attentional resources are dedicated to their job requirements, an improvement in job efficiency and effectiveness can be perceived. From this, if an organization or individual uses self-regulating technology, they can directly contribute to the advancement of their workplace efficiency (Mark et al., 2017).

By using technology, employees can limit unwanted distractions in their workday and ensure that their time spent in their work schedule is spent productively. Limiting the notifications received from unwanted applications reduces distractions that require the employee's attention, and only the notifications that the employee considers necessary are displayed to them. By making the employee aware of their time spent on their devices by machine learning and analytics, they become more self-aware of their time spent on technology and can start to govern their technological use in their work schedule (Orhan et al., 2021).

Limiting the calls and instant messaging requests received during the workday would also lead to employees maintaining their mental focus on their job requirements and keeping their attention on job-related conversations. When governing the various applications available to use in their work schedule, it also ensures that employees remain focused on job specifications without spending time unproductively with non-work-related software applications or websites.

Lord et al. (2010) depicts analyzing self-regulation and workplace efficiency in a negative feedback loop, where a cognitive change was achieved to improve task acquisition. This is an example of how employees can analyze their own self-regulation job-related gains by setting a goal, making a conscious decision on change, and tracking if this change aligns them closer to their task (Lord et al., 2010).

If an employee uses self-regulating technology, the assumption can be made that they will become more efficient in their work schedule. This assumption should indicate that individuals and organizations should use the self-regulating technologies available to them to ensure their workforce becomes optimally efficient.

2.7 Conclusion

In the literature review section of this research, self-regulating technology, workplace efficiency, and workplace distractions were described, a deeper understanding of what self-regulating technology was provided, a clearer understanding of workplace efficiency and how it can be measured was provided, and the distractions perceived in the workplace. Their positive and adverse implications are identified.

The literature review provides insight into how distractions can alter workplace efficiency and satisfaction and how limiting them could lead to an increase in workplace efficiency. The literature review also drew connotations among distractions and how they can be determined with self-regulating technology and how this limitation affects workplace efficiency. To conclude, the literature review is the foundation for the study. The literature review helped to better understand how workplace efficiency can be altered through self-regulating technology.

CHAPTER 3: THEORETICAL UNDERPINNING OF SELF-REGULATING TECHNOLOGIES

3.1 Introduction

This section provides theoretical support, the factors affecting self-regulation and work performance, the relationships between these factors, and a proposed theoretical framework. This section helps the research understand what the relationships between the factors of self-regulation and work performance entail. It enables the study to identify the correlations among diverse phenomena. The guidelines for creating a proposed theoretical framework based on the evidence obtained are presented.

3.2 Research models

A research model is a framework, or approach used to conduct research in a particular field. It is a way of organizing and analyzing data to answer a research question or test a hypothesis. Research models are often used in the social sciences, such as psychology and sociology, and in other fields, such as biology and economics. These models can be theoretical, empirical, or a combination of both and are designed to help researchers better understand a particular phenomenon or topic (Shaw, 2002).

A theoretical research model is a research framework or approach based on a set of assumptions or theoretical principles. It is a way of organizing and interpreting data to understand a particular phenomenon or topic better. A theoretical research model provides a framework for understanding the fundamental mechanisms that govern a specific phenomenon or behavior. An empirical research model is a framework or approach to research based on empirical evidence or evidence based on observation or experience. It is a way of organizing and analyzing data to answer a research question or test a hypothesis. Empirical research models are often used in the natural sciences, such as biology and physics, designed to provide a basis for understanding the relationships among variables and phenomena. These models can be tested and validated through data collection and statistical analysis (Wagner, 2003).

There is no one specific way to create a research model, as the process can vary depending on the research conducted and the research question or hypothesis tested; however, creating a research model typically involves these steps:

- **Identify the research question or hypothesis you want to investigate.** This will guide the development of a research model and ensure that it focuses on approaching the specific concern or problem of interest.
- **Review the existing literature on the topic.** This will help us to understand the state of knowledge on the subject and identify any divergences or areas where further research is needed.
- **Develop a theoretical framework or set of assumptions to serve as the basis for the research model**. This framework should be based on existing theories and knowledge about the topic and should help to provide a logical and coherent structure for the research.
- **Determine the variables to be studied and how they will be measured.** This will help to design a study and collect data that can test the hypothesis or answer the research question.
- **Select the appropriate research design and methodology for the study.** This will depend on the research question or hypothesis tested and the data that will be collected.
- **Collect and analyze the data according to the research design and methodology.** This may involve experimenting, surveys, or other data collection forms, and applying statistical analysis to the data to test the hypothesis or answer the research question.
- **Interpret the results of the study and draw conclusions based on the data collected.** This may involve discussing the implications of the findings and making recommendations for future research on the topic.

Creating a research model is a complex and iterative process involving thoroughly understanding the topic and the appropriate research methods for studying it. Carefully plan and execute the study to obtain accurate and reliable results (Fraser & Galinsky, 2010).

From these steps, a more precise understanding of the factors of self-regulation and work performance is required; therefore, a relational analysis between the factors of these phenomena can be made; a theoretical framework can be constructed. The subsections analyze and explain the diverse self-regulation and work-performance factors.

3.3 Self-regulation and workplace efficiency

Self-regulation refers to the ability of an individual to control their thoughts, emotions, and behaviors to achieve their goals and maintain a sense of well-being. It is a crucial aspect of personal development and mental health, essential for managing stress, overcoming challenges, and succeeding in various domains of life (Bell, 2017).

Bell (2017) explains the following factors that can affect an individual's self-regulating ability:

- **Cognitive abilities:** The self-regulating ability relates to an individual's cognitive abilities, such as their ability to pay attention, remember information, and make decisions.
- **Emotional intelligence:** Individuals with high emotional intelligence can better understand and manage their emotions, enhancing their self-regulating ability.
- **Personality:** Certain personality traits, such as conscientiousness and emotional stability, are related to an individual's self-regulating ability.
- **Social support:** Having supportive relationships with others can provide individuals with the emotional and social resources they need to self-regulate effectively.
- **Environmental factors:** The environment where an individual lives and works can also affect their self-regulating ability. For example, a chaotic or stressful environment may make it more difficult for an individual to self-regulate, while a calm and supportive environment may facilitate self-regulation.

Cognitive abilities are mental processes enabling an individual to perceive, think, learn, and remember information. These abilities include attention, memory, language, problem-solving, and decision-making. Cognitive abilities are essential for daily life, including learning, communication, and problem-solving (Ones et al., 2012).

Emotional intelligence is the ability to understand and manage your own and others' emotions. It involves the ability to recognize, interpret, and respond to emotional cues and to use that information to guide one's thoughts, behaviors, and decisions. Emotional intelligence is a crucial factor in an individual's ability to form and maintain relationships and is also related to success in various domains of life, such as work, education, and personal well-being (Salovey & Mayer, 1990).

Personality is a set of psychological traits and characteristics that structure an individual's unique character. It is the pattern of thoughts, feelings, and behaviors consistent across various situations and periods. Personality is often considered a combination of traits, such as

introversion/extroversion, agreeableness, conscientiousness, emotional stability, and openness to experience. These traits are stable over time and can influence an individual's thoughts, feelings, and behaviors (Lazarus, 1963).

Social support refers to the emotional and practical assistance individuals receive from their social networks, such as friends, family, and other supportive individuals. Social support can come in several forms, such as emotional support (e.g., listening and providing comfort), informational support (e.g., advising and information), and tangible support (e.g., assisting with tasks or resources). Social support is vital for individuals' mental and physical health and can help to reduce stress, improve well-being, and increase resilience (Kaplan et al., 1977).

Environmental factors refer to the physical, social, and cultural conditions where individuals live and work. These factors can significantly influence an individual's health, well-being, and behavior. For example, environmental factors, such as air and water quality, noise, and access to green spaces, can affect physical health. Social and cultural factors, such as community support, access to education and healthcare, and cultural norms and values, can affect mental health and well-being. Environmental factors can also influence behavior, such as an individual's dietary choices, physical activity levels, and risk-taking behaviors (Özsomer et al., 1997). From the information obtained, it can be summarized that the factors of self-regulation include factors presented in Figure 3-1.

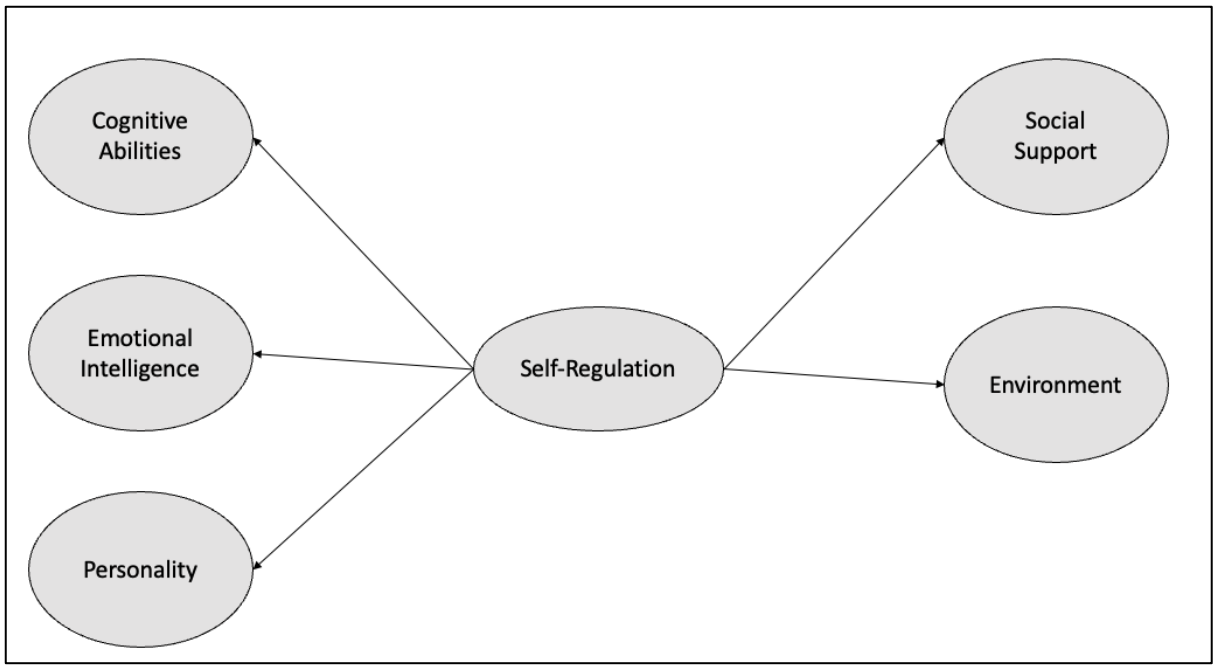


Figure 3-1: Self-regulation factors (Bell, 2017)

Workplace efficiency refers to the extent to which an individual meets the expectations and requirements of their job. It is a measure of the quality and quantity of work that an individual produces and the efficiency and effectiveness with which they complete tasks and meet objectives. Work efficiency is typically evaluated by supervisors or managers and can be affected by numerous factors, such as an individual's skills, knowledge, abilities, motivation, and working conditions (Koopmans et al., 2011).

Jayaweera (2015) explains the following factors affecting an individual's workplace efficiency:

Variable		Number of Items	Cronbach's Alba
Job Performance		22	0.936
Physical Work Factors	environmental	08	0.942
Psychosocial Factors	Environmental	15	0.961
Motivation		18	0.954

Figure 3-2: The variables of workplace efficiency (Jayweera, 2015)

- **Skills and knowledge:** An individual's skills and knowledge play a crucial role in their ability to perform well at work. Having the skills and knowledge to complete tasks and meet job requirements is essential for significant work efficiency.
- **Ability:** An individual's ability to perform a particular task or function is also an essential factor in their work efficiency. This may include physical abilities, such as manual dexterity or strength, and cognitive abilities, such as attention, memory, problem-solving and educational qualification.
- **Motivation:** An individual's motivation level can also affect their work efficiency. Individuals with high motivation levels are likely to exert the effort and concentration required for effective job performance.
- **Working conditions:** The working conditions where an individual performs their job can also affect their work efficiency. Factors, such as the physical environment, the availability of resources and support, and the level of support and feedback from supervisors and colleagues, can affect an individual's ability to perform well at work.
- **Personal factors:** An individual's personal characteristics, such as their personality, emotional intelligence, and self-regulation skills, sex, age, can also affect their work

efficiency. For example, organized, self-motivated individuals able to manage their emotions may be more likely to perform well at work.

Figure 3-3 presents the derived workplace efficiency factors from Jayweera's (2015) findings.

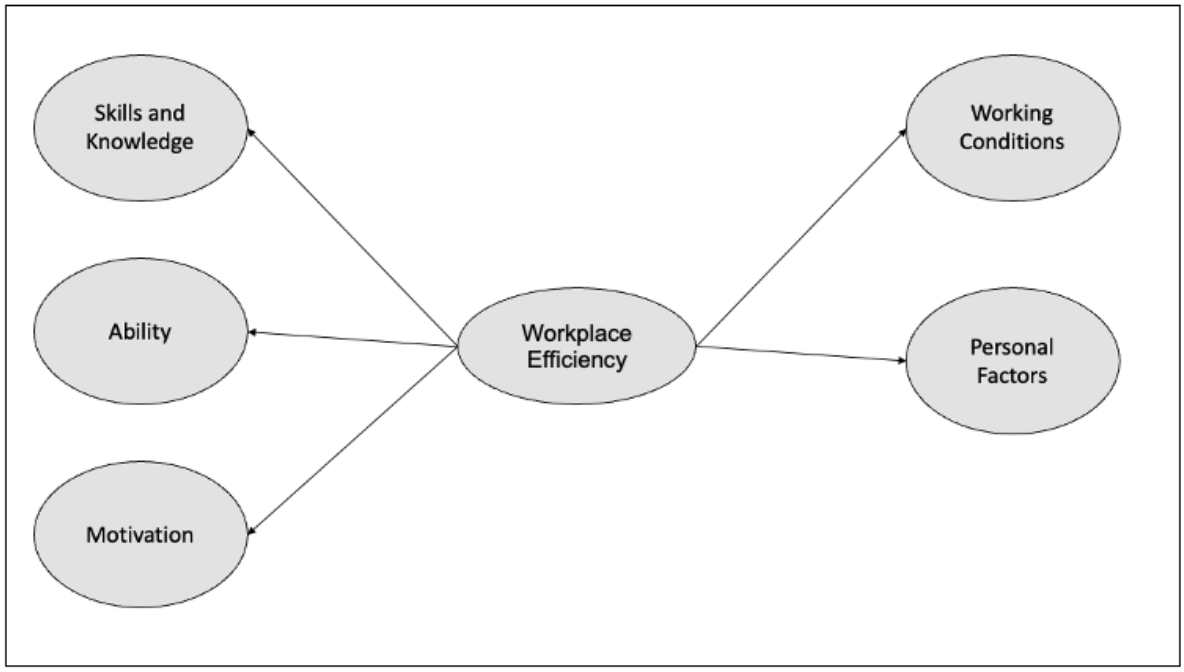


Figure 3-3: Derived workplace efficiency factors (Jayaweera, 2015)

A detailed relational analysis of the factors can help analyze and explain how these factors influence each other, with the identified factors affecting self-regulation and workplace efficiency.

3.4 Relational analysis

Relational analysis is a research methodology focusing on the relationships between various elements or variables in a system or environment. It involves studying the connections and interactions between these elements and how they influence each other. Relational analysis can be applied in various fields, such as sociology, psychology, and economics, and can help researchers better understand the dynamics of complex systems and motivating factors (Coleman, 1958). The relationships below, are evaluated (Sections 3.4.1 to 3.4.10).

3.4.1 Skills/knowledge and workplace efficiency

A strong relationship exists between an individual's skills and their workplace efficiency. The skills and knowledge to perform a job is essential for significant workplace efficiency. For example, if an individual lacks the technical skills required to operate a piece of equipment, they may not perform their job effectively. Similarly, if an individual lacks the interpersonal skills needed to work effectively with others, they may struggle to complete tasks or meet objectives that require collaboration. Having a solid set of skills can enable an individual to perform their job more effectively and efficiently and can improve their work competence (Sung & Ashton, 2005).

Smith (2018) identifies the following strategies for an employer to improve an employee's skills:

- **Providing training and development opportunities:** Employers can offer training and development programs to help employees learn new skills and improve their existing skills. These programs can be delivered in person or online, covering a wide range of topics, such as technical skills, leadership skills, or soft skills.
- **Creating a learning-friendly environment:** Employers can create a work environment encouraging learning and development. This can involve providing employees with access to resources, such as books, courses, or workshops, and creating opportunities for learning from each other through mentoring or peer learning.
- **Giving feedback and support**: Employers can provide employees with regular feedback on their performance and offer support to help them improve their skills. This can involve giving employees constructive feedback on their strengths and weaknesses and providing them with guidance and support to help them overcome challenges and develop their skills.
- **Providing opportunities for skill-building:** Employers can create opportunities for employees to establish their skills in the job. This can involve assigning employees tasks and projects that challenge them and help them to develop new skills and providing them with support and resources to help them succeed.

Employers can implement several methods to aid employees improve their skills. By providing training, creating a supportive environment, providing feedback, and offering opportunities for skill-building, employers can help employees develop their skills and improve their overall workplace efficiency (Smith, 2018).

3.4.2 Ability and workplace efficiency

The relationship between ability and workplace efficiency is complex and can vary depending on the specific job and individual. The ability to perform a job is an essential factor in significant workplace efficiency. For example, if a job requires physical abilities, such as manual dexterity or strength, an individual may need these abilities to perform the task effectively. Similarly, if a job requires cognitive abilities, such as attention, memory, or problem-solving, an individual may need to have these abilities to perform tasks well; however, ability is not the only factor that determines workplace efficiency; other factors, such as motivation and working conditions, can also play a role (De Vries et al., 2013).

Improving an employee's ability is similar to improving their skills, and several of the same strategies can be used. According to Smith (2018), some ways to improve an employee's ability include:

- **Providing training and development opportunities:** Employers can offer training and development programs to help employees improve their abilities and enhance their performance. These programs can be tailored to the specific needs and goals of the employee and can focus on areas where the employee needs to improve.
- **Creating a supportive and challenging environment:** Employers can create a supportive and challenging work environment which can help employees to improve their abilities. This can involve providing employees with the resources and support they need to succeed and setting goals and expectations that challenge them to stretch their abilities.
- **Providing feedback and support:** Employers can provide employees with regular feedback on their performance and offer support to help them improve their abilities. This can involve giving employees constructive feedback on their strengths and weaknesses and providing them with guidance and support to help them overcome challenges and develop their abilities.
- **Providing opportunities for skill-building:** Employers can create opportunities for employees to establish their abilities in the job. This can involve assigning employees tasks and projects that require them to use and develop their abilities and providing them with support and resources to help them succeed.

Employers can implement several conducts to help employees improve their abilities. These approaches include providing training, creating a supportive and challenging environment, providing feedback, and offering opportunities for skill-building, (Smith, 2018).

3.4.3 Motivation and workplace efficiency

Motivation is a crucial factor in an individual's workplace efficiency. Individuals with a high level of motivation are often more prepared to put forth the effort and focus essential for outstanding job performance. For instance, such a person is likely to work diligently, persevere in the encounter of challenges, and take on extra tasks or responsibilities to achieve their goals and objectives. Individuals lacking motivation might be less likely to exert the effort for high performance at work and could be more susceptible to disengagement or dissatisfaction with their job. Conversely, high motivation levels can enhance an individual's overall workplace efficiency and help them achieve their goals (Kuranchie-Mensah & Amponsah-Tawiah, 2016).

Sageer et al. (2012) remark that improving an employee's motivation can involve a combination of strategies, including providing rewards and recognition, creating a positive work environment, and offering development opportunities. Some ways to improve an employee's motivation include:

- **Providing rewards and recognition:** Employers can present employees with rewards and recognition for their achievements and hard work. This can involve giving employees bonuses, promotions, or other forms of recognition, such as certificates or awards. These rewards can help to motivate employees by recognizing their efforts and contributions and by providing them with incentives to continue working hard.
- **Creating a positive work environment:** Employers can create a positive and supportive work environment, which can help to motivate employees. This can involve a comfortable and safe workspace, offering flexible work arrangements, and creating opportunities for employees to socialize and establish relationships with their colleagues. A positive work environment can help employees to feel valued and supported, which can increase their motivation.
- **Offering development opportunities:** Employers can offer employees development opportunities, which can help to motivate them by providing them with a sense of purpose and challenge. This can involve providing employees with training and development opportunities, assigning them new and challenging tasks, and giving them the support and resources, they need to succeed. Providing employees with development opportunities can help to motivate them by giving them a sense of progress and achievement.

There are several ways that employers can help to improve an employee's motivation. By providing rewards and recognition, creating a positive work environment, and offering

development opportunities, employers can help employees feel motivated and engaged in their work (Sageer et al., 2012).

3.4.4 Working conditions and workplace efficiency

The working conditions where an individual performs their job can significantly influence their overall workplace efficiency. Factors such as the physical environment, the availability of resources and support, and the level of support and feedback from supervisors and colleagues, can affect an individual's ability to perform well at work. For example, if an individual works in a noisy, crowded, or uncomfortable environment, they may have difficulty focusing and performing to the best of their abilities. Similarly, if an individual lacks access to the resources and support they need to complete tasks, they may struggle to perform effectively. Good working conditions can facilitate significant workplace efficiency, while deficient working conditions hinder it (Holden et al., 2010).

Mathews and Khann (2016) indicate that improving an employee's working conditions can involve various strategies, depending on the specific needs and concerns of the employee. Some ways to improve an employee's working conditions include:

- **Providing a comfortable and safe workspace:** Employers can ensure that employees have a comfortable and safe workspace, which can help to improve their working conditions. This can involve providing employees with ergonomic furniture, adequate lighting and ventilation, and access to clean and safe facilities, such as restrooms and break rooms.
- **Offering flexible work arrangements:** Employers can provide employees with flexible work arrangements, such as telecommuting or flexible hours, which can help to improve their working conditions by providing them with more control over their work environment and schedule.
- **Providing support and resources:** Employers can provide employees with the support and resources they need to succeed. This can involve providing employees with access to training and development opportunities, offering them support and guidance from managers and colleagues, and providing them with the tools and equipment they need to do their job effectively.
- **Addressing concerns and issues:** Employers can address any concerns or issues employees may have about their working conditions. This can involve listening to employees' feedback and suggestions and addressing any problems or challenges they

may encounter. Employers can also provide employees with channels for reporting concerns or issues, such as a suggestion box or an anonymous feedback system.

There are several ways that employers can help to improve an employee's working conditions. By providing a comfortable and safe workspace, offering flexible work arrangements, providing support and resources, and addressing concerns and issues, employers can help employees feel satisfied and supported in their work (Mathews & Khann, 2016).

3.4.5 Personal factors and workplace efficiency

Personal factors, such as an individual's personality, emotional intelligence, and self-regulation skills, can also affect their overall workplace efficiency. For example, individuals who are organized, self-motivated, and able to manage their emotions may be more likely to perform well. They may better plan and prioritize their tasks, remain focused and engaged, and constructively handle challenges and setbacks. Individuals who are disorganized, easily distracted, or prone to emotional outbursts may struggle to perform their jobs effectively. These personal factors can interact with other factors, such as skills, ability, motivation, and working conditions, to influence an individual's overall workplace efficiency (Porter & Steers, 1973).

3.4.6 Cognitive abilities and self-regulation

Cognitive abilities, such as attention, memory, and decision-making, play a vital role in an individual's self-regulating ability. For example, an individual with significant attentional control may better focus on the task and avoid distractions. This can help them to stay on track and avoid impulsive or inappropriate behaviors. Similarly, individuals with significant memory may better recall relevant information and use it to guide their thoughts and actions. These cognitive abilities can support self-regulation by enabling individuals to monitor and control their thoughts, emotions, and behaviors (Dresel & Haugwitz, 2006).

According to Angevaren et al. (2008), improving cognitive capacity concerning self-regulation can involve various strategies, such as engaging in mentally challenging activities, maintaining a healthy lifestyle, and practicing mindfulness and other techniques to improve focus and concentration. Some ways to enhance cognitive capacity concerning self-regulation include:

- **Engaging in mentally challenging activities:** Engaging in activities that challenge the brain, such as puzzles, games, or learning a new skill, can help to improve cognitive

capacity. These activities can help to improve memory, problem-solving, and other cognitive skills and can also increase the connections between brain cells, which can help to improve cognitive function.

- **Maintaining a healthy lifestyle:** Maintaining a healthy lifestyle can also help to improve cognitive capacity. This can involve eating a balanced diet, regular exercise, adequate sleep, and avoiding substances, such as alcohol and tobacco, which can impair cognitive function.
- **Practicing mindfulness and other techniques:** Practicing mindfulness and other techniques, such as meditation, deep breathing, or progressive muscle relaxation, can help to improve cognitive capacity by reducing stress and increasing focus and concentration. These techniques can help individuals to control their thoughts and emotions and can enhance their self-regulating ability.

Individuals can employ several techniques to improve their cognitive capacity concerning self-regulation. These include engaging in mentally challenging activities, maintaining a healthy lifestyle, and practicing mindfulness and other techniques (Angevaren et al., 2008).

3.4.7 Emotional intelligence and self-regulation

Emotional intelligence relates closely to self-regulation. Individuals with high emotional intelligence can better understand and manage their own emotions and the emotions of others. This can enhance their self-regulating ability and make decisions in their best interests. For example, an individual with high emotional intelligence may better recognize and manage their own emotions of stress or anxiety and use strategies, such as deep breathing or self-talk, to calm themselves. This can help them to avoid impulsive or rash actions and to remain focused and in control. High emotional intelligence can support self-regulation and improve individuals' ability to manage their thoughts, emotions, and behaviors (Grewel et al., 2006).

According to Kotsou et al. (2019), improving emotional intelligence concerning self-regulation can involve various strategies, including practicing self-awareness, self-regulation, empathy, and pursuing feedback and support from others. Some ways to improve emotional intelligence concerning self-regulation include:

- **Practicing self-awareness**: Practicing self-awareness involves learning one's own thoughts, emotions, and behaviors and understanding how they affect oneself and others.

This can include focusing on one's own emotions and reactions and learning to identify and label them.

- **Practicing self-regulation**: Practicing self-regulation involves learning to control one's thoughts, emotions, and behaviors to achieve goals and objectives. This can include setting goals and plans, monitoring one's progress, and adjusting one's actions and reactions as needed.
- **Practicing empathy**: Practicing empathy involves understanding and responding to the emotions of others. This can include listening to others, observing things from their perspective, and responding with emotions and actions.
- **Seeking feedback and support**: Seeking feedback and support from others can help individuals to improve their emotional intelligence. This can involve requesting feedback from friends, family, or colleagues and pursuing support from therapists, coaches, or other professionals who can help individuals develop their emotional intelligence skills.

Individuals can implement several strategies to improve their emotional intelligence concerning self-regulation. By practicing self-awareness, self-regulation, empathy, and pursuing feedback and support from others, individuals can enhance their emotional intelligence and improve their self-regulating ability (Kotsou et al., 2019).

3.4.8 Personality and self-regulation

Certain personality traits are related to an individual's self-regulating ability. For example, individuals high in conscientiousness and emotional stability may be more likely to have significant self-regulation skills. Conscientious individuals tend to be organized, responsible, and disciplined, enabling them to plan and execute their actions effectively. Emotionally stable individuals tend to be calm, resilient, and able to manage their emotions, which can help them maintain control and focus on challenging situations. These personality traits can support self-regulation by providing individuals with the skills and dispositions to manage their thoughts, emotions, and behaviors (Hoyle, 2010).

3.4.9 Social support and self-regulation

Having supportive relationships with others can provide individuals with the emotional and social resources they need to self-regulate effectively. For example, if an individual feels overwhelmed or stressed, they may talk to a friend or family member and receive support and understanding. This can help them to manage their emotions and maintain control over their

thoughts and behaviors. Similarly, if an individual encounters a difficult decision or challenge, they may pursue advice or guidance from others with experience or expertise in the relevant area. This can help them make thoughtful decisions rather than relying on impulsive or reactive responses. Social support can enhance an individual's self-regulating ability and make better choices (Ley & Young, 2001).

3.4.10 Environment and self-regulation

The environment where an individual lives and works can also affect their self-regulating ability. For example, a chaotic or stressful environment may make it more difficult for individuals to self-regulate, as they may be overwhelmed by stimuli or distractions. A calm and supportive environment may facilitate self-regulation, as it can provide individuals with the resources and support to manage their thoughts, emotions, and behaviors. For example, a quiet and organized workspace may enable an individual to focus and work effectively, while a supportive and collaborative team environment may allow an individual to communicate and cooperate with others. The environment can be critical in supporting or hindering self-regulation (Thomas et al., 2010).

3.5 Proposed theoretical framework

A theoretical framework is a set of assumptions, concepts, and theories that provide a basis for understanding a particular phenomenon or concept. It is a structure that helps to organize and interpret data and provides a context for research and analysis. A theoretical framework is typically developed from existing theories and knowledge about a topic and can guide the development of research questions, hypotheses, and methods. It is an essential tool for researchers, as it helps to provide a logical and coherent basis for their work (Lederman & Lederman, 2015).

One example of a theoretical framework is Maslow's hierarchy of needs. This framework is because individuals' hierarchy of needs must be satisfied to achieve their full potential. The hierarchy comprises five levels of needs: physiological, safety, love/belonging, esteem, and self-actualization. According to this framework, individuals must satisfy their lower-level needs before moving on to higher levels. For example, individuals must have their primary physiological conditions, such as food and shelter, met before focusing on their safety and security needs. This framework provides an approach to organizing and understanding human

motivation and behavior and can guide research and analysis in various fields, such as psychology, sociology, and education (Mcleod, 2007).

A theoretical framework provides a logical and coherent structure for understanding a particular phenomenon or concept. It is a way of organizing and interpreting data and can guide the developing of research questions, hypotheses, and methods. A theoretical framework can also help to identify divergences or areas where further research is needed and can provide a basis for comparing various theories and research findings. A theoretical framework is an essential tool for researchers, as it helps to provide a coherent and logical basis for their work (Lederman & Lederman, 2015).

One possible theoretical framework for self-regulation and workplace efficiency could be based on self-regulation as a mediating variable. This framework would posit that self-regulation is a crucial factor in determining an individual's overall workplace efficiency and mediates the relationship between other factors, such as skills, ability, motivation, working conditions, and work efficiency.

In this framework, skills and ability are independent variables, as they can influence an individual's workplace efficiency. Self-regulation would be the mediating variable, as the vital factor connects the independent variables to the dependent variable (workplace efficiency). Finally, workplace efficiency would be the dependent variable, as the outcome is being studied.

According to this framework, an individual's skills and ability would determine their potential for significant workplace efficiency; however, their self-regulating ability determines whether they can realize that potential. For example, individuals with strong skills and abilities may struggle to perform well if they cannot control their thoughts, emotions, and behaviors. Individuals with weaker skills and abilities may perform well if they self-regulate effectively. This framework would suggest that self-regulation is a critical factor in determining an individual's workplace efficiency, which is an essential area for research and intervention.

Another possible theoretical framework for self-regulation and workplace efficiency could be based on self-regulation as a product of multiple determinants. This framework would posit that self-regulation is a complex and multi-dimensional construct influenced by various factors. These factors could include individual characteristics, such as cognitive abilities, emotional

intelligence, and personality, and environmental factors, including social support and working conditions.

In this framework, the individual characteristics and environmental factors would be the independent variables, as they can influence an individual's self-regulating ability. Self-regulation would be the dependent variable, as the outcome is being studied.

According to this framework, an individual's self-regulating ability would be determined by multiple factors. For example, an individual's cognitive abilities and emotional intelligence may enable them to control their thoughts and emotions, while their personality and social support may provide them with the motivation and resources, they need to manage their behaviors. In this framework, self-regulation would be observed as a complex and dynamic construct influenced by multiple determinants. This framework would suggest that research on self-regulation and workplace efficiency should consider the factors affecting an individual's self-regulating ability.

Another possible theoretical framework for self-regulation and workplace efficiency could be based on self-regulation as a dynamic process. This framework would posit that self-regulation is an ongoing process involving monitoring and controlling one's thoughts, emotions, and behaviors to achieve goals and objectives. It would observe self-regulation as a skill that can be developed and improved over time and consider factors, such as motivation, feedback, and practice, as crucial determinants of self-regulation.

In this framework, motivation, feedback, and practice are independent variables, as they can influence an individual's self-regulating ability. Self-regulation would be the dependent variable, as the outcome is being studied.

According to this framework, an individual's self-regulating ability would be influenced by their motivation level, the feedback they receive, and the amount of practice they engage in. For example, a highly motivated individual to improve their self-regulation skills may be more likely to pursue feedback and engage in practice activities to help them develop those skills. In this framework, self-regulation is a dynamic process influenced by various factors that can be improved through effort and practice. This framework suggests that research on self-regulation and workplace efficiency should focus on the processes and mechanisms that motivate self-regulation and consider how individuals can develop and improve their self-regulation skills.

From the above examples, a proposed theoretical framework was created for this research. With this proposed theoretical framework, workplace efficiency is the study's dependent variable, as it is the variable measured. In research, the dependent variable is measured or observed. It is the outcome or result that the researchers are interested in, and it is typically the variable affected by the independent variable. The dependent variable is often called the "outcome variable" or the "response variable," as it is measured or observed in response to changes in the independent variable. The dependent variable is the variable that researchers are trying to explain or predict through their study. The independent variables will be those factors that influence an individual's self-regulating ability. In research, the independent variable is manipulated or controlled by the researchers. It is the variable that the researchers believe affects the dependent variable. The independent variable is often called the "predictor variable" or the "explanatory variable," as it explains or predicts changes in the dependent variable. The independent variable is the variable researchers believe has a causal relationship with the dependent variable and that they are trying to study or assess.

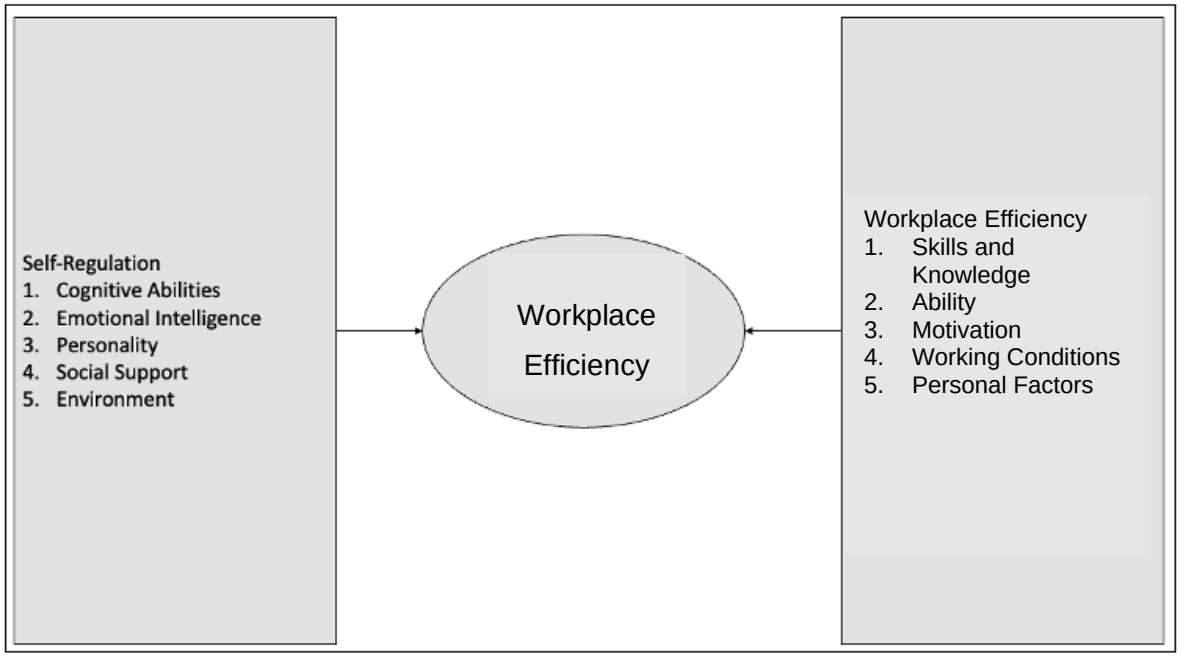


Figure 3-4: Proposed theoretical framework

3.5.1 Cognitive abilities' influence on workplace efficiency

Cognitive capabilities, such as intelligence, memory, and problem-solving, can significantly influence workplace efficiency. Individuals with solid cognitive capabilities are likely to process

and analyze information quickly and accurately, which can help them to perform tasks efficiently and effectively. They are also expected to think creatively and produce innovative ideas and solutions to problems, which can help them to innovate and add value to their work. Individuals with weaker cognitive capabilities may struggle to perform tasks that require complex thinking or problem-solving and may have difficulty adapting to new situations or challenges. This can affect their ability to perform and may lead to lower productivity and lower job satisfaction. Cognitive capabilities can play a crucial role in workplace efficiency, and individuals with solid cognitive capabilities will probably have an advantage in the workplace. Employers can help employees improve their cognitive capabilities by providing training and development opportunities focusing on cognitive skills, such as problem-solving, critical thinking, and creativity (Morgeson et al., 2009).

3.5.2 Emotional intelligence's influence on workplace efficiency

Emotional intelligence, or the ability to understand and manage one's own emotions and the emotions of others, can have a considerable influence on workplace efficiency. Individuals with high emotional intelligence are likely to communicate effectively, handle conflicts and challenges, and establish positive relationships with colleagues and customers. These skills can help individuals to work well with others and can improve teamwork, collaboration, and customer service. Individuals with low emotional intelligence may struggle to understand and manage their own emotions and the emotions of others, which can affect their ability to work well with others. They may have difficulty communicating effectively, handling conflicts and challenges, and building positive relationships, which can lead to lower job satisfaction and lower productivity. Emotional intelligence can play a crucial role in workplace efficiency, and individuals with high emotional intelligence are likely to have an advantage in the workplace. Employers can help employees improve their emotional intelligence by providing training and development opportunities focusing on emotional intelligence skills, such as self-awareness, empathy, and communication (Moon & Hur, 2011).

3.5.3 Personalities' influence on workplace efficiency

Personality, or an individual's unique patterns of thought, emotion, and behavior, can affect work efficiency. Diverse personality traits can affect an individual's ability to perform well in various job roles and work environments. For example, individuals with outgoing and extroverted personalities may be well-suited to jobs that require interacting with customers or clients, while individuals with more introverted personalities may be better suited to jobs that

require independent work and focus. Individuals who are conscientious, organized, and responsible are likely to be more successful in their work, as they are likely to manage their time and responsibilities effectively and work well with others. Individuals who are less conscientious, organized, and responsible may struggle to manage their time and responsibilities and may have difficulty collaborating with others, affecting their workplace efficiency.

Personality can play a role in workplace efficiency, and individuals well-suited to the demands of their job and work environment are likely to be more successful in their work. Employers can help employees succeed by providing them with roles and tasks that align with their personalities and strengths and by offering support and resources to help them overcome any challenges or difficulties (Anvari et al., 2011).

3.5.4 Social support's influence on workplace efficiency

Social support, or the emotional and practical support individuals receive from their social network, can affect workplace efficiency. Individuals with strong social support from friends, family, and colleagues are likely to feel more satisfied and engaged in their work and are more inclined to succeed in their careers. Social support can give individuals a sense of belonging and connection, improving their mental health and well-being. It can also offer practical support, such as help with childcare or transportation, making it easier for individuals to manage their work and personal responsibilities. Individuals with weak social support may feel isolated and unsupported, affecting their workplace efficiency. They may have difficulty managing stress and challenges and may have lower job satisfaction and lower productivity. Social support can play a crucial role in workplace efficiency, and individuals with strong social support are likely to be more successful in their work. Employers can help employees establish social solid support networks by creating a positive and inclusive work environment and offering resources and support for employees who may encounter challenges or difficulties (Glaser et al., 1999).

3.5.5 The work environment's influence on workplace efficiency

The work environment, or the physical and social conditions where individuals work, can significantly influence workplace efficiency. A positive work environment, characterized by a comfortable and safe workspace, supportive and engaging colleagues, and development opportunities, can help employees feel satisfied and engaged in their work and improve their

productivity and job satisfaction. A hostile work environment, characterized by inadequate lighting, ventilation, or ergonomics, unsupportive or aggressive colleagues, and a lack of development opportunities, can harm workplace efficiency. Employees who work in adverse work environments may feel stressed, unhappy, and unsupported, affecting their ability to perform and leading to lower job satisfaction and productivity. The work environment can play a crucial role in work efficiency, and employers can help to improve work efficiency by creating a positive and supportive work environment for employees. This can involve providing employees with a comfortable and safe workspace, offering development opportunities, and fostering a positive and inclusive culture (Chandrasekar, 2011).

3.5.6 Skills/knowledge influence on work efficiency

A specific set of skills can significantly affect an employee's overall workplace efficiency. For example, if employees have effective communication skills, they may effectively communicate with their colleagues and clients, which can improve team collaboration and lead to better outcomes for the company. If an employee lacks specific skills necessary for their role, it can hinder their ability to perform their job effectively and affect their work efficiency. Employees must continuously develop and improve their skills to succeed (Elnaga, 2013).

3.5.7 Ability's influence on workplace efficiency

An employee's ability can also significantly influence their workplace efficiency. Ability refers to an individual's inherent talents and capabilities, which can influence their ability to perform specific tasks or duties. For example, an employee with a prominent level of intelligence may quickly understand and solve complex problems, which can improve their productivity and the company's success. Employees lacking these abilities may struggle to perform their job effectively, which can negatively affect their workplace efficiency. Employees must understand their own abilities and strive to improve them to succeed in their careers (Elnaga, 2013).

3.5.8 Motivation's influence on work efficiency

An employee's motivation level can also have a considerable influence on their overall workplace efficiency. Motivation refers to an individual's desire or motivation to do something, which can influence their level of effort and engagement in their job. A highly motivated employee is more likely to be enthusiastic and dedicated to their work, which can lead to better performance and outcomes for the company. An unmotivated employee may lack the motivation and determination to perform their job effectively, negatively affecting their work

efficiency. Employers must create a work environment, fostering inspiration, which helps employees stay engaged (Shahzadi, 2014).

3.6 Conclusion

This section provides the proposed theoretical framework, based on the research questions and topics. This framework depicts how the various factors of self-regulation influence an employee's overall workplace efficiency.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

In the research methodology section, the research theory, strategy, data collection, data analysis, and ethical concerns are identified and explained. With this section, multiple research philosophies are analyzed, and the best suited is chosen. The data collection strategies are determined, and the most appropriate strategy is selected. The methods of examining and evaluating the data are determined, and the most relevant approach is selected.

This section identifies how the research was planned to be conducted; it identifies the data used, how this data was collected, why this data can be relevant, and what means of analysis was performed.

Using self-regulating technology, employees can limit the distractions they encounter during their workday. Since these distractions are limited, an employee can maintain their focus on their job requirements. When the direction of an employee is supported, it should be evaluated whether they become more efficient and effective regarding their job requirements and organizational performance indicators.

In this section, a relevant research approach is chosen. When analyzing how self-regulating technology can promote workplace efficiency, an interpretive paradigm with qualitative data is acquired through semi-structured interviews. Chapter 5 comprises further information regarding data collection, analysis, and design.

4.2 Research paradigms

A research paradigm, as described by Kuhn (1962), is a “general concept” or “set of beliefs, values, and assumptions” that a community of researchers has in common regarding how to conduct research (Kuhn, 1962). Chalmers (2013) defines a research paradigm as “made up of the general theoretical assumptions and laws, and techniques for their application that the members of a particular scientific community adopt.” From these definitions, it can be concluded that a research paradigm, in a broader sense, is a set of beliefs, values, and assumptions shared by a community of scientific research. According to Khaldi (2017), these scientific beliefs regarding a specific paradigm align the critical choices in a study and will help research students choose and justify the following:

- Research questions or hypotheses.
- Types of research instruments to be used.
- Steps involved in collecting data.
- Steps involved in analyzing the data obtained.

Khaldi (2017) further remarks that the research paradigm chosen by a researcher will have a considerable influence on the outcomes of the research (Khaldi, 2017).

From these definitions and examinations of what a research paradigm is and what it encapsulates, a research paradigm is a model or approach to research that considers various beliefs, values, and common assumptions shared in a scientific body of knowledge. Saunders et al. (2009) acknowledge several significant types of research paradigms: positivism, realism, interpretivism, and pragmatism. These research paradigms are investigated in the subsequent sections (Saunders et al., 2009).

4.2.1 Positivism

Positivism can be described as a research paradigm focusing on factual data obtained through observation; it adheres to a more scientific approach to analyzing information and comprises existing theories to construct a hypothesis. This hypothesis is assessed against data collected through observation and accepted or rejected based on the findings. If the hypothesis constructed on the theories identified is rejected, further development can help focus the research (Saunders et al., 2009). A positivist research paradigm focuses on facts rather than assumptions and impressions and focuses on the data through data collection and interpretation quantitatively (Collins, 2018).

In the positivist paradigm, the researcher does not become directly involved with the study and observes the research objectively. This means that the researcher omits their opinions about the matter of study and does not employ a biased approach to data collection, analysis, and interpretation. The emphasis of a positivist paradigm research approach is on quantifiable data rather than qualitative data since an objective approach to data analysis is undertaken. Positivism is, therefore, a more statistical approach to research and adheres to several scientific constraints to conducting studies (Crowther & Lancaster, 2008).

Della Porta and Keating (2008) remark that for positivist research, “the world exists as an objective entity, outside of the mind of the observer, and in principle, it is knowable in its

entirety" (Della Porta & Keating, 2008). The research is observed from an external perspective and is examined holistically. Della Porta et al. (2008) remark that "Positivist approaches share the assumption that, in natural as in social sciences, the researcher can be separated from the object of his/her research and therefore observe it in a neutral way and without affecting the observed object" (Della Porta & Keating, 2008). From this evaluation, positivist researchers do not let their personal moral beliefs, assumptions, and values affect their research and evaluate it from a neutral, external perspective.

4.2.2 Interpretivism

Interpretivism can be defined as a research paradigm where an integrated approach to observing reality is used and requires the researcher to interpret the data obtained to acquire meaning. In interpretivism, quantitative and qualitative data are acquired; the qualitative data provide an understanding or reasoning behind the quantitative data (Saunders et al., 2009).

Interpretivism requires the researcher to interpret various study elements and involves human interest. The researcher needs to understand the differences between the subjects and participants involved in the study and the environment where the research occurs holistically. It requires the researcher to understand quantitative and qualitative data. In the interpretivist paradigm, the researcher does not solely focus on the quantitative data but uses qualitative data to create, analyze, and explain the quantitative data obtained. A limitation of interpretivism includes biased opinions and assumptions; since it involves human interest and interaction, emotions should also be considered when conducting a study (Myers, 2019).

Concerning interpretivism, various elements should be considered when conducting studies. These include the moral and ethical societal factors to which the study participant adheres, the world and observations of the participants, and the biased opinions and emotions participants might have toward a subject (Basias & Pollalis 2018).

Creswell (2009) describes this research paradigm as "a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2009).

From these definitions and interpretations of what interpretivism entails, it can be deduced that interpretive research aspires to describe and understand quantitative data by using qualitative

data to acquire meaning behind the factual data obtained; it concerns why the data depicts the information.

4.2.3 Critical research

Critical research can be described as a research paradigm where the knowledge of reality or the world results from social, cultural, and historical conditioning. In critical research, the researcher subjectively influences the research process (Myers et al., 2011).

Critical research relies on the human mind and reality being two concepts—meaning that the world we experience is a derivative of the social and cultural status quo. It recognizes the importance of human senses and experience when conducting a study. Critical research requires the researcher to critique data acquired to understand its meaning; it involves quantitative and qualitative data but adheres to qualitative data to derive a cause and effect of the study undertaken. Critical research recognizes the importance of social factors, biased emotions or assumptions, and the social, ethical, and moral senses in research and considers them when making critical decisions (Saunders et al., 2009).

According to Bohman (2005), critical research is “any research that challenges conventional knowledges bases whether quantitative or qualitative, that makes claims to scientific objectivity”.

From these critical research definitions and explanations, it can be deduced that critical research is a research paradigm where it is believed that social reality research is conducted where historically is produced and reproduced by people, resulting directly from social constructs.

4.2.4 Pragmatism

Pragmatism is a research paradigm where aspects of positivism and interpretivism are considered. It involves an integrated approach to data collection, analysis, and interpretation. It recognizes that the world functions independently from human interactions; however, these interactions provide meaning behind the data collected. Pragmatism is the practice of objectively observing and analyzing the world, with a focus on individuals’ environments and experiences (Goles & Hirschheim, 2000).

In pragmatic research paradigms, the analyzed concepts are relevant only if they contribute to or support an action. This means that a pragmatic approach accepts concepts with a cause-and-effect relationship. Pragmatic research recognizes that a study's environment cannot be observed from a single perspective; multiple perspectives exist which need to be analyzed to understand the research (Biggam, 2018).

A pragmatic research paradigm emphasizes the research question and strives to obtain, analyze, and interpret data supporting the research question constructed.

4.2.5 Research paradigms of similar studies

From the literature obtained and identified—Appendix C*: Literature analysis*, the research paradigm primarily used is interpretivism. When analyzing employee performance and productivity, it was established that quantitative data were used to report on metrics associated with performance indicators and measurements. The data were qualitatively interpreted through identifying psychological factors, such as feelings, stressors, and emotions. Literature evaluating employee performance and using self-regulating technology followed with the same approach to obtaining meaning from the research.

The divergence in the body of knowledge is that there is no definitive evidence that self-regulatory technology can promote workplace efficiency. It is important to identify the factors that contribute to employee efficiency and effectiveness, measure them, and determine how self-regulatory technology can help improve them. Self-regulatory technology relates to distractions. Using self-regulatory technology reduces distractions; when distractions are reduced, a theory can be made that employees are more focused on their job requirements while their productivity improves.

The literature regarding technological use in the workplace identified the cognitive and emotional implications personal technology holds; these factors were qualitative and explained why employees would apply work technology for personal use. According to the literature obtained, a good practice among organizations to measure employee performance would be to create KPIs. This measures efficiency against metrics appropriate to each team in the organization. It can be deduced that quantitative metrics should be associated with employee productivity; however, the cause and effect behind the quantitative data from a technological perspective is qualitatively described (Baker, 2002).

From the literature, it was established that data were quantitively obtained but qualitatively explained, indicating that interpretivism was the research paradigm.

4.2.6 Research paradigm choice

Interpretivism was chosen as the philosophy behind the research because it is an integrated approach to observing reality and requiring the researcher to interpret the data to understand it. This study aimed to determine how self-regulating technology can promote workplace efficiency. From this, it can be deduced that the relationship between self-regulating technology and how it can encourage efficiency workplace needs to be interpreted and understood. Employee performance should be measured, and only the quantifiable metrics of their workplace efficiency should be evaluated; however, open-ended questions should be directed; reasoning behind responses should be obtained to describe and explain the quantitative data qualitatively; therefore, a better understanding of the data can be obtained.

Interpretivism was chosen as the research philosophy because it evaluates research from an integrated approach. Since workplace efficiency entertains quantitative and qualitative attributes, self-regulating technology promoting workplace efficiency should be observed quantitively and qualitatively by applying measurement standards to workplace efficiency requirements.

4.2.7 Research strategies of similar studies

When evaluating how self-regulating technology can promote workplace efficiency, the literature was obtained (*Appendix C - Literature analysis*), suggesting that an interview approach was the most taken. Since the interview approach involves obtaining a more extensive set of data, generalizations on the ‘who?’, ‘what?’, ‘when?’ and ‘where?’ aspects of a problem were analyzed commonly. Predefined questions were commonly directed to participants, and data comparisons were made to analyze a theory. The literature obtained typically also wanted to explain the relationship between technological use and how it affects performance, cognitive capacity, and job satisfaction.

The literature obtained used interview-based research as an explanatory study approach to help explain the cause and effect of various variables. Regarding personal technology use in the workplace, it was used to analyze why employees were using technology for non-work-

related purposes. It was also further used to understand what the cognitive influence of technological use had on employees.

The literature to indicate how organizations determine workplace efficiency was also analyzed through interviews. It allowed the research to acquire valuable information from managerial and procedural staff. The literature was used to define and explain the reasoning behind why some employees were more productive than others.

4.2.8 Research strategy choice

The research strategy used in this study is survey research. According to Seidman (2013), an interview is an intended and purposeful conversation between a researcher and a research participant, where the intended outcome of the discussion is to obtain data relevant to the research objectives. The data obtained serves as a foundation to support or reject a hypothesis or to answer the main research questions created. Interviews involve directing questions to participants, listening to their responses, probing further elaboration and clarification on responses, and recording the provided data. Interviews can be structured, semi-structured, or unstructured, depending on the level of detail associated with the predetermined questions and the flexibility of the conversation (Seidman, 2013).

The purpose of interview research is to explore the reasoning behind a phenomenon that has occurred through observing various variables. When measuring product effectiveness, or with this research, how self-regulating technology can promote workplace efficiency, interview research is significant. Defining the effectiveness of an employee or the manipulation of various variables which might affect this is unknown. Through this, an attempt is made to determine the relationship among these multiple factors holistically (Harland, 2015).

Self-regulating technology can promote workplace efficiency; a theory can be made that by minimizing employee distractions during their workday through self-regulating technology, the attention of the employee can remain focused on their job requirements and specifications. When an employee's focus is maintained on their job requirements, their workplace efficiency and work quality is improved.

For this research, a sample space of employees was selected. Data were collected from them to assess the theory. These employees would use self-regulating technology or refrain from

using it. Through interviews, this study formulated a theory, collect evidence with various variables, and qualitatively explain the reasoning behind the data.

4.3 Research design

The research design section identifies and explains the research philosophy, strategy, and theory used to obtain the required information. This section helps the reader understand the belief around acquiring the data, and how this data should be analyzed and used. The most suited research philosophy is chosen, and the data collection strategy and the research theory are described. For research to return valuable information or to conclude on a justifiable end, a significant research design should be undertaken. A particular field of study is examined, and greater knowledge about it is created.

Saunders et al. (2009) depict research design as an “onion” approach where each layer of the onion critical decisions should be made on philosophical beliefs, how the research will be conducted, what data will be used, how this data will be collected, and how the data will be analyzed (Figure 4-1). In the research design section of this study, each layer of the research “onion” was analyzed, and critical selections were made to create a meaningful research approach (Saunders et al., 2009).

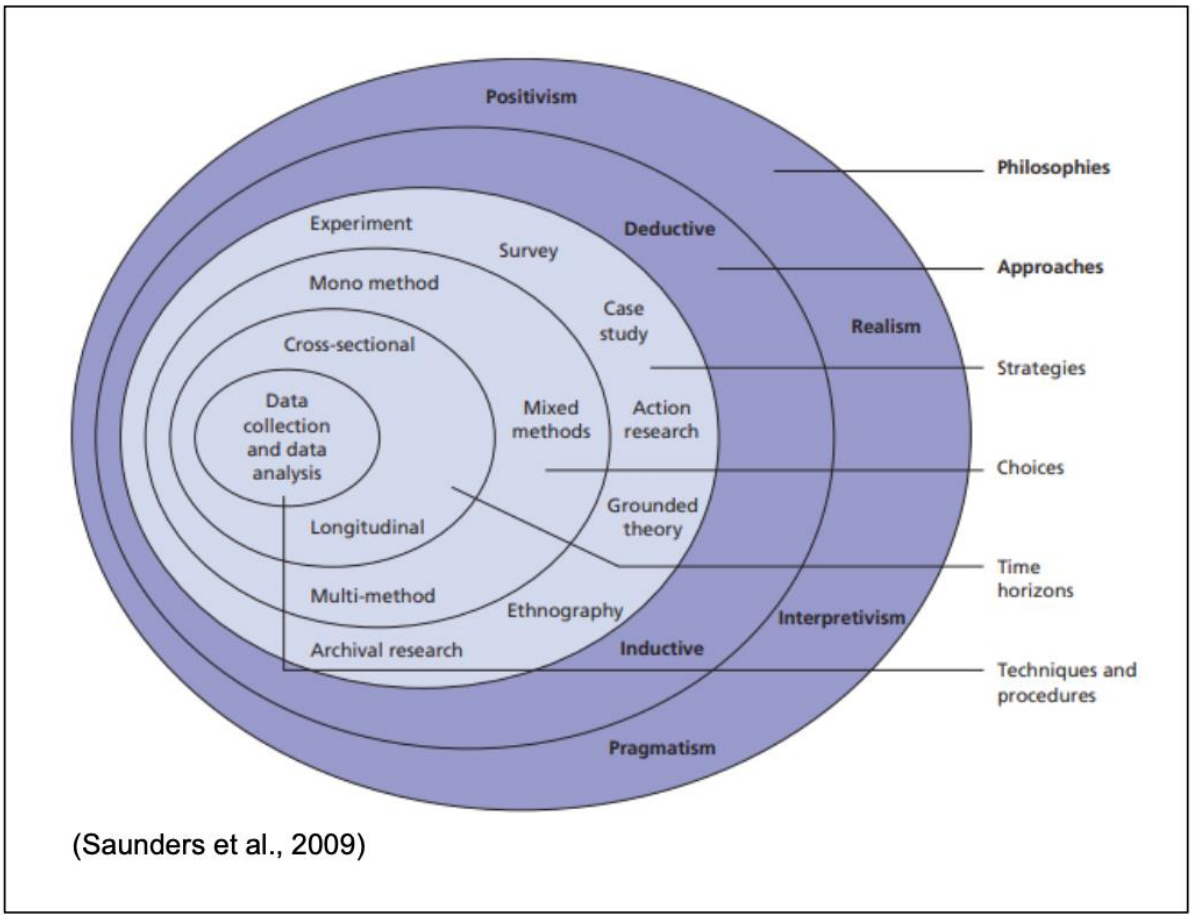


Figure 4-1: The research onion (Saunders et al., 2009)

4.3.1 Research philosophy

A research philosophy helps the reader understand the researcher's world observations; it is a philosophical commitment and significantly influences the research. The research philosophy chosen for this study is interpretivism. Interpretivism can be defined as a research philosophy where the researcher interprets various elements and involves human interest. It requires the researcher to understand the differences among the participants and acquire an understanding of the world the research occurs in holistically. Interpretivism involves obtaining and understanding quantitative and qualitative data (Saunders et al., 2009).

Interpretivism was chosen as the philosophy behind the research because it is an integrated approach to observing reality, requiring the researcher to interpret the data to obtain an understanding thereof. The research aimed to determine how self-regulating technology can promote workplace efficiency. From this, it can be deduced that the relationship between how

self-regulating technology and how it can promote workplace efficiency needs to be interpreted and understood. For this, an employee's overall workplace efficiency should be measured, and only the quantifiable metrics thereof should be evaluated; however, open-ended questions should be directed to obtain the qualitative data, ensuring a better understanding of the data.

To conclude, interpretivism was chosen as the research philosophy of this study because it evaluates research from an integrated approach. Since workplace efficiency has quantitative and qualitative attributes, self-regulating technology promoting workplace efficiency should be observed quantitively and qualitatively by applying measurement standards to workplace efficiency requirements.

4.3.2 Research approach

Saunders et al. (2009) identified two approaches that can be undertaken—deductive and inductive. These approaches provide a framework for how the research will be conducted—quantitively or qualitatively. A *deductive* approach would be one where a hypothesis is made, and rigorous testing is conducted to accept or reject the hypothesis made, whereas an *inductive* approach would collect data and create a theory that supports the research objective (Saunders et al., 2009).

This study employed a deductive approach. When evaluating how self-regulating technology can promote workplace efficiency, quantitative and qualitative data should be collected. The qualitative data provide a social reasoning behind it. This allows understanding the nature of the problem more clearly. From the data, a theory is created, which describes the relationship between self-regulating technology and workplace efficiency. A crucial characteristic of a deductive research approach is that the theory follows the data. Through a deductive research approach, cause and effect is analyzed, while the social or psychological reasoning behind it is explained (Saunders et al., 2009).

4.3.3 Research strategy

This study employed the survey research strategy. Survey research can be defined as a research strategy where data are collected from a sample of participants predefined to the observation from which quantitative data are obtained and qualitatively explained. A survey strategy is usually concerned with the 'who?', 'what?', 'when?', 'where?' 'why?' and 'how?' aspects of a problem. It is a means of obtaining copious quantities of data from a sample

space; survey research strategies usually collect data through questionnaires or interviews where the questions are standardized, and comparisons of responses can be drawn easily. It allows the researcher to create and explain a relationship among variables (Saunders et al., 2009).

The purpose of survey research is to explore the reasoning behind a phenomenon that has occurred through the observation of various variables. When measuring how self-regulating technology can promote workplace efficiency, survey research is significant since defining the effectiveness of an employee or the manipulation of various variables which might affect this is unknown and through this, an attempt is made to determine the relationship between these multiple factors holistically (Harland, 2015).

Regarding how self-regulating technology can promote workplace efficiency, a theory can be made that, by minimizing the distractions an employee encounters during their workday through self-regulating technology, the attention of the employee can be focused on their job requirements and specifications. When an employee's focus remains on their job requirements, their workplace efficiency and work quality is improved.

For this research, a sample space of employees was selected. Data were collected from them to test the theory created. These employees would use self-regulating technology or refrain from using it. Through interviews, this study formulated a theory, collect evidence with various variables, and qualitatively explain the reasoning behind the data.

4.3.3.1 Research goal

This study aimed to determine the effect of self-regulating technology on workplace efficiency. This research focused on the extent to which employees are aware of available self-regulating technologies; whether its use affects their efficiency; how they perceive the effect of these technologies on their daily work requirements; its use as a tool to minimize distractions throughout the workday. This research contributes to the scientific knowledge regarding workplace self-regulating technologies and their effects.

4.3.4 Research choices

Regarding research choices, the data should be identified. Two types of data should be analyzed, and multiple methods can be used to collect and analyze them. The two data types are *quantitative* and *qualitative* data. *Quantitative* data are numeric data, while *qualitative* data

refers to non-numeric data. Research choices, as depicted by Saunders et al. (2009), can be subdivided into various categories. Multiple methods can be used to collect the data, and a choice can be made on whether quantitative or qualitative data will be used. Saunders et al. (2009) depict a graphical explanation of the various types of research choices; from this graphical explanation, a mono or multi-method approach to research could be taken (Figure 4-2). A multi-method research approach indicates that multiple methods are used to acquire data; however, a restriction is made to the data for it to be quantitative or qualitative, but never both.

Mono-method research refers to a research approach where the analysis uses a single data collection method throughout the study; therefore, the researcher relies solely on one specific method to collect the data used throughout the research. Mono-method research provides various advantages, including simplicity, consistency in data collection, and the ease of data analysis; however, the researcher must consider the limitations and potential biases associated with using only one data source collection (Bryman, 2016).

Multi-method research refers to a research approach where an incorporation of multiple data collection methods is used in a single study. This research approach aims to capitalize on the strengths of various methods of collecting data and provides a robust understanding of a specific research topic. One of the key advantages of using multi-method research is the ability to complement and validate findings across various data collection methods (Bryman, 2016).

Concerning how self-regulating technology can promote workplace efficiency, this research employed a mono-method study to test the theory made in the research approach by using qualitative data (Saunders et al., 2009).

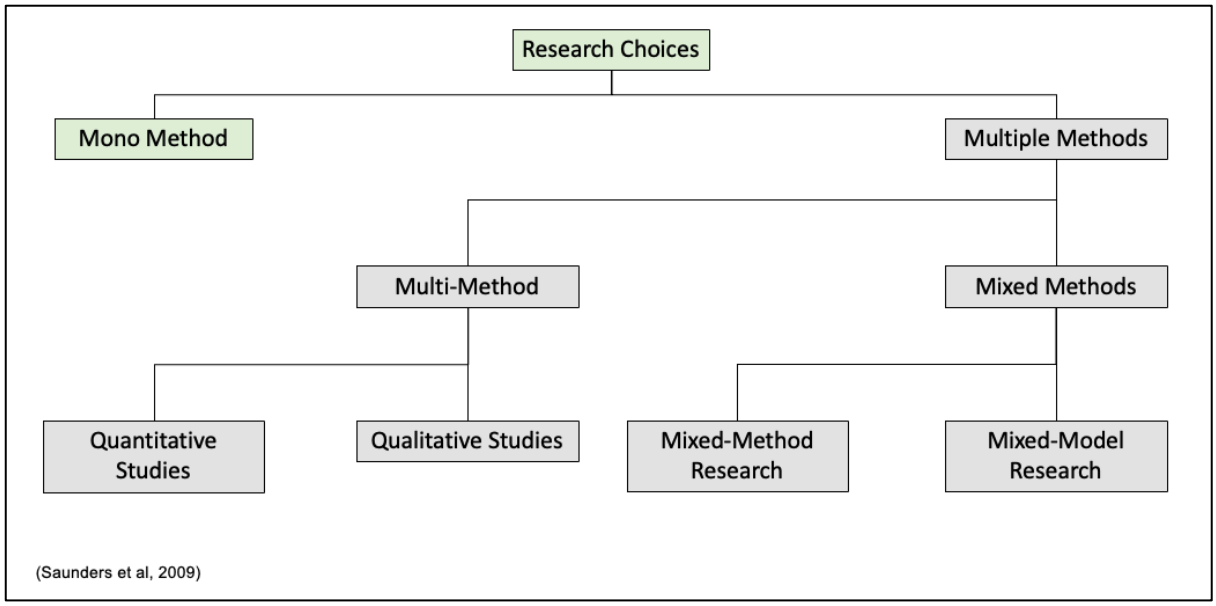


Figure 4-2: Research choices (Saunders et al., 2009)

4.3.5 Research time horizons

An essential characteristic of research design is time horizons; time horizons involve evaluating the period in which the research observation should occur. When choosing a time horizon or period, two approaches can be taken. One is using a cross-sectional time horizon and the other using longitudinal time horizons; therefore, the research uses data at a specific point, or data acquired over time. The former identifies cross-sectional and the latter longitudinal time horizons. In evaluating how self-regulating technology can promote workplace efficiency, a cross-sectional study was conducted. The survey research approach explains how self-regulating technology can promote workplace efficiency by obtaining qualitative data from a sample of employees at a specific point (Saunders et al., 2009).

4.3.6 Research data collection

This section identifies and explains how data were generated and collected. This section is a guideline for how the research data are conducted. It does not contain the data used to assess the hypothesis.

Regarding data collection, data used should be identified and understood. The data analysis method and the best practice for acquiring the data from credible sources are identified. To measure how self-regulating technology can promote workplace efficiency, both quantitative and qualitative data should be obtained to help explain the phenomenon examined. When

workplace efficiency is measured through self-regulating technologies, interviews will identify how the employees perceived their efficiency throughout the research observation. (Saunders et al., 2009).

4.3.6.1 Data collection plan

The data collection plan explains and analyzes the guidelines, framework, and methods of acquiring the data. Data were acquired through semi-structured interviews to measure the effectiveness of employees based on using self-regulating technologies. The data collection process and the results and analysis thereof are established in Chapter 5, where the techniques described in this chapter are implemented.

Oates (2006) identifies four primary methodologies for data generation. These include interviews, observations, questionnaires, and document analysis. These four primary methodologies are commonly used to collect data during research observations. This study employed interviews and questionnaires to collect the primary data. The reasoning behind these choices and how they will be conducted is included in the subsection (Oates, 2006).

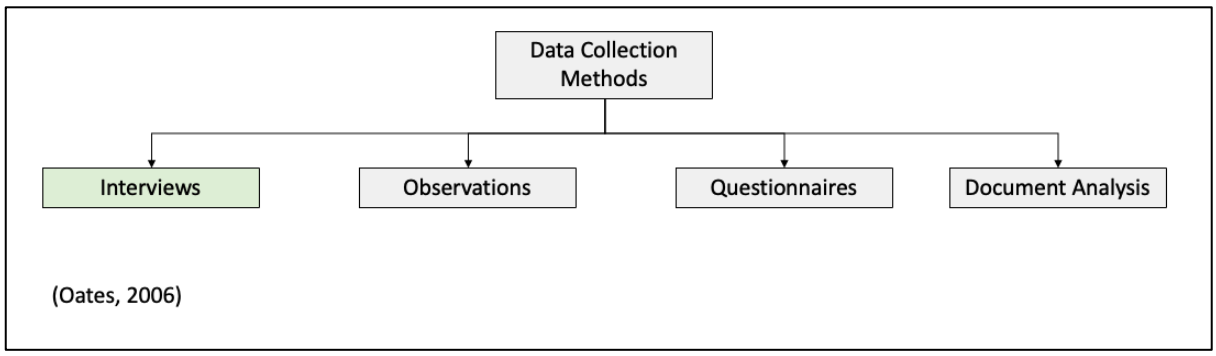


Figure 4-3: Data collection methods

4.4.6.1.1 Data collection through interviews

When measuring how using self-regulating technologies can promote workplace efficiency, another significant fit for data acquisition would be through interviews. An interview, as described by Seidman (2013), is an intended and purposeful conversation between a researcher and a research participant, where the intended outcome of the conversation is to obtain data relevant to the research objectives. The data obtained serves as a foundation to support or reject a hypothesis or to answer the main research questions created. Interviews involve directing questions to participants, listening to their responses, probing further

elaboration and clarification on responses, and recording the provided data. Interviews can be structured, semi-structured, or unstructured, depending on the level of detail associated with the predetermined questions and the flexibility of the conversation (Seidman, 2013).

For this research, a semi-structured interview includes a standard set of questions relating to how self-regulating technology can promote workplace efficiency (Appendix AAppendix A - *Semi-structured interview*).

Interviews obtained data on how self-regulating technology can promote workplace efficiency, because it allowed a standardized set of unbiased questions to be directed. The results thereof should indicate whether the theory of the research can be confirmed. The interview can also be more widely spread and receive more data.

4.3.7 Research ethical considerations

Ethical behavior and decision-making are derived from the actions of free-willed humans; when encountered with various possibilities and outcomes based on human interaction, they help distinguish right from wrong (Laudon, 1995). In the research design, ethical considerations are required to ensure that the data collected and analyzed are conducted ethically. Regarding research design, it should be confirmed that the subject researched is not harmed, embarrassed, or disadvantaged. The research population should provide their consent to become subjects of the matter; identification and other personal information should stay anonymous unless indicated and approved otherwise by the participant. Regarding research, it should be ensured that the approach to acquiring access to data, collecting data, processing data, and storing it is ethical (Saunders et al., 2009).

An ethical code of conduct regarding data access, storage, and analysis is created (Appendix B - *Research code of conduct*). This was presented to each participant. This code of conduct includes a deduction of the rights of each participant, as provided by Oates (2006). The author provides a framework for ethical research and includes these ethical considerations, which should be undertaken:

- **The right to decline participation:** The subject of the research has the right to choose if they want to participate in the research.

- **The right of withdrawal**: The subject has the right to withdraw their participation from the research at any point. If the subject withdraws their participation, all data collected from the participant will be discarded.
- **The right to informed consent:** The subject has the right to all information regarding to participation in the research, and all information must be provided to them.
- **The right to anonymity:** The subject has the right to anonymity, meaning that no personal information will be used in the research.
- **The right of confidentiality:** The subject has the right to abstain from confidential information at any point. This means that confidential information must be removed from the study when and if the subject specifies this.

Oates (2006) also provides a framework for the responsibility of the researcher:

- The researcher will obtain no confidential or proprietary information.
- No information will be collected irrelevant to the research.
- The researcher will behave with integrity to the information obtained.
- The researcher will adhere to the rights of each participant.
- The researcher will always act responsibly and ethically under all circumstances.
- The researcher will abstain from plagiarism.

All ethical considerations were undertaken when observing how self-regulating technology can promote workplace efficiency. All rights, as described, were acted upon, and the research was conducted ethically, considering the responsibilities of an ethical researcher. This includes abstaining from confidential information and adhering to the aforementioned ethical guidelines.

Ethical clearance was also obtained from the University of Pretoria, and no ethical issues occurred during the data collection process. With regards to the ethical considerations depicted the researcher ensured that each participant of the research study understood the principals considered.

- **The right of withdrawal:** It was ensured that the participant of the study understood that they had the right to withdraw from the study at any time and that the data provided by them would subsequently be removed from the research. The participants of the research agreed to the fact, and the researcher acknowledged this. All participants of

the study consented to the data provided being used within the research and no participant withdrew their participation.

- **The right to informed consent:** It was ensured that the participant of the study understood all aspects of the research undertaken, introduction into what self-regulating technologies is, what the research is about, and how it will be conducted was explained to each participant. How the participant's data will be used and examined was explained and full consent was obtained from each research participant.
- **The right to anonymity:** It was ensured that each participant of the study understood that the data they provide will be kept completely anonymous. The researcher ensured that the data obtained was correlated a participant number, that the required confidential information between the researcher and the participant was kept confidential and that no identifiable information was used within the study.
- **The right of confidentiality**: It was ensured that each participant of the research study understood that they could abstain from confidential information at any point within the research. It was explained that if the participant deemed the information to be confidential and did not want to share it with the researcher that they could do so at any point within the study.

4.4 Data management

Data management is crucial in research, encompassing various processes involved in handling, storing, managing, and organizing the research data. To effectively direct the data, it is the researcher's responsibility to ensure its integrity, security, and accessibility throughout the entire research. This involves the systematic procedures for data collection, storage, cleaning, analysis, and documentation. Smith (2021) remarks that the data collection procedures used in a study should be well-planned and standardized to ensure consistency and reliability. It is, therefore, the researcher's responsibility to establish clear protocols for data collection; this includes the instructions provided to study participants, the data recording formats, and the data validation procedures (Smith, 2021).

Jones (2018) emphasizes the importance of data storage and organization. Jones remarks that it is required that researchers implement secure data storage systems, whether encrypted hard drives or cloud-based platforms, to ensure that the data obtained during the research are protected against loss or unauthorized access. It should also be assured that data backup

procedures are implemented to prevent data loss owing to technical failures or accidental deletion (Jones, 2018).

Storing the data obtained from research participants securely is a critical component of research data management and ensures the confidentiality, integrity, and availability of the research data. It is required for researchers to establish robust measures to protect sensitive and valuable data from unauthorized access, loss, or corruption and involves appropriate hardware, software, and security protocols to safeguard research data. To ensure the secure storage of research data, researchers should employ encryption techniques. By using data encryption, the data are transformed into an unreadable form using cryptographic algorithms, which makes it inaccessible to unauthorized individuals. A significant approach to ensure protection against data loss is regular backups. This process involves the researcher creating and establishing a data backup strategy to create duplicate copies of the data periodically to ensure that it can be restored effectively in the event of data loss or system failure (Jones, 2018).

Choosing the correct storage media is also a crucial part of the research data management plan. Researchers can consider using encrypted external hard drives, secure servers, or cloud-based storage services as their data storage medium. These options often provide the researcher with features, such as access control, authentication mechanisms, and data encryptions at various levels, to ensure the confidentiality and integrity of the stored data (Jones, 2018).

It is also essential for researchers to ensure access control exists in the data storage medium. Researchers should implement measures to restrict access to authorized personnel only. This includes using features such as the requirement of strong passwords to access the data storage medium, two-factor authentication, and role-based access permissions to ensure that the read/write authorizations of the data storage repository are only provided to the required authorized contributors (Jones, 2018).

Data cleaning is another crucial step in the data management of a study and involves identifying and rectifying errors or inconsistencies obtained in the research dataset. This process involves reviewing the data obtained from participants for any missing values, outliers, or data entry mistakes. It is required for the researcher to document the steps undertaken in the data cleaning process to ensure the transparency and replicability of the research conducted (Smith, 2021).

4.5 Data analysis

Data analysis, in the research context, involves examining, interpreting, and synthesizing the collected data to derive meaningful insight and to draw conclusions from the data obtained, and when appropriately conducted, it ensures the accuracy, reliability, and validity of research findings. The data analysis methods used in a study should be guided by the research questions and the data to be obtained. Qualitative data analysis techniques, such as thematic analysis or content analysis, are used for analyzing textual or narrative data, while quantitative data analysis techniques involve numerical and statistical calculations (Creswell, 2014).

When analyzing data, various techniques can be used depending on the data being analyzed.

These techniques can be used for quantitative data analysis:

- **Descriptive statistics:** in this data analysis technique, the characteristics of the data are summarized, including the measures of central tendencies (mean, median, mode) and the variability (standard deviation and range) (Field et al., 2012).
- **Inferential statistics:** in this data analysis technique, inferences are made about a population based on sample data techniques, such as hypothesis testing, analysis of variance, regression analysis, and chi-square test, which are commonly used in this approach (Pallant, 2016).
- **Data mining:** In this data analysis technique, data mining techniques are used, such as clustering and classification algorithms, to uncover patterns, relationships, and trends in large datasets (Hans et al., 2011).

For qualitative data, these data analysis techniques exist:

- **Thematic analysis:** In this data analysis technique, the themes or patterns observed in a qualitative dataset are identified, analyzed, and interpreted through coding and categorization (Braun & Clarke, 2012).
- **Content analysis:** In this data analysis technique, the textual or visual data are systematically analyzed to identify recurring themes or concepts (Krippendorff, 2018).
- **Grounded theory:** In this data analysis technique, an iterative approach is taken to develop theories and explanations based on qualitative data analysis. This technique involves constant comparison and theoretical sampling (Charmaz, 2014).

4.6 The research process and procedures

This section provides the information required to understand the various approaches, procedures, and methodologies used in this study to obtain, analyze, collect, and manage the data obtained from the participants.

This study chose a semi-structured interview. This interview is based on a standardized list of questions (Appendix A - *Standardized semi-structured interview*) and allows open-ended questions where the study participant can respond to the questions based on their experiences and perspectives. An invitation to participate in the study was shared with individuals in the researcher's network of previous and current colleagues and connections through social media (with this study, *WhatsApp* was used to distribute the invitations). A convenience sample was used to obtain the research candidates of the main researcher's own private network of previous and current colleagues in multiple organizations and industries. An informed consent form (Appendix D - *Research consent form)* was provided to each participant before participation, and it was remarked that participation in the study was voluntary.

Each interview was then securely held on *Google Meet;* the interview was recorded using *Apple Dictation* built-in voice-to-text software on the researcher's Mac OS laptop. The data obtained from the participants were securely stored using a password-encrypted *Excel* file on *Google Drive*. Access to the data was restricted to only the main researcher and his supervisor, Prof. Marié Hattingh, and it was ensured that access to the online data storage required two-factor authentication.

4.6.1 Data sampling

With this research, convenience sampling was used to obtain the data relevant to the study.

Convenience sampling is a non-probability sampling technique where the selection of the various study participants is conducted based on their availability and accessibility. It involves selecting participants readily available and convenient for the researcher to include in the study. Regarding online surveys, interviews, or questionnaires, participants may be recruited from social media platforms or online forums where these participants are easily accessible (American Psychological Association, 2020).

This method of sampling was chosen because it is cost-effective, providing a sample space of individuals widely spread across various industries and providing an environment where the

study participants are easily accessible. It also provides a foundation for exploratory research where *if* larger-scale studies were to be conducted, preliminary data could be delivered to inform the design and implementation (Bryman, 2016).

The main researcher used convenience sampling by using his own network of previous and current colleagues and connections to obtain a sample space of seventeen individuals to voluntarily participate in the research by using *WhatsApp* to distribute an invitation to participate in an online interview with various participants.

To determine the sample size required for the study, even though there are no hard defined rules for determining sample sizes, the suggestions made in various different studies were followed to ensure that sample size chosen should be sufficiently large and varied to elucidate the aims of the study, and followed the general rule that a sample size between ten and fifty participants would be sufficient (Malterud et al., 2016; Creswell & Creswell, 2018).

A commonly stated principle for determining sample size in a qualitative study is that N should be sufficiently large and varied to elucidate the aims of the study (Kuzel, 1999; Marshall, 1996; Patton, 2015).

4.6.2 Data collection instruments

This research employed a semi-structured interview as the data collection instrument.

Semi-structured interviews are a data collection methodology that includes structured and unstructured interviews. It provides a flexible approach to collecting richly detailed information from research participants. It allows and empowers the research participants to be expressive of their personal feelings, experiences, and perspectives related to a phenomenon (Seidman, 2013).

This data collection instrument was selected because it allowed the researcher to obtain rich participant data. The structured questions allowed the researcher to obtain information about the main research topics and questions. The open-ended discussions permitted the researcher to get more detailed descriptions of the participants' own experiences and perspectives.

4.6.3 Data collection procedure

This study employed these data collection procedures to collect the data required, identify the sample space of the research, how the sample space was recruited to participate in the study, the research timelines, how the data were collected, stored, cleaned, and analyzed.

Determining the data sampling method: in this research, the convenience sampling method was used to obtain a sample space of seventeen individual participants. This method of sampling was chosen owing to it being a convenient, cost-effective, and efficient way of obtaining data from a broad range of various individuals. With this research, the main researcher's own network of previous and current colleagues and connections was used; these were contacted through *WhatsApp* to participate in the study. According to various studies, to determine the sample size required for the study, even though there are no hard defined rules for determining sample sizes, the suggestions made in various different studies were followed to ensure that sample size chosen should be sufficiently large and varied to elucidate the aims of the study, and followed the general rule that a sample size between ten and fifty participants would be sufficient (Malterud et al., 2016; Creswell & Creswell, 2018).

How the sample space was recruited: the sample space in this study was recruited through *WhatsApp*; this social media platform was used to contact the main researcher's own network of previous and current colleagues and connections. This method of recruitment was used owing to it being a cost-effective, convenient, and efficient way to recruit members of a broad audience into the sample space of the research conducted.

The research timelines: the study was conducted from May 2023 until August 2023. With this time frame, individuals were provided with adequate time to complete the research interviews and for the researcher to acquire, store, and analyze the information obtained.

How the data were collected: the data required for this research were acquired through semi-structured interviews; a link to participate in the study was shared through social media, and an online interview was held securely through *Google Meet*. The information and discussions conducted in the interview were recorded using *Apple Dictation* and the data were copied into a password-encrypted *Excel* file securely stored on *Google Drive*. The complete set of questions is presented in Appendix A - *Standardized questionnaire*.

How the data were stored: once the data were captured, the researcher copied the data into a password-encrypted *Excel* file and hosted it on *Google Drive*. It was ensured that access to

the encrypted file was only provided to the researcher and his supervisor, Prof. Marié Hattingh, and that the authentication into the online repository required two-factor authentication.

How the data were cleaned: once the data was securely stored, the researcher cleaned the data by removing all data entry errors from the sample space of data required. All information considered irrelevant to the question was also removed from the appropriate dataset to ensure that the necessary information was complete and concise regarding the research questions.

How the data were analyzed: once the data were cleaned, the researcher conducted various analyzes on the dataset to obtain meaningful and justifiable responses to the research questions. Themes and correlations to data were analyzed and justified, and a clear and concise answer to the main research question was proposed.

4.6.4 Data collection ethical considerations

This research constructed an ethical code of conduct regarding data access, storage, and analysis (Appendix B - *Research code of conduct*). This code of conduct was presented to each participant. This code of conduct includes a deduction of the rights of each participant, as provided by Oates (2006).

Oates (2006) provides a framework for ethical research and includes these ethical considerations, which should be undertaken:

- **The right to decline participation:** The subject of the research has the right to choose if they want to participate in the research.
- **The right of withdrawal:** The subject has the right to withdraw their participation from the research at any point. If the subject withdraws their participation, all data collected from the participant will be discarded.
- **The right to informed consent:** The subject has the right to all information regarding participation in the research, and all information must be provided to them.
- **The right to anonymity:** The subject has the right to anonymity, meaning that no personal information will be used in the research.
- **The right of confidentiality**: The subject has the right to abstain from confidential information at any point. Meaning that confidential information must be removed from the study when and if the subject specifies this.

Oates (2006) also provides a framework for the responsibility of the researcher:

- The researcher will obtain no confidential or proprietary information.
- No information will be collected irrelevant to the research.
- The researcher will behave with integrity to the information obtained.
- The researcher will adhere to the rights of each participant.
- The researcher will always act responsibly and ethically under all circumstances.
- The researcher will abstain from plagiarism.

All ethical considerations will be undertaken when observing how self-regulating technology can promote workplace efficiency. All rights, as described, will be acted upon and the research will be conducted ethically in consideration with the responsibilities of an ethical researcher, this includes abstaining from confidential information, and adhering to the ethical guidelines as stipulated above.

This research presented a clear consent form to each participant (Appendix D - *Research consent form*). Each participant had to agree to the required consent form to voluntarily participate in the study.

4.6.5 Data management plan

The data collected from each participant through the interviews, which were securely held on *Google* Meet and recorded through *Apple Dictation,* was securely stored in a password-encrypted *Excel* file, and securely stored on a two-factor authenticated online *Google Drive* repository.

Secure data storage is a critical aspect of data management in research, and proper data storage principles are essential for protecting confidential information and maintaining trust with each research participant. Secure data storage helps to preserve the confidentiality of each research participant's personal information, and the researcher bear an ethical and legal responsibility to safeguard the data obtained from each participant by ensuring that access to the data is restricted to authorized individuals. Secure data storage also helps to maintain the integrity of the research's data. By implementing the appropriate access controls and backup mechanisms, researchers can prevent data loss, corruption, and unauthorized alterations and ensure the accuracy and reliability of the data. It is also required for researchers to comply with the applicable laws, regulations, and institutional guidelines related to data storage and the protection thereof (American Psychological Association, 2020).

The research approach to data management ensured that the researcher complied with all the required amenities by encrypting the *Excel* file where the data were stored and by restricting the access controls to the online repository to only himself and his supervisor.

4.6.6 Data analysis strategies

In this study, a thematic analysis was employed as the approach for data analysis.

According to Clarke et al. (2006), thematic analysis is a qualitative data analysis methodology, allowing the researcher to identify and interpret patterns, themes, and meanings from textual data. It provides a flexible approach to analyzing qualitative data and providing meaningful insights from its findings. The process of conducting thematic data analysis includes:

- **Familiarization:** in this step, the researcher familiarizes himself with the data by reading and re-reading the texts to acquire a comprehensive understanding of the context. This step immerses the researcher in the data and helps identify initial impressions and patterns (Clarke et al., 2006).
- **Generating initial codes:** in this step, researchers create codes by identifying and labeling meaningful units of information, such as words, phrases, and sentences that capture imported aspects of the data. This process involves systematically coding the data to create a set of initial variable codes (Clarke et al., 2006).
- **Searching for themes:** in this step, researchers review the codes they created and search for overarching patterns or themes emerging across the data obtained. Themes are coherent patterns of meaning representing essential aspects of the phenomenon under investigation. Researchers may, in this step, refine, combine, and separate codes to create meaningful themes (Clarke et al., 2006).
- **Reviewing and defining themes:** during this phase, researchers review and refine the themes by ensuring they are internally coherent, unique, and relevant to the research question. Researchers also examine the entire dataset to ensure the themes accurately represent the data (Clarke et al., 2006).
- **Defining and naming themes:** in this phase, researchers define and describe each theme, providing clear explanations and examples. Names and labels are assigned that encapsulate the essence of each theme (Clarke et al., 2006).
- **Interpreting and reporting:** in this step, researchers interpret the themes in context with the research question and broader literature surrounding the research intent, and the relationships between the themes are analyzed (Clarke et al., 2006).

Thematic analysis was chosen as the data analysis technique in this study because it is a flexible, in-depth exploration of the phenomenon being investigated, allowing complete transparency and rigor through systematic coding and documentation regarding the analysis of the data.

4.6.7 Creating the interview guide

In qualitative research, an interview guide is a research tool used to structure and guide the interview process. It is a flexible document providing a framework for conducting interviews while allowing exploration of detailed questions. Fontana and Frey (2005) remark that the primary purpose of an interview guide is to ensure consistency and coherence throughout the interview process. It is a design, assisting the researcher in remaining focused on the research objectives, ensuring that the interview does not stray from the relevant research topics (Fontana & Frey, 2005).

During this research, the following proposed theoretical framework was structured (Figure 4-4).

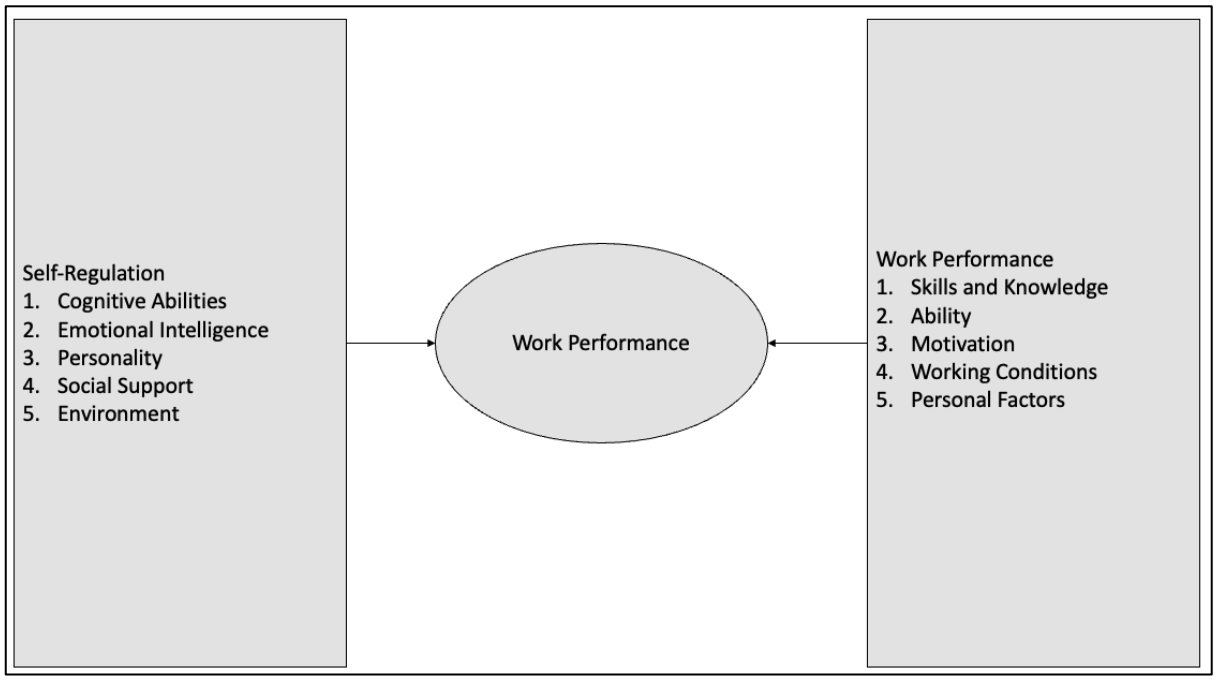


Figure 4-4: Proposed theoretical framework

From this proposed theoretical framework, a general semi-structured interview guide was produced. Each question portrays a factor that could influence work efficiency through self-

regulating technologies. The complete interview guide is observed in *Appendix A - Semi-structured interview*.

Figure 4-5 illustrates the research design undertaken in this study. This study undertook an interpretivism approach to deductive research. A mono-data collection method was used with semi-structured interviews to conduct qualitative research.

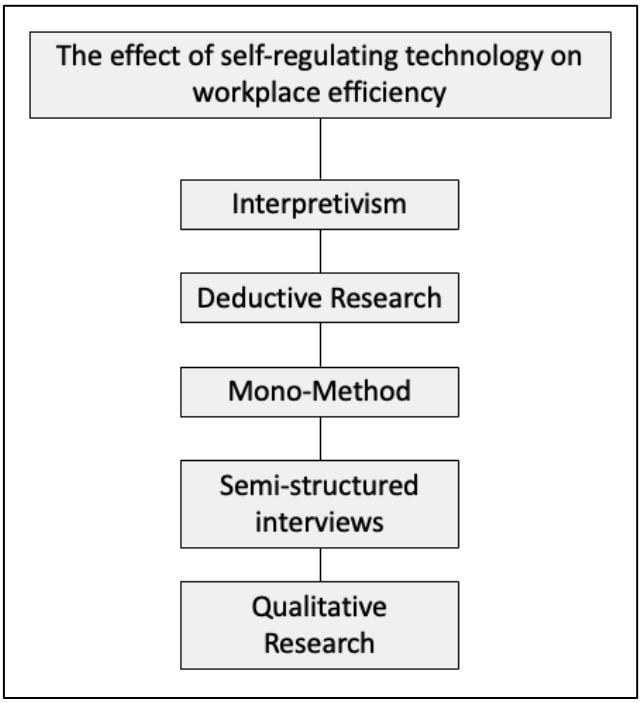


Figure 4-5: Research design

4.7 Conclusion

To conclude, the research methodology section depicts the research philosophy, approach, strategy, choices, time horizons, data collection methods, data analysis methods, and ethical concerns associated with the research. It provides a better understanding of the beliefs and approaches undertaken while providing a guideline for ethical research (*Appendix B – Research code of conduct).*

CHAPTER 5: DATA ANALYSIS AND RESULTS

5.1 Introduction

In this section of the research, the data collection and management plans, analysis, and results obtained from the research survey are depicted. This section provides the needed information regarding how the research was conducted, what actions were taken to collect the research results, how the researcher managed the data obtained, how and in what strategies the data were analyzed, and the complete result set. This section serves as the research support and strives to depict the data in such a manner as to support the main and sub-research questions created.

5.2 Research results

This research employed a semi-structured interview to obtain data related to the effect of self-regulating technologies on workplace performance. Seventeen participants were included in the study, and the results obtained are depicted in the subsequent section. This section begins with a thematic analysis of the data obtained and then a further analysis of the core results.

5.2.1 Demographic overview of participants

This section depicts the demographic data obtained from the research participants and further analyzes the core data points identified. These tables depict the results obtained from the seventeen participants. This data is further analyzed and examined in this section.

Table 5-1: Participants' data

Participant number	Age distribution	Work distribution	Office layout	Type of self-regulating technology used
Participant 1	25-30	Software engineer	Open plan office	Apple Focus Mode
Participant 2	25-30	Software engineer	Cubicle office	Apple Focus Mode

Participant number	Age distribution	Work distribution	Office layout	Type of self-regulating technology used
Participant 3	18-25	Business analyst	Cubicle office	None
Participant 4	18-25	Business analyst	Work from home	None
Participant 5	35-40	Software engineer	Cubicle office	Forest App
Participant 6	30-35	User experience engineer	Work from home	Confluence, Headspace, InsightTimer
Participant 7	25-30	Software engineer	Work from home	None
Participant 8	25-30	Business analyst	Open plan office	Apple Focus Mode
Participant 9	25-30	Software engineer	Open plan office	Forest App
Participant 10	40-45	Software engineer	Work from home	None
Participant 11	35-40	Human resource manager	Open plan office	Google Tasks
Participant 12	20-25	General manager	Open plan office	Samsung Focus Mode
Participant 13	40-45	Software engineer	Work from home	BlockSite, AdGuard, Screen Timer
Participant 14	20-25	General manager	Work from home	Screen Timer

Participant number	Age distribution	Work distribution	Office layout	Type of self-regulating technology used
Participant 15	60+	Portfolio manager	Work from home	Samsung Focus Mode
Participant 16	30-35	Quality assurance engineer	Work from home	Samsung Focus Mode
Participant 17	20-25	Quality assurance engineer	Open plan office	Screen Timer

5.2.1.1 Participant age distribution

From the sample space chosen for the research, a median of 33 years of age was found. Age distribution is a valuable consideration in research since it substantially influences various aspects of human life and social dynamics. It helps draw conclusions based on the demographics of the study. In social and economic studies, age distribution is crucial since various age groups contribute to the labor force and have biased opinions and consumer behavior.

5.2.1.2 Participant work distribution

The study participants, various job titles, and roles were evaluated, and the subsequent work descriptions were provided. The general work allocation of the study participants, as depicted in **Figure 5-1**, was software engineers. These included junior, intermediate, and senior software engineers. Most of the participants in the study worked in the *Information Technology: Software and Consulting* industry, and to expand the sample space, additional participants were approached from the human resources (*HR) consulting*, *financial services,* and *retail* industries. The participants were then further questioned on the office layout they work in. This was chosen so the research could understand if diverse office layouts led to a decrease in distractions during an ordinary workday. From the interviews, it was established that eight of the seventeen participants worked from home. Participants were also probed to

indicate whether they have ever missed a work deadline owing to distractions; twelve of the seventeen participants agreed that distractions did not hinder their ability to complete their work on time.

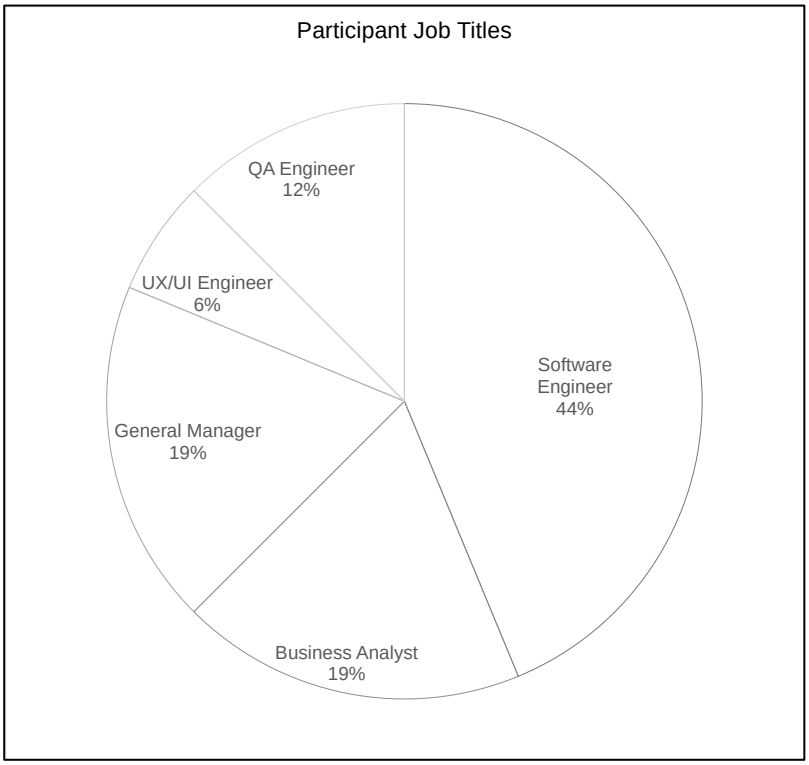


Figure 5-1: Participant job titles

In the results obtained, it was established that eight of the seventeen employees worked from home. The COVID-19 pandemic led to a shift in how people work, with working from home and working from the office, and a hybrid combination of both, becoming a prominent feature of the modern work environment. The sudden need for quarantine measures and applying social distancing forced several organizations to adapt their business procedures to accommodate remote work arrangements to ensure that their operations can still be completed successfully. Even after the pandemic, there has been a clear increase in employees who choose and prefer to work remotely (Birimoglu et al., 2022).

5.2.1.3 The mandatory implementation of self-regulating

In the research results, it was established that eleven out of the seventeen employees supported the mandatory implementation of self-regulating technologies. With self-regulating technology interruptions caused by social media, messaging, or non-work-related applications

can be drastically reduced, and eleven of the research participants indicated that a mandatory application identified and implemented throughout the organization can benefit them through the means of reduced distraction allowing them to improve their productivity and work quality. Accompanied by these data points, the participants primarily agreed that they would be more open to using self-regulating technologies throughout their workday, if colleagues, managers, and team members also used them.

> “I can see the benefits of using mandatory self-regulation technologies, it the potential is there to optimize your productivity.” – Participant 1

> “I think there could be many benefits for a company if management made the use of self-regulatory applications mandatory.” – Participant 8

> “I think companies could definitely increase productivity by implementing self-regulatory tech, some people might be over reliant on technology and social media, and this could really help.” – Participant 15

On the contrary six of the seventeen employees did not support the mandatory implementation of self-regulating technologies.

> “I don't know, there are a few concerns I still have about potential misuse, invasion of privacy, and the consequences of relying too heavily on technology to monitor and regulate my work routine.” – Participant 10

> “Relying too heavily on technology for self-regulation might destroy the personal touch that is essential for a healthy work environment.” – Participant 12

Furthermore, two participants did elaborate stating that the approach to implementation should be a diverse approach.

> “I do think the implementation thereof (mandatory self-regulating technologies) should be carefully assessed though. Just to make sure what the impact could be on employees.” – Participant 1

> “Mandatory in the sense that you have various options for your personality yes. Forcing a person to use one specific one because the CEO is finding it useful for him, no.” – Participant 11

5.2.1.4 Integrating self-regulating technologies

The research results indicated that twelve out of the seventeen employees believe that implementing and using self-regulating technologies in their work routines is easy to do. Most research participants felt that once they got into the habit of using these technologies, they could feel that their productivity improved, they felt less distracted and more concentrated on their primary responsibilities, and they had more time on their hands during the workday.

One of the most beneficial features of self-regulating technologies among the research participants is the ability to set goals and track their progress toward achieving them. The participants felt that, when their goals are visualized, accompanied by the ability to maintain their focus on their primary responsibilities, they were more efficient in task delivery and had better work quality.

From the results obtained, twelve of the seventeen employees indicated that they used self-regulating technologies to improve their focus during the workday and to reduce the stress they experience from their workload. These employees also felt that using self-regulating technologies drastically improved their performance. Since distractions were reduced, they had more cognitive capacity to adopt complex tasks, and the tendency to become distracted by unrelated messages and notifications led to them being more present in meetings and conversations regarding projects or task descriptions.

> "When my focus mode is on, my priorities definitely shift. I'm more focused on my work, I stay focused, and I can face the hardest challenge you can throw at me. Basically, my phone becomes a brick, only there for the essentials, I don't look at it for hours, and when lunch comes, I get back up to date with what happened in the world." – Participant 2

5.2.1.5 Adopting self-regulating technologies at work

One of the most common themes identified in the research results regarding the adoption of self-regulating technologies was the employees' reluctance to change. Of the seventeen research participants, fourteen indicated that their most significant barrier to using self-regulating technologies was their own inability to quickly adapt it into their work routine.

> "I think getting it to fit into your work routine would be the greatest barrier, I try to get into using it as soon as I'm at my desk."– Participant 3

> “Getting people to buy into it. Not a lot of people know about it, and I deal the evidence that it actually helps, just really isn’t there.” - Participant 5

> “People are generally set in stone, they're not always open to trying something new.” - Participant 7

> “I think the biggest problem with the adoption of self-regulating tech is inaccessibility, I mean I work in a tech company so I have devices capable of using the apps, but I don't think that can be a general assumption.” – Participant 1

5.2.1.6 Improvements to self-regulating technologies

The research results indicated that employees would be more inclined to use self-regulating technologies if features, such as gamification, goal tracking, and data transparency, were available in the applications. The research participants indicated that they would want a platform where they can set their goals, analyze their time spent on tasks, and prioritize responsibilities to help them become more efficient at work. More advanced features, such as task scheduling depending on geographic location, were also mentioned. As well as companies and organizations making using self-regulation technologies mandatory or creating incentives for employees to use them. Employees also indicated that they would want to better fine-tune the self-regulating technologies they use; therefore, it is tailored to their specific needs. For example, one research participant indicated that it would be beneficial for them to restrict the notifications they receive to applications.

> “I’d like to see just a bit more flexibility on the types of notifications that can pop through, I’d love to be able to do with *WhatsApp* what you could do with *iMessage*.” – Participant 2

> “Achievements, gamification and maybe integration with organizational software like *Miro* or *GitHub* or something, like you get to plant a tree with every pull-request you make.” – Participant 5

5.2.2 Thematic analysis

To gain a better understanding of the data and how we can start to interpret it, a thematic analysis was done on the results to obtain and identify common themes amongst the research participants.

A thematic analysis identified common themes in the research results to obtain a better understanding of the data. Thematic analysis is a research method used to help identify, analyze, and interpret the various patterns or “themes” in qualitative data. It provides an accessible and systematic approach to generating codes and themes, where codes are the smallest unit of analysis that captures interesting features of the data. Codes are the base building blocks of the more significant themes or patterns established in the research results. These themes provide a framework for organizing and reporting the researcher’s observations (Clarke et al., 2015).

Since thematic analysis is typically used where written, verbal, or visual messages are analyzed, it was ideally suited for this research. The interviews were conducted in the research, and the responses were coded. Once the responses were coded, various themes were identified using the codes.

The thematic analysis of the narratives conducted between the principal researcher and the study participants identified six main themes across the results.

5.2.2.1 Theme 1: self-regulating technologies

The participants were asked to identify self-regulating technologies used during a typical workday. From the results, it was established that most participants used device-native self-regulation capabilities (device-native self-regulating technologies refer to applications or features used native to the operating system of the user and excludes installing additional functionality to the device) rather than that of third-party vendors or software.

Table 5.2 depicts the self-regulating technologies participants used and what they considered their biggest distractions in their working environment.

Table 5-2: Self-regulating technologies

Participant number	Self-regulating technology used	Applications used during the workday
Participant 1	Apple Focus Mode	Instagram, WhatsApp, YouTube, OneDayOnly
Participant 2	Apple Focus Mode	Loud working environment. Telegram
Participant 3	None	WhatsApp, SnapChat, Instagram

Participant number	Self-regulating technology used	Applications used during the workday
Participant 4	None	Emails, Microsoft Teams, Slack. Telegram
Participant 5	Forest App	Loud working environment. WhatsApp, LinkedIn
Participant 6	Confluence, Headspace, InsightTimer	WhatsApp, YouTube, Instagram, Facebook
Participant 7	None	YouTube, WhatsApp, Facebook
Participant 8	Apple Focus Mode	WhatsApp, LinkedIn, Instagram
Participant 9	Forest App	WhatsApp, YouTube, LinkedIn
Participant 10	None	WhatsApp, Instagram, YouTube
Participant 11	Google Tasks	LinkedIn, WhatsApp, Telegram
Participant 12	Samsung Focus Mode	WhatsApp, Instagram, Facebook
Participant 13	BlockSite, AdGuard, Screen Timer	LinkedIn, WhatsApp, Facebook
Participant 14	Screen Timer	WhatsApp, TikTok, Instagram
Participant 15	Samsung Focus Mode	WhatsApp, LinkedIn
Participant 16	Samsung Focus Mode	WhatsApp, YouTube
Participant 17	Screen Timer	Instagram, WhatsApp

The study participants were asked: In a typical workday, how often do you use your mobile device/laptop for non-work-related activities. From this prompt, eleven of the seventeen participants remarked that they often use their devices for non-work-related activities during an average workday.

The participants discussed the reasoning and notions behind using self-regulating technologies, whether the participants knew self-regulating technologies existed, what various technologies were available to them, what they were using, and their general perception of self-regulating technology. From these narratives, multiple sub-themes were identified, which provided insight into why participants opted to use self-regulating technology. These included participants needing to reduce distractions during the workday, to focus their attention on

specific tasks with greater cognitive intent. Some agreed that using self-regulating technologies fosters an environment where positive habits are created.

Table 5-3 illustrates the codes extracted from the quotations that describe the notion of self-regulation technology use by the participants.

Table 5-3: The notion of self-regulating technology

Examples of Quotations	Codes
"When I use my Mac or iPhone's work schedule (Focus Mode) while I'm busy with tickets or if I'm in meetings, I did notice that I can focus a bit more on my work" – Participant 1 *"It does get rid of all the spam calls and messages I get through the day, and just by doing that, it definitely keeps me more focused on my work." – Participant 2* *"I know some apps help you structure your work into focused intervals, and then a brief rest periods, to try and boost your productivity." – Participant 6* *"I use True Caller to get rid of the general annoyance of being bothered by phone calls at work, and it definitely helps alleviate the pain of unwanted spam. It's like putting a force field around distractions." – Participant 8* *"They act as a helpful assistant to my self-discipline and reinforces positive habits, which I think ultimately leads to greater efficiency and accomplishment." – Participant 15*	▪ Focus more. ▪ Create habits. ▪ Reduce distractions. ▪ Stress relief. ▪ Emotional regulation. ▪ Improve time management skills.

The participants were further probed whether they feel a need exists for mandatory workplace self-regulating technologies to help keep individuals focused on their work requirements. From the sample space of participants, the general feeling regarding mandatory self-regulating technologies was positive; however, an emphasis was on the lack of freedom, which mandatory workplace self-regulating technologies would create.

> "... your work shouldn't force you to use self-regulating technologies just because management want to jump on a new buzz word, they should at

least give you options or show you the benefits of using it, then allowing you to make an informed decision ...” – Participant 11

The study participants were asked: In a typical workday, how often do you use your mobile device/laptop for non-work-related activities? From this prompt, over eleven of the seventeen participants remarked that they often use their devices for non-work-related activities during an average workday.

The participants identified the applications they use and where they were emphasized (the list is ordered with the most used app being first):

1. WhatsApp
2. YouTube
3. Instagram
4. Facebook
5. LinkedIn
6. Telegram
7. TikTok

The participants were asked whether they were aware of any self-regulating technologies readily available to them; from the sample, twelve of the seventeen participants indicated that they were familiar of self-regulating technologies they could use and already used these technologies in their daily work routine.

5.2.2.2 Theme 2: The support for decision-making

A general theme identified in the narratives conducted between the participants and the researcher was that using self-regulating technology benefits the user in their support for decision-making. It was discussed and established that self-regulating technologies are typically created to help the individual prioritize their tasks, manage their time better, and allow users to micro-manage their daily schedules. The study participants primarily agreed that self-regulating technologies created an environment where they felt more in control of what they were supposed to do; they tracked and managed their time better and felt like they completed their job responsibilities with greater efficiency.

From the list of participants, thirteen agreed on the fact that self-regulating technologies help them to maintain their focus on job-requirements.

> "By being limited on the amount of time I can spend on social media, it has allowed me to prioritize work and stay focused, as I am not focused on "staying on top of things" by checking every notification anymore."– Participant 12
>
> "It definitely helps me screen out what is important and what isn't."– Participant 11
>
> "It helps me get that time placement. Like today I'm doing this, this is my focus. And assist me in identifying the crucial goals of projects." - Participant 7

Table 5-4 illustrates the codes extracted from the quotations that describe how self-regulating technologies help support decision making.

Table 5-4: Support for decision-making

Examples of Quotations	Codes
"By being limited on the amount of time I can spend on social media, it has helps me prioritize work and remain focused, as I am not focused on "staying on top of things" by checking every notification anymore." – Participant 12 *"I can set my Focus Mode to allow only messages and calls from certain people or important contacts. It ensures I don't miss critical updates from my team or supervisors, which helps me stay informed…" – Participant 4* *"By being limited on the amount of time I can spend on social media, it allowed me to prioritize work and stay focused. Since I'm not trying to stay on top of things by checking every notification anymore" – Participant 12* *"It definitely helps me screen out what's important and what's not." -Participant 10* *"It helps me get that time placement. Like today I'm doing this, this is my focus. And assist me in identifying the crucial goals of projects." – Participant 7*	▪ Task prioritization. ▪ Time limiting. ▪ Prioritize communication. ▪ Stay informed.

The participants were then further probed to describe a time when they felt particularly overwhelmed or distracted at work, and how self-regulating technologies helped them in these situations.

> "… we use *YouTrack* to keep track of tickets and our SCRUM processes. I had this one ticket which we sized to be a five, which is a big task, and I noticed that while I was using self-regulating tech, it did keep me completely focused on that task for a good few hours without distractions." - Participant 1

> "Back at the beginning of the year, things were quite hectic for me. I had to juggle six projects simultaneously, and each one had its own set of sprint ceremony meetings. I found myself stuck in meetings from 8:00 AM to 5:00 PM or even 6:00 PM every day, leaving me with no time for actual productive work. looking back, if I had known about the tools I use now, I could have effectively prioritized the crucial meetings and skipped the ones that weren't essential. This way, I would have gained more focused work time and achieved better productivity." - Participant 6

5.2.2.3 Theme 3: The emotional influence of self-regulating technologies

The narrative between the participants and the researcher led to a discussion on whether they believed that self-regulating technologies affect their emotional intelligence, whether they thought that by using self-regulating technologies, they were more inclined to interact with colleagues, and the reasoning for it. A general topic introduced by the participants was the "level of annoyance" (Participant 3, Participant 8, Participant 9, Participant 10) they experienced during their workday with numerous distractions, and how self-regulating technology helped them manage these. They experienced "improved tolerance" (Participant 7) and "enhanced emotional regulation" (Participant 3). Some participants elaborated on how self-regulating technologies and the general gamification thereof helped them experience "a sense of self-completion" (Participant 5) on task performance while improving their job satisfaction.

Table 5-5 illustrates the codes extracted from the quotations that describe how the participants remarked the emotional influence of self-regulating technologies.

Table 5-5: The emotional influence of self-regulating technologies

Examples of Quotations	Codes
"I've noticed that self-regulating technologies have had both positive and challenging impacts on my ability to recognize, understand, and manage emotions, both in myself and others. As someone who works in UX design, being empathetic and curious is part of my nature, and I'm usually good at picking up on people's emotions and state of mind. However, since the shift to remote work and increased reliance on technology, I've found it a bit more difficult to accurately gage emotions." – Participant 6 *"... these technologies grant great personal benefits that I didn't realize I was lacking." – Participant 12* *"They act as a helpful assistant to my self-discipline and reinforces positive habits, which I think ultimately leads to greater efficiency and accomplishment." – Participant 15*	▪ Empathy toward others. ▪ Sense of completion. ▪ Reduced annoyance. ▪ Self-awareness.

The participants were further probed to elaborate whether they felt that self-regulating technologies have contributed to their ability to recognize, understand, and manage emotions. From the results obtained eleven of the seventeen participants agreed that self-regulating technologies promoted better management of emotions. The following Figure 5.2 illustrates the data obtained.

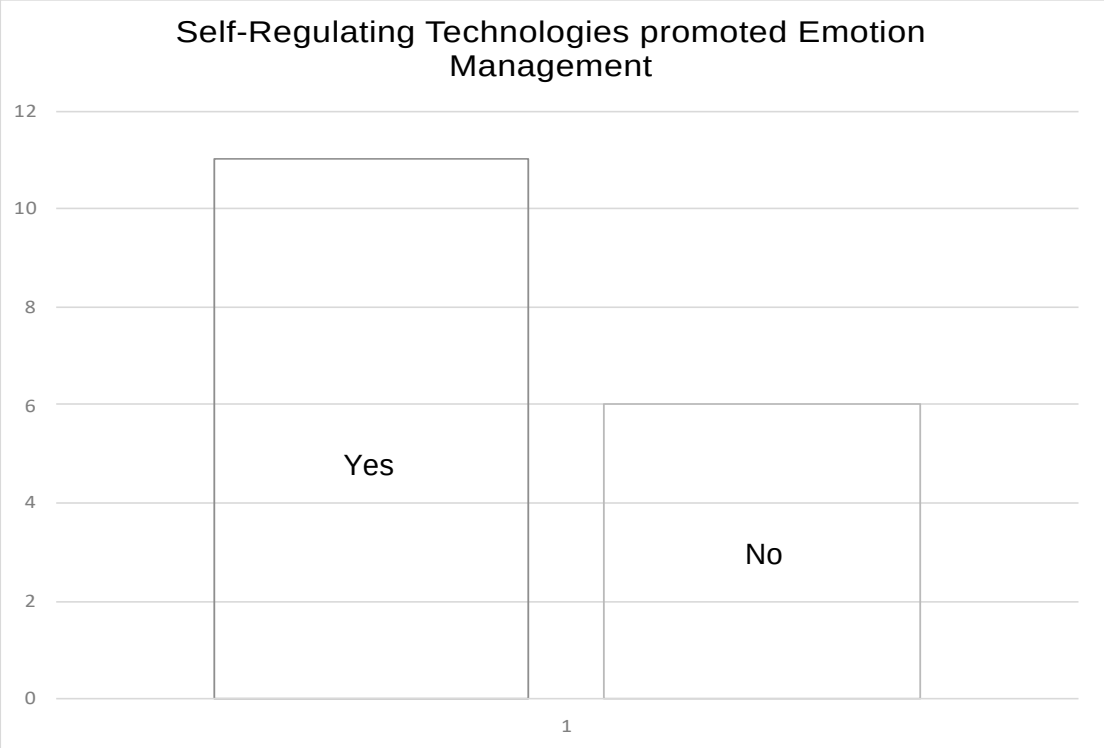


Figure 5-2 Felt self-regulating technologies promoted emotion management

5.2.2.4 Theme 4: The concern of distractions

A common subject for discussion in the narrative between the participants and the researcher was the participants concern with distractions. Participants felt that with the increased usage of various communication platforms in their working environment, such as Microsoft Teams, Slack, WhatsApp, Discord, the increased communication channels went together with the distractions.

From the list of participants, eleven remarked that they find it challenging to re-concentrate on work assignments after distractions occurred, indicating that the attentional resources required to re-concentrate on work requirements can be a draining resource; eleven of the participants indicated that they experience distractions regularly during the workday. The following Table 5-6 depicts how easily the participants are distracted, the average time they take to refocus on their work after a distraction occurs, and how good they consider themselves to be at blocking distractions.

Table 5-6: Reactions to distractions

Participant number	Distracted easily	Average time to refocus	Blocking distractions
Participant 1	No	6-10 Minutes	Moderately good
Participant 2	Yes	6-10 Minutes	Good
Participant 3	No	6-10 Minutes	Moderately good
Participant 4	Yes	1-5 Minutes	Neutral
Participant 5	Yes	11-20 Minutes	Moderately good
Participant 6	Yes	1-5 Minutes	Moderately good
Participant 7	No	6-10 Minutes	Moderately good
Participant 8	Yes	6-10 Minutes	Neutral
Participant 9	Yes	1-5 Minutes	Moderately good
Participant 10	Yes	11-20 Minutes	Moderately good
Participant 11	No	Less than a minute	Good
Participant 12	No	6-10 Minutes	Moderately good
Participant 13	Yes	Over 20 minutes	Moderately good
Participant 14	Yes	11-20 Minutes	Moderately good
Participant 15	No	6-10 Minutes	Good
Participant 16	Yes	6-10 Minutes	Good
Participant 17	No	6-10 Minutes	Moderately good

The participants were further probed to indicate what they felt was their biggest distraction during the average workday. From this, it was suggested that social media notifications were a big distraction for most participants; however, noisy environments were emphasized, as quoted by one participant:

> "The open work area we collaborate in, is extremely noisy, people talk too loudly and often have meeting rooms which are over booked, and people are forced into collaboration areas." – Participant 17

Participants expressed concern that the growing number of notifications, distractions, and information sources required to stay informed were reducing their productivity and straining their cognitive capacity to focus on work responsibilities.

Table 5-7 illustrates the codes extracted from the quotations that describe how the participants remarked their concerns of distractions within the workplace.

Table 5-7: The concerns of distractions

Examples of Quotations	Codes
"It allows me to customize which notifications and apps I want to receive notifications and alerts from while I'm at work. By blocking unnecessary distractions, I can maintain my focus and make decisions without interruptions, and I feel this really boosts my productivity" – Participant 5 *"... by using these apps, it creates an environment of uninterrupted work, you kind of cut yourself off from the world and can focus on one thing at a time. It really creates a calm space." – Participant 2* *"... just placing you in a scenario where you're not that easily distracted." – Participant 5*	▪ Reduce notifications. ▪ Fear Of Missing Out.

The research results further indicated that ten out of the seventeen employees find their working environment distracting, experience these distractions regularly, and take six to ten minutes to re-concentrate on their tasks after a distraction.

> "... distractions take your mind of things which might have taken you a good few hours to understand ..." – Participant 5

Participant 14 indicated that distractions while working felt like a rabbit hole in discomfort.

Even though most research participants felt like their work environment was distracting, some indicated that they had missed a deadline owing to distractions in the workplace; however, most employees admitted that they use their work devices for non-work-related activities regularly during the workday.

Table 5-8: Level of distractions

Participant number	Uses self-regulating technologies	Work environment	Distracted easily (Self-reported)
Participant 1	Yes	Open plan office	No
Participant 2	Yes	Cubicle office	Yes
Participant 3	Yes	Cubicle office	No
Participant 4	No	Cubicle office	Yes
Participant 5	Yes	Works from home	Yes
Participant 6	Yes	Cubicle office	Yes
Participant 7	Yes	Works from home	No
Participant 8	No	Works from home	Yes
Participant 9	Yes	Open plan office	Yes
Participant 10	No	Works from home	Yes
Participant 11	Yes	Open plan office	No
Participant 12	Yes	Open plan office	No
Participant 13	Yes	Works from home	Yes
Participant 14	Yes	Open plan office	Yes
Participant 15	Yes	Cubicle office	No
Participant 16	Yes	Works from home	Yes
Participant 17	Yes	Open plan office	No

5.2.2.5 Theme 5: Commitment to work

Participants discussed the increased commitment to work while using self-regulating technologies. A general assumption can be made based on the results that participants felt more committed to their work when they used self-regulating technologies. They felt that with the task tracking and time management features available to them in self-regulating technologies; they set visible goals and promoted their ambition to achieve them in a timelier fashion.

Table 5-9 illustrates the codes extracted from the quotations that describe how the participants remarked how self-regulating technologies have affected their commitment to work.

Table 5-9: Commitment to work

Examples of Quotations	Codes
"... it's like peanut butter and jelly... it helps me stay committed to my work." – Participant 1 *"I appreciate self-regulating technologies that help me keep track of tasks, deadlines, and priorities." – Participant 6* *"I can focus on what is needed form me with much greater attention." – Participant 8* *"By utilizing these technologies, I can create structured routines and set clear priorities which keeps me on track of important deadlines." – Participant 14* *"I'm able to get rid of 20% of my annoyances in the office ..." – Participant 9* *"I think they help me stay on top of my responsibilities and maintain a well-organized work routine." – Participant 14*	▪ Committed to work. ▪ Narrows down requirements. ▪ Greater attention.

Furthermore, the participants were probed to elaborate on how effective they deemed self-regulating technologies are at improving their workplace efficiency. From this, fifteen of the seventeen participants agreed that self-regulating technologies are very effective at improving workplace efficiency.

> "... once I get used to the tech, they genuinely help my day-to-day." – Participant 6

> "Very effective. I like the gamification of *Forest*, it keeps it interesting and challenges you to get the things which needs to be done, done and on time, so I would say it is a great tool to help you improve your work performance." – Participant 5

"Very effective. distractions make you lose your concentration and I do find it hard getting back on track when your mind has wondered a bit too far." – Participant 3

5.2.2.6 Theme 6: The concerns of using self-regulating technology

Participants were probed to discuss their concerns about using self-regulating technology. A general theme appeared that self-regulating technologies are not that appealing to use in the workplace constantly. Some concerns were raised about the data sharing and privacy policies of self-regulating technologies, and participants rarely felt comfortable sharing their working schedules and activities with third-party applications without clear and concise data usage policies. Participants were provided the opportunity to participate in an open discussion on the lacking features of self-regulating technologies, and a general concern was raised that the self-regulating technologies available had no appealing qualities or features, which made users want to use them specifically.

Table 5-10 illustrates the codes extracted from the quotations that describe how the participants remarked how self-regulating technologies have affected their commitment to work.

Table 5-10: Concerns of usage

Examples of Quotations	Codes
"I am not the most organized person and in certain aspects I am not self-disciplined in capturing what I've done on a digital platform. Technology tools only help when you are committed to use them." – Participant 11 *"I believe you might find that some of these technologies need regular adjustments to suit the working Joe's needs." – Participant 16* *"I'm not a hundred percent comfortable with sharing my work routine with others. So, I think it's crucial for these apps to be completely transparent with their data collection procedures." – Participant 17* *"... it'll need to be more addicting for me to use it constantly." – Participant 3*	▪ Commitment to usage. ▪ Usefulness shortcoming. ▪ Privacy concerns. Addictive personalities.

Examples of Quotations	Codes
"Sometimes it does feel that when I use focus apps, I cut myself off from my team." – Participant 7	

Research participants also elaborated on how easily self-regulating technologies could be incorporated into their daily work routines and twelve of the seventeen participants agreed that this could be achieved with ease.

> "Not at all, you just need to get into the habit of using it, but it does make getting your tasks done a lot more fun." – Participant 5

> "Not hard at all, when I get to the office or start my workday, I've got my schedule set to be from 09:00 to 15:00 and off at lunch so that notifications can come through" – Participant 8

> "Not hard, it's very easy to download an app sign in and off you go, I mean devices basically come out with focus modes incorporated into the OS nowadays, so just using it really isn't a challenge." – Participant 9

However, five of the participants were hesitant in the adoption of self-regulating technologies into their work routine.

> "…it just always felt like a schlep, I couldn't get into the routine of using it properly…" – Participant 1

> "It's okay. You need to understand the technology you work with for it to make an impact. So, I think getting up to speed might require some time and effort." – Participant 15

5.3 Discussion

This study attempted to understand, analyze, and interpret how self-regulating technologies can promote workplace efficiency, whether employees who used self-regulating technologies established themselves to be more proficient in what they do, and whether self-regulating

technologies can, in total, reduce the stress, emotional influence, and other psychosocial effects workplace distractions have on an individual.

From the proposed theoretical framework created, it was seen that there are various factors which ultimately contribute to an efficient employee, and that all these factors can affect whether an employee is deemed efficient.

From the results obtained, it was indicated that employees feel that by using self-regulating technologies—they have better control over distractions; they are better in tune with their working environment; and they can focus better on their primary responsibilities. The results indicated that employees think that if they minimize the distractions during the workday; they have a chance to focus on their tasks and complete them timelier and with a greater quality. Being less distracted and having more cognitive capacity to focus on tasks allowed employees to reduce their stress regarding the workload assigned to them.

The participants of the study indicated that they are more efficient at performing their jobs when they use self-regulating technologies. Although there are general enhancements that they would like these self-regulating technologies to encapsulate, the research sample agreed that self-regulating technologies could be easily integrated into their daily work routines and would benefit them in creating healthier working habits; however, it was agreed that there might be a reluctance to change in the workforce to adopt self-regulating technologies into their daily work routine, but when these technologies were assumed that, the benefits thereof would significantly improve the employee's efficiency and job satisfaction by allowing them to create an efficient work environment.

Regarding the question: How can using self-regulating technologies make employees more efficient?

It can be observed that by using self-regulating technologies, employees established that they were more in control of their daily work routine, removed inevitable distractions from their working environment, and created a space where they established it to be more efficient. A conclusion can therefore be made that, by using self-regulating technologies, employees can improve their work-life balance, reduce cognitive stress, and improve their efficiency.

Supporting these claims, numerous studies have been conducted on the influence of removing distractions from the working environment and how this could affect an employee's efficiency with task performance. According to Gonzalez-Mulé et al. (2014), distractions experienced in

the workplace can drastically affect an employee's performance. In their study conducted to analyze the relationship between interruptions, distractions, and task performance, it was established that when employees are regularly subjected to interruptions or distractions, their ability to focus deteriorates, leading to longer task completion rates and a negative efficiency rate. It was concluded that, by experiencing regular distractions, an employee's cognitive capacity is drained at a substantial rate, leading to mental fatigue or, in layperson's terms, "brain-drain" (Gonzalez-Mulé et al., 2014).

Sterling (2018) delved into the influence workplace design and technological use have on employee distractions and remarked that a well-designed working environment could influence an employee's ability to concentrate and that by additionally implementing technological solutions, such as self-regulating technologies, sound damping technologies or similar, can reduce the distractions and employee faces throughout their workday, which enhances employees' efficiency (Sterling, 2018).

Furthermore, can start to analyze the various themes identified and relate them to literature.

Theme 1: Self-regulating technologies

The first theme identified explored why participants opted to use self-regulating technology and found that the notion to adopt self-regulating technologies included various factors. These included participants needing to reduce distractions during the workday, to focus their attention on specific tasks with greater cognitive intent, and creating an environment where positive habits are created.

The results obtained coincides with previous research undertaken into the notion of utilizing self-regulating technology. Yot-Domínguez et al. (2017) where research was done to investigate the utilization of and notion for adoption of self-regulating strategies and technologies within universities and found that there are various strategies and reasonings behind adopting self-regulating technologies, and that teachers should foster and environment where self-regulating technology adoption is promoted. The students using these applications indicated that there are many different factors which contributed to the adoption of these applications, including task management (Yot-Domínguez et al., 2017). Selwyn & Aagaard (2021) investigated the need to ban mobile devices in classrooms due to the various distractions which they impose. And found that, supporting the research results found, there

is a growing need to restrict technological usage within classrooms and diminish the number of distractions they impose, prompting the need to adopt self-regulating technologies.

Furthermore, Kellen & Saxenda (2020) investigated the utilization of meditation applications to help in stressful circumstances and noted that there was a range of positive results and benefits participants perceived in battling anxiety and stress. Some participants even created a 'more mindful' daily routine.

Regarding the effect of self-regulating technologies on workplace performance, age distribution was observed as a crucial delimitator since various age groups are perceived to be more technologically inclined and are more openly willing to participate and adopt newer technologies (Chatterjee et al., 2019).

From this the notion of utilizing self-regulating technology lies in whether the technology can benefit the user, whether the technology can help accomplish goals set, and can the technology foster a healthier environment for the end user.

Theme 2: The support for decision-making

The second theme identified explored how self-regulating technologies can be used to support decision-making. The study participants primarily agreed that self-regulating technologies created an environment where they felt more in control of what they were supposed to do; they tracked and managed their time better and felt like they completed their job responsibilities with greater efficiency.

The results obtained coincides with previous research undertaken into how technology can be used to help support decision making. Laudon & Laudon (2020) investigated how collaborative technologies can be used to enhance decision making within organizations and found that cloud-based platforms enabled real-time collaboration within teams and ensured decision-makers have access to the information required regardless of their physical location.

Furthermore, Haag et al., (2019) investigated the adoption of decision-making software within organizations to help provide an interactive approach to decision making and found that these technologies aid managers in evaluating alternatives and making sound and informed decisions. It was also found that these technologies facilitate a comprehensive view of the organizations landscape.

Theme 3: The emotional influence of self-regulating technologies

The third theme identified explored the emotional influence self-regulating technologies implores. A general topic introduced by the participants of this research was the level of annoyance they experienced during their workday with numerous distractions, and how self-regulating technology helped them manage these.

Previous research undertaken supports the results found, Papoutsi et al. (2021) investigated how the usage of virtual and augmented reality can help develop emotional intelligence skills and much like the utilization of self-regulating technology it was found that individuals were more easily inclined to adapt to their social situations and were more appropriately adjusted to their social circumstances.

Furthermore, Kellen & Saxenda (2020) noted that individuals utilized self-regulating technologies to help respond to unwanted circumstances in a healthier manner and found that many benefits were perceived by participants with regards to their response to stressful environments.

Additionally, the research indicates that eight of the twelve employees worked from home. Working from home has become prevalent in the modern-work era (Oakman et al., 2020; Barrero et al., 2021; Ipsen et al., 2021). According to Ipsen et al. (2021) this shift to remote work has significantly impacted employees, influencing various aspects of their personal and professional lives and with this shift many different advantages and disadvantages aspire.

Table 5-11 depicts the various advantages and disadvantages remarked by Ipsen et al. (2021).

Table 5-11: The advantages and disadvantages of working from home (Ipsen et al., 2021)

Advantages	Disadvantages
• Work-life balance • Work efficiency • Work control	• Home office constraints • Work uncertainties • Inadequate tools

Due to the positive experiences of working from home, Ipsen et al. (2021) noted that “more workplaces are likely to offer people the opportunity to continue work from home (WFH) post-

COVID-19 to meet the increased demand for flexibility." This statement is supported by the data obtained within the literature, as eight of the seventeen employees noted that they work from home.

Accompanied with the convenience of working from home, there is an increased expectation of constant availability, this makes it challenging for employees to establish a clear separation between professional responsibilities and personal time. Golden (2020), noted that this lack in defined boundaries can contribute to a higher stress level and increased burnout rate amongst employees (Golden, 2020). Supporting this the notion to use self-regulating technologies to foster an environment which caters for a better work-life balance is needed.

"…it just generally feels like my work life is better managed."– Participant 15

From this it can be seen that self-regulating technologies can be used as a medium to help respond to social situations in a healthier manner and ultimately helps support the improvement of one's own emotional intelligence and mental well-being.

Theme 4: The concern of distractions

The fourth theme identified explored the growing concern the participants had with distractions. The participants expressed concern that the growing number of notifications, distractions, and information sources required to stay informed were reducing their productivity and straining their cognitive capacity to focus on work responsibilities.

Supporting this evidence, Dontre (2021) investigated how the utilization of technology within an academic environment led to an increase of distractions observed and noted that a measurement of self-regulation is required to help reduce the number of distractions perceived. Furthermore, Fitz et al. (2019) investigated how continuous notifications can be harmful to one's own mental well-being and stated that by utilizing batch notifications an individual feels less stressed and overwhelmed by the information provided.

From this it can be deduced that self-regulating technologies enable users to reduce the number of distractions they perceive throughout the workday, ultimately allowing them to focus on their job requirements with greater attention.

Theme 5: Commitment to work

The fifth theme identified explored the increased commitment to work participants felt whilst using self-regulating technologies. Participants felt more committed to their work when they used self-regulating technologies. They felt that with the task tracking and time management features available to them in self-regulating technologies; they set visible goals and promoted their ambition to achieve them in a timelier fashion.

Supporting the results obtained previous research undertaken by Lee et al. (2021) indicated that with the increase utilization of various communication tools available to employees they were more inclined to complete their job requirements in a timeous fashion, however accompanied with the continuous and always available communication, employee fatigue was more likely to occur.

From this the results obtained can be supported, with the utilization of self-regulating technologies employees can ensure that when they are required to focus on their job requirements their full attention and cognitive capacity can be spent on what is needed from them in the moment, allowing them to finish their tasks at a faster rate, and ensuring that deadlines are achieved.

Theme 6: The concerns of using self-regulating technologies

The sixth theme identified explored the concerns of self-regulating technology usage. A general theme appeared that self-regulating technologies are not that appealing to use in the workplace constantly. Some concerns were raised about the data sharing and privacy policies of self-regulating technologies, and participants rarely felt comfortable sharing their working schedules and activities with third-party applications without clear and concise data usage policies.

Technological adoption is a topic widely studied and contains various approaches and recommendations for application development and design to ensure continuous and positive technology adoption and utilization. In a recent study Hart & Sutcliffe (2019) investigated user experience and technology acceptance with regards to iPad users and noted that application adoption is higher when individuals find the application useful.

Reluctance to change refers to an individual's resistance to adopting a new practice, technology, or idea. Individuals typically have a fear of the unknown and can feel they lose control when recent technological advancements are made (Armenakis et al., 2002). Regarding self-regulating technologies and the research results, a consensus was reached

among the research participants that there might be a low acceptance rate for implementing self-regulating technologies in organizations.

From this it should be noted that the adoption and usage of self-regulating technology is very dependent on the individual. To justify this, the participants were probed on whether they think that their personality traits have clashed with self-regulating technologies. Most participants agreed that self-regulating technologies does not conflict with their personality traits; however, one specified that:

> "... sometimes it does feel that when I use focus apps, I cut myself off from my team." – Participant 3

This relates to one of the common themes identified in the results, where users fear missing out. The fear of missing out (FOMO) is a feeling of anxiety or unease an individual experiences from the belief that they are missing something exciting or interesting happening somewhere else. This phenomenon is typically associated with social media and could lead to employees or individuals constantly checking their devices for updates on events that might be inappropriate in the situation (Barry & Wong, 2020). This is coupled with most of the research participants indicating that they often use their personal devices for non-work-related activities during the workday, even though most believe that they are moderately capable and good at screening distractions in their working environment.

Furthermore, literature indicates that additional technostress is prevalent in the modern-day workplace due to social media usage at work (Khan et al., 2021). Khan et al. (2021) noted that in the corporate world, social media addiction is rapidly increasing. Accompanied with this self-regulation should applied to help reduce the increased impact of social media addiction. Khan et al. (2021) found that self-regulation effectively buffers the negative effects of social media overuse. This can be supported by the research results obtained, where five of the seventeen participants noted specifically that they used self-regulating technologies to block out the addiction of social media usage at work.

> "I actively use app blockers to resist the urge to check social media during work hours" – Participant 15

> "…minimizing the temptation to check social media." – Participant 16

> "…every time a notification came through you would find me, checking what happened, going to *Instagram* to get updates, *Facebook*, *WhatsApp."* – Participant 8

To conclude, by using self-regulating technologies, employees have a more significant arsenal available to them to help reduce the distractions perceived in their working environment, and by minimizing the distractions, employees can protect their own mental and cognitive capacity, allowing them to remain focused longer on tasks, and perform at a higher efficiency rate. Self-regulating technologies promote an efficient workforce.

5.4 Conclusion

This section depicts the data analysis techniques and research results. This section strives to identify, analyze, and interpreted the data obtained. This section also concludes with a supporting analysis that using self-regulating technology can lead to employees being more efficient in their working environment.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This section is the concluding chapter of the explorational journey into the effect of self-regulation technology on workplace efficiency. This section captures the essence of the study and summarizes the key findings, insights, and implications by offering closure to the research.

In this section, the research objectives are revisited. How these objectives have been solicited throughout the investigation are depicted. This section reflects on the research process, reiterating the significance of the research topic in the broader academic and real-world context. The conclusion presents the divergence between the research findings and the implications thereof to clarify potential recommendations for future research.

6.2 Summary of findings

From the data analyzed in Section 5.2, it was established that, by using self-regulating technologies, employees have a more significant arsenal available to them to help reduce the distractions perceived in their working environment, and by minimizing the distractions, employees can protect their mental and cognitive capacity, allowing them to remain focused on tasks, and perform at a higher efficiency rate. Self-regulating technologies promote an employee efficiency.

This study sought to explore the effect of self-regulating technology on workplace efficiency. The data collection involved in-depth interviews with seventeen participants from various career paths. Throughout the thematic analysis of the study, the subsequent key findings emerged.

6.2.1 Theme 1: Self-regulating technologies

Participants discussed the reasoning and notions behind their usage of self-regulating technologies, whether the participants knew self-regulating technologies existed, what various technologies were available to them, what they were using, and their general perception of the subject. From these narratives, multiple sub-themes were identified, which provided insight into why participants opted to use self-regulating technology. These included participants needing to reduce distractions during the workday to focus on specific tasks with greater

cognitive intent. Some agreed that using self-regulating technologies fosters an environment where positive habits are created.

6.2.2 Theme 2: The support for decision-making

A general theme identified in the narratives conducted between the participants and the main researcher was that using self-regulating technology benefits the user in their support for decision-making. It was discussed and established that self-regulating technologies are typically created to help the individual prioritize their tasks, manage their time better, and allow users to micro-manage their daily schedules. The participants primarily agreed that using self-regulating technologies created an environment where they felt more in control of what they were supposed to do. They tracked and managed their time better and felt like they completed their job responsibilities with greater efficiency.

6.2.3 Theme 3: The emotional influence of self-regulating technologies

The narrative between the participants and the researcher led to a discussion on whether they believed that self-regulating technologies could affect their emotional intelligence. They felt more inclined to interact with colleagues, and what the reasoning behind it was. A general topic introduced by the participants was the level of annoyance they experienced during their workday with numerous distractions, and how self-regulating technology helped them manage these distractions. They felt like their tolerance was improved and their emotional regulation was enhanced. Some participants elaborated on how using self-regulating technologies and the general gamification thereof helped them experience a sense of self-completion on task performance and improved their job satisfaction.

6.2.4 Theme 4: The concern of distractions

A common talking point in the narrative conducted between the participants and the researcher was the participants' concern with distractions. Participants felt that with the increased usage of various communication platforms in their working environment, such as *Microsoft Teams, Slack, WhatsApp, Discord,* the increased communication channels went together with the distractions. Participants expressed concern that the growing number of notifications, distractions, and information sources required to stay informed were reducing their productivity and straining their cognitive capacity to focus on work responsibilities.

6.2.5 Theme 5: Commitment to work

Participants reported feeling more committed to their work when using self-regulating technologies. The results suggest that the task tracking and time management features available in these technologies helped participants set visible goals and promoted their ambition to achieve their goals more efficiently.

6.2.6 Theme 6: The concerns of using self-regulating technologies

When asked about their concerns regarding self-regulating technology, participants expressed a general sentiment that such technologies are not particularly appealing for constant use in the workplace. Participants expressed concerns about the data sharing and privacy policies of self-regulating technologies. They were hesitant to share their working schedules and activities with third-party applications without clear and concise data usage policies. During an open discussion on the features of self-regulating technologies, participants expressed a concern that the available technologies lacked appealing qualities or features that would make users want to use them specifically.

6.3 Answering the research question

The findings provide valuable insights into the intricacies of workplace efficiency and how self-regulating technologies can improve it. The data support the claim that employees can become more efficient in their working environments by using self-regulating technologies, which is in line with the research questions and objectives. This was established by answering the following two sub research questions:

Sub-RQ1: *What is the effect of workplace distractions on employee attention?*

It was established from the data that ten of the seventeen participants confirmed their workplace to be distracting and indicated that it typically takes them an average of six to ten minutes to refocus after a distraction. Most participants believed that they were good or moderately good at blocking distractions and indicated that they mostly do not miss deadlines owing to distractions; however, it was indicated that, on average, employees perceive distractions regularly, influencing their efficiency. From this, it can be concluded that distractions hinder an employee's efficiency by removing their focus from their working requirements, and negatively affecting their attention.

Sub-RQ2: *How do self-regulation applications help employees maintain focus by limiting distractions?*

According to the data, thirteen of the participants agreed that using self-regulating technology is effective in blocking distractions, allowing them to maintain their focus on their job requirements, and leading to task completion at a higher efficiency rate.

The main research and sub-research questions which this study aimed to answer, can be concluded. They emphasize that through using self-regulating technologies, employees could remove the unneeded distractions, maintain their focus on their job requirements, and complete their tasks at a higher efficiency rate.

By answering the two sub-research questions, the main research question can be answered.

What impact does the daily use of self-regulating technology have on employee workplace efficiency?

From the data obtained in Section 5.2, the following influence of using self-regulating is observed in response to the research question:

- **Improved efficiency:** Thirteen of the participants agreed that self-regulating technology considerably influences their efficiency at work. Through the features self-regulating technology provides, such as goal tracking, time management, and application restrictions, these employees could complete their job requirements at a higher efficiency level and a greater success rate.
- **Improved time management:** Twelve research participants considered it necessary to raise that self-regulating technologies enabled them to manage their time more effectively. Through self-regulating technology, allowing users to track their time spent on tasks and applications, it created an environment where the employees managed their time more effectively.
- **Enhanced task focus:** Thirteen of the participants agreed that, by using self-regulating technologies, they concentrated better on job requirements. This allowed them to reduce distractions during the day and keep their cognitive capabilities zoned on their job requirements.

6.4 Theoretical contribution

This qualitative study explored the complex and intricate relationship between self-regulating technology and its effect on workplace efficiency. The research made several notable contributions through in-depth interviews and thematic analysis of the results, as specified in the subsequent sections.

The proposed theoretical framework created within this study helped to identify the various factors which influence self-regulation and workplace efficiency respectively. The correlation between these factors and the relationships thereof were used to construct questions used within the semi-structured interview (Appendix A – Semi-structured interview) to gather sufficient data to analyze the effect of self-regulating technologies on workplace efficiency.

6.4.1 The need to understand the nuanced effect of self-regulating technology

This research provides an understanding of the multifaceted ways self-regulating technology affects workplace efficiency by exploring the various experiences perceived by participants who used such technologies during their workday. It uncovers the positive and negative effects of self-regulating technologies on workplace efficiency and emphasizes the importance of considering individual differences in employees' contexts.

6.4.2 The exploration into employee experiences

This research evaluated how employees' diverse experiences led to their use of self-regulating technologies, how they adapted their work routines to accommodate such technologies, and how they affected employee efficiency. The research emphasizes the challenges, coping strategies, and adaptations of everyone to the introduction of self-regulating technologies and creates a holistic understanding of how using such technologies can influence employee efficiency.

6.4.3 Work-life balance and employee well-being

This study reveals the effect of self-regulating technologies on employees' perception of their work environment and work-life balance. Participants reported that using self-regulating technologies helped them create a more positive working environment and improved their work-life balance.

6.4.4 Practical recommendations

From this research the following recommendations can be made to employees and organizations. Employees need to be made aware of the various types of self-regulating technologies they have at their disposal; organizations should not force the adoption of these technologies but rather create an environment where the usage of these technologies are supported. Technologies enable employees to create a personalized working experience where your attention and focus can maintain on your job requirements creating an environment where you can promote your overall efficiency. It can consequently be recommended that employees make use of self-regulating technologies, to find the applications which support their customized ways of working and adopt a new approach to distraction management.

6.4.5 Limitations

The following are the limitations identified and areas that this study omitted:

- This study focused on self-regulating technologies readily available to employees and organizations.
- This study focused on how self-regulating technology can promote workplace efficiency by eliminating distractions and how this alters employee efficiency.
- This study focused on research, including 2022, as the source of information for responsible technology use in various communities.
- The study focused on the self-regulating technologies readily available and relies on data gathered from seventeen semi-structured interviews with Software Engineers working in the South African consulting, financial services, and retail industries. The data was gathered in the second semester of the year 2023.

6.4.6 Future research

This research aimed to provide a better understanding of how self-regulating technologies can affect workplace efficiency and identifies areas for future research on self-regulating technology, such as the long-term effects of use, widespread adoption, and influence of specific industry contexts.

Future research could expand the multitude of participants to include individuals from diverse working environments to obtain more information on the various types of self-regulating

technologies being employed, whether the participants of the study deemed these technologies beneficial, and how easily these technologies can be incorporated into an average work routine.

6.5 Conclusion

In conclusion, this research suggests that integrating self-regulating technology into the modern workplace could be a double-edged sword. The study examined how employees could overcome the challenges encountered in the workplace by adopting self-regulating technologies.

By using self-regulating technologies, employees can minimize the distractions they perceive during their workday, which results in a decrease in the exhaustive amounts of cognitive capacity required to refocus on tasks after distractions. Participants shared their experiences and stories regarding their interactions with self-regulating technologies in their working environment. They remarked that by using these technologies, they acquired better control of their working environment, could set better goals, and keep track of them, and felt like they were improving their efficiency.

REFERENCES

Afuah, A. (2004). Business models: A strategic management approach. McGraw-Hill/Irwin.

American Psychological Association. (2020). Publication Manual of the American Psychological Association (7th ed.). https://doi.org/10.1037/0000165-000

Angevaren, M., Aufdemkampe, G., Verhaar, H. J., Aleman, A., & Vanhees, L. (2008). Physical activity and enhanced fitness to improve cognitive function in older people without known cognitive impairment. *Cochrane database of systematic reviews*, (2).

Anvari, M. R. A., Kalali, N. S., & Gholipour, A. (2011). How does personality affect on job burnout?. *International Journal of Trade, Economics and Finance*, *2*(2), 115.

Apple Support. (2022). Use Focus on your iPhone, iPad, or iPod touch. [online] Available at: <https://support.apple.com/en-za/HT212608> [Accessed 19 March 2022].

Baker, T. ed. (2002). Key performance indicators manual: a practical guide for the best practice development, implementation and use of KPIs. Allen & Unwin.

Baron, R. S., Baron, P. H., & Miller, N. (1973). The relation between distraction and persuasion. *Psychological Bulletin*, *80*(4), 310.

Barrero, J. M., Bloom, N., & Davis, S. J. (2021). Why working from home will stick (No. w28731). National Bureau of Economic Research.

Barry, C. T., & Wong, M. Y. (2020). Fear of missing out (FoMO): A generational phenomenon or an individual difference?. Journal of Social and Personal Relationships, 37(12), 2952-2966.

Basias, N., & Pollalis, Y. (2018). Quantitative and qualitative research in business & technology: Justifying a suitable research methodology. Review of Integrative Business and Economics Research, 7, 91-105.

Basu, V., Hartono, E., Lederer, A. L., & Sethi, V. (2002). The impact of organizational commitment, senior management involvement, and team involvement on strategic information systems planning. *Information & Management*, *39*(6), pp.513-524.

Beaudry, P., & Francois, P. (2007). The Economics of Inefficient Technology Use.

Bell, A. (2017). Why Self-Regulation Is the Most Important Thing in the World. GoodTherapy. Retrieved 10 May 2022, from https://www.goodtherapy.org/blog/why-self-regulation-is-most- important-thing-in-world-0807175.

Bell, B. S., & Kozlowski, S. W. (2002). Adaptive guidance: Enhancing self-regulation, knowledge, and performance in technology-based training. Personnel Psychology, 55(2), pp.267-306.

Biggam, J. (2018). EBOOK: Succeeding with your Master's Dissertation: A Step-by-Step Handbook: Step-by-step Handbook. McGraw-Hill Education (UK).

Birimoglu Okuyan, C., & Begen, M. A. (2022). Working from home during the COVID-19 pandemic, its effects on health, and recommendations: The pandemic and beyond. Perspectives in Psychiatric Care, 58(1), 173-179.

Blair, C. (2010). Stress and the development of self-regulation in context. Child development perspectives, 4(3), 181-188.

Bock, G. W., & Ho, S. L. (2009). Non-work related computing (NWRC). *Communications of the ACM*, *52*(4), 124-128.

Bohman, J. (2005). Critical theory. The Stanford Encyclopedia of Philosophy, Edward N. Zalta (ed.), http://plato.stanford.edu/archives/spr2013/entries /critical-theory.

Bondanini, G., Giorgi, G., Ariza-Montes, A., Vega-Muñoz, A., & Andreucci-Annunziata, P. (2020). Technostress dark side of technology in the workplace: A scientometric analysis. International Journal of Environmental Research and Public Health, 17(21), 8013.

Bortoluzzi, B., Carey, D., McArthur, J. J., & Menassa, C. (2018). Measurements of workplace productivity in the office context: A systematic review and current industry insights. Journal of Corporate Real Estate.

Brandt, S., & Brandt, S. (1998). *Data analysis*. Springer-Verlag.

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), APA Handbook of Research Methods in Psychology, Vol. 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological (pp. 57-71). American Psychological Association.

Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2021). The online survey as a qualitative research tool. International journal of social research methodology, 24(6), 641-654.

Brinkmann, S., & Kvale, S. (2015). Interviews: Learning the Craft of Qualitative Research Interviewing (3rd ed.). Sage Publications.

Bryman, A. (2016). *Social research methods*. Oxford university press.

Brynjolfsson, E., & Hitt, L. M. (1996). Productivity, business profitability, and consumer surplus: Three different measures of information technology value. MIS quarterly, 121-142.

Brynjolfsson, E., & McAfee, A. (2017). The Business of Artificial Intelligence Harvard Business Review. Harvard Business Review.

Bucher, E., Fieseler, C., & Suphan, A. (2013). The stress potential of social media in the workplace. Information, Communication & Society, 16(10), 1639-1667.

Burns, J., & Needle, D. (2010). *Business in context: An introduction to business and its environment*. Boston: South-Western Cengage Learning.

Calkins, S. D., & Leerkes, E. M. (2004). Early attachment processes and the development of emotional self-regulation. Handbook of self-regulation: Research, theory, and applications, 324-339.

Carver, C. S., & Scheier, M. F. (2001). On the self-regulation of behavior. Cambridge University Press.

Chalmers, A. F. (2013). What is this thing called science?. Hackett Publishing.

Chandrasekar, K. (2011). Workplace environment and its impact on organisational performance in public sector organisations. *International journal of enterprise computing and business systems*, *1*(1), 1-19.

Charmaz, K. (2014). Constructing Grounded Theory (2nd ed.). Sage Publications.

Chatterjee, U., Choudhury, H., & Jana, A. (2019). Aging population, human capital accumulation, and economic growth: A general equilibrium analysis for India. Economic Analysis and Policy, 63, 223–242. https://doi.org/10.1016/j.eap.2019.07.001

Chen, M., & Brynjolfsson, E. (2019). From art to science: Neural-style transfer for A/B testing and personalized content recommendation. Management Science, 67(5), 2485-2501.

Clarke, V., Braun, V., & Hayfield, N. (2015). Thematic analysis. Qualitative psychology: A practical guide to research methods, 3, 222-248.

Coleman, J. (1958). Relational analysis: The study of social organizations with survey methods. *Human organization*, *17*(4), 28-36.

Collins, H. (2010). “Creative Research: The Theory and Practice of Research for the Creative Industries” AVA Publications, p.38

Coovert, M. D., & Thompson, L. F. (2003). Technology and workplace health.

Couper, M. P. (2017). Web Surveys: A Review of Issues and Approaches. Public Opinion Quarterly, 81(1), 219-260.

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (4th ed.). Sage Publications.

Creswell, J. W., & Zhang, W. (2009). The application of mixed methods designs to trauma research. *Journal of Traumatic Stress: Official publication of the international society for traumatic stress studies*, *22*(6), 612-621.

Creswell, J.W. & Creswell, J.D. (2018). Research design: Qualitative, quantitative and mixed methods approaches (5th ed). Thousand Oaks: SAGE.

Crowther, D., & Lancaster, G. (2008). Research Methods: A Concise Introduction to Research in Management and Business Consultancy.

De Vries, H. J., Reneman, M. F., Groothoff, J. W., Geertzen, J. H., & Brouwer, S. (2013). Self-reported work ability and work efficiency in workers with chronic nonspecific musculoskeletal pain. *Journal of occupational rehabilitation*, *23*(1), 1-10.

Della Porta, D., & Keating, M. (Eds.). (2008). *Approaches and methodologies in the social sciences: A pluralist perspective*. Cambridge University Press.

Deloitte. (2017). "Global Mobile Consumer Survey 2016." 24 May 2022. Retrieved from https://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/globalmobile-consumer-survey.html

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method (4th ed.). Wiley.

Dontre, A. J. (2021). The influence of technology on academic distraction: A review. Human Behavior and Emerging Technologies, 3(3), 379-390.

Dresel, M., & Haugwitz, M. (2006). The relationship between cognitive abilities and self-regulated learning: evidence for interactions with academic self-concept and gender. *High ability studies*, *16*(02), 201-218.

Elnaga, A., & Imran, A. (2013). The effect of training on employee performance. *European journal of Business and Management*, *5*(4), 137-147.

Emad, G. R. (2010). Introduction of technology into workplace and the need for change in pedagogy. *Procedia-Social and Behavioral Sciences*, *2*(2), 875-879.

Epstein, M. J., & Manzoni, J. F. (1997). The Balanced Scorecard and Tableau de Bord: a global perspective on translating strategy into action (Vol. 63). Fontainebleau: Insead.

Evans, G. W., Fuller-Rowell, T. E., & Doan, S. N. (2012). Childhood cumulative risk and obesity: The mediating role of self-regulatory ability. Pediatrics, 129(1), e68-e73. 958.

Fink, A. (2003). *How to design survey studies*. Sage.

Fitz, Nicholas, Kostadin Kushlev, Ranjan Jagannathan, Terrel Lewis, Devang Paliwal, and Dan Ariely. "Batching smartphone notifications can improve well-being." Computers in Human Behavior 101 (2019): 84-94.

Fontana, A., & Frey, J. H. (2005). The Interview: From Structured Questions to Negotiated Text. In N. K. Denzin & Y. S. Lincoln (Eds.), The SAGE Handbook of Qualitative Research (3rd ed., pp. 645-672). Sage Publications.

Fraser, M. W., & Galinsky, M. J. (2010). Steps in intervention research: Designing and developing social programs. *Research on social work practice*, *20*(5), 459-466.

Garrett, R. K., & Danziger, J. N. (2008). Disaffection or expected outcomes: Understanding personal Internet use during work. *Journal of Computer-Mediated Communication*, *13*(4).

Giddens, A. (1999). Risk and responsibility. Mod. L. Rev., 62, p.1.

Gillie, T., & Broadbent, D. (1989). What makes interruptions disruptive? A study of length, similarity, and complexity. *Psychological research*, *50*(4), 243-250.

Glaser, D. N., Tatum, B. C., Nebeker, D. M., Sorenson, R. C., & Aiello, J. R. (1999). Workload and social support: Effects on performance and stress. *Human Performance*, *12*(2), 155-176.

Goles, T., & Hirschheim, R. (2000). The paradigm is dead, the paradigm is dead...long live the paradigm: the legacy of Burrell and Morgan. Omega, 28(3), pp.249-268.

Gonzalez-Mulé, E., Mount, M. K., & Oh, I.-S. (2014). A meta-analysis of the relationship between distractions, interruptions, and task performance. Journal of Applied Psychology, 99(3), 411–429.

Grant, A. M., & Parker, S. K. (2019). Redesigning work design theories: The rise of relational and proactive perspectives. Academy of Management Annals, 13(1), 499-550.

Grewal, D., Brackett, M., & Salovey, P. (2006). Emotional intelligence and the self-regulation of affect.

Grinin, L., & Grinin, A. L. (2016). The cybernetic revolution and the forthcoming epoch of self-regulating systems. ООО" Издательство" Учитель".

Groen, B. A., Wouters, M. J., & Wilderom, C. P. (2017). Employee participation, performance metrics, and workplace efficiency: A survey study based on self-determination theory. *Management accounting research*, *36*, pp.51-66.

Haag, S., Cummings, M., & McCubbrey, D. (2019). Management Information Systems for the Information Age (10th ed.). McGraw-Hill Education.

Halfon, N., Forrest, C. B., Lerner, R. M., & Faustman, E. M. (2018). Handbook of life course health development.

Harland, D. J. (2015). An Introduction to Experimental Research An Introduction to Exploratory Research. *Nursing (Lond)*, *4*(6).

Hart, J., & Sutcliffe, A. (2019). Is it all about the Apps or the Device?: User experience and technology acceptance among iPad users. International Journal of Human-Computer Studies, 130, 93-112.

Hevner, A., & Chatterjee, S. (2010). Design science research in information systems. In Design research in information systems (pp. 9-22). Springer, Boston, MA.

Holden, L., Scuffham, P. A., Hilton, M. F., Vecchio, N. N., & Whiteford, H. A. (2010). Work efficiency decrements are associated with Australian working conditions, particularly the demand to work longer hours. *Journal of Occupational and Environmental Medicine*, 281-290.

Holland, B. (2002). Towards strategic focus and alignment. Chartered Accountants Journal of New Zealand 81(9), pp.69-72.

Hooper, S., & Rieber, L. P. (1995). Teaching with technology. Teaching: Theory into practice, 2013, pp.154-170.

Hoyle, R. H. (2010). Personality and self-regulation. *Handbook of personality and self-regulation*, 1-18.

Ipsen, C., van Veldhoven, M., Kirchner, K., & Hansen, J. P. (2021). Six key advantages and disadvantages of working from home in Europe during COVID-19. International journal of environmental research and public health, 18(4), 1826

James, W. (1899). Talks to teachers on psychology and to students on some of life's ideals. New York, NY: Holt and Company.

Jacobs, J. V., Hettinger, L. J., Huang, Y. H., Jeffries, S., Lesch, M. F., Simmons, L. A., ... & Willetts, J. L. (2019). Employee acceptance of wearable technology in the workplace. Applied ergonomics, 78, 148-156.

Jayaweera, T. (2015). Impact of work environmental factors on workplace efficiency, mediating role of work motivation: A study of hotel sector in England. *International journal of business and management*, *10*(3), 271.

Jin, J., & Dabbish, L. A. (2009, April). Self-interruption on the computer: a typology of discretionary task interleaving. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 1799-1808).

Jirotka, M., & Stahl, B. C. (2020). The need for responsible technology. Journal of Responsible Technology, 1, 100002.

Jones, R. (2018). Research Methods in the Social Sciences (4th ed.). Routledge.

Jonge, D. D., Rodger, S., & Fitzgibbon, H. (2001). Putting technology to work: Users' perspective on integrating assistive technology into the workplace. Work, 16(2), 77-89.

Kahn, R., & Cannell, C. (1957). The Dynamics of Interviewing. New York and Chichester: Wiley. Keaveney, S.M. (1995) 'Customer switching behaviour in service industries: an exploratory study', Journal of Marketing, Vol. 59, No. 2, pp. 71–82.

Kanfer, R., & Ackerman, P. L. (1996). A self-regulatory skills perspective to reducing cognitive interference. In I. G. Sarason, G. R. Pierce, & B. R. Sarason (Eds.), Cognitive interference: Theories, methods, and findings (pp. 153-171). Hillsdale, NJ: Erlbaum.

Kaplan, B. H., Cassel, J. C., & Gore, S. (1977). Social support and health. *Medical care*, *15*(5), 47-58.

Kaur, H., Williams, A. C., McDuff, D., Czerwinski, M., Teevan, J., & Iqbal, S. T. (2020, April). Optimizing for happiness and productivity: Modeling opportune moments for transitions and breaks at work. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (pp. 1-15).

Kellen, M., & Saxena, D. (2020). Calm my headspace: Motivations and barriers for adoption and usage of meditation apps during times of crisis.

Khan, N. A., Khan, A. N., & Moin, M. F. (2021). Self-regulation and social media addiction: A multi-wave data analysis in China. *Technology in Society*, *64*, 101527.

Kim, S., & Christensen, A. L. (2017). The dark and bright sides of personal use of technology at work: A job demands–resources model. *Human Resource Development Review*, *16*(4), 425-447. https://doi.org/10. 1177/1534484317725438.

Knopf, J. W. (2006). Doing a literature review. PS: Political Science & Politics, 39(1), 127-132.

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., De Vet, H. C., & Van Der Beek, A. J. (2011). Conceptual frameworks of individual work efficiency: A systematic review. *Journal of occupational and environmental medicine*, 856-866.

Kotsou, I., Mikolajczak, M., Heeren, A., Grégoire, J., & Leys, C. (2019). Improving emotional intelligence: A systematic review of existing work and future challenges. *Emotion Review*, *11*(2), 151-165.

Krippendorff, K. (2018). Content Analysis: An Introduction to Its Methodology (4th ed.). Sage Publications.

Krueger, A. B. (1993). How computers have changed the wage structure: evidence from microdata, 1984–1989. *The Quarterly Journal of Economics*, *108*(1), pp.33-60.

Kuhn, T. S. (1962). The Structure of Scientific Revolutions. Chicago (University of Chicago Press) 1962.

Kuranchie-Mensah, E. B., & Amponsah-Tawiah, K. (2016). Employee motivation and work performance: A comparative study of mining companies in Ghana. *Journal of Industrial Engineering and Management (JIEM)*, *9*(2), 255-309.

Lahza, H., Khosravi, H., Demartini, G., & Gasevic, D. (2022). March). Effects of Technological Interventions for Self-regulation: A Control Experiment in Learnersourcing. In *LAK22: 12th International Learning Analytics and Knowledge Conference* (pp. 542-548).

Laudon, K. C. (1995). Ethical concepts and information technology. Communications of the ACM, 38(12), pp.33-39.

Laudon, K. C., & Laudon, J. P. (2020). IT infrastructure and emerging technologies. Management Information Systems. Managing the Digital Firm (16th ed., pp. 162-209). Pearson.

Lavie, N. (2010). Attention, distraction, and cognitive control under load. Current directions in psychological science, 19(3), 143-148.

Lazarus, R. S. (1963). Personality theory. In R. S. Lazarus, Personality, and adjustment (pp. 51–72). Prentice-Hall, Inc. https://doi.org/10.1037/13116-005

Le, T., Senaratne, H., McQuaid, M., & Tigwell, G. W. (2021, May). Exploring a Multifaceted Framework to Support the Design of Mobile Apps for Self-Regulating Anxiety. In Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems (pp. 1-7).

Lee, S., Zhou, Z. E., Xie, J., & Guo, H. (2021). Work-related use of information and communication technologies after hours and employee fatigue: the exacerbating effect of affective commitment. Journal of Managerial Psychology, 36(6), 477-490.

Leesakul, N., Oostveen, A. M., Eimontaite, I., Wilson, M. L., & Hyde, R. (2022). Workplace 4.0: Exploring the implications of technology adoption in digital manufacturing on a sustainable workforce. Sustainability, 14(6), 3311.

Lederman, N. G., & Lederman, J. S. (2015). What is a theoretical framework? A practical answer. *Journal of Science Teacher Education*, *26*(7), 593-597.

Legault, G. A., Verchère, C., & Patenaude, J. (2018). Support for the development of technological innovations: promoting responsible social uses. Science and Engineering Ethics, 24, 529-549

Leonardi, P. M., & Treem, J. W. (2020). Behavioral visibility: A new paradigm for organization studies in the age of digitization, digitalization, and datafication. Organization Studies, 41(12), 1601-1625.

Ley, K., & Young, D. B. (2001). Instructional principles for self-regulation. Educational Technology Research and Development, 49(2), 93-103.

Li, W. A. N. G. (2005). The advantages of using technology in second language education. THE Journal, 32(10), pp.38-42.

Loaiza, V. M., & Halse, S. C. (2019). Where working memory meets long-term memory: The interplay of list length and distractors on memory performance. Journal of Experimental Psychology: Learning, Memory, and Cognition, 45(8), 1455.

Lord, R. G., Diefendorff, J. M., Schmidt, A. M., & Hall, R. J. (2010). Self-regulation at work. *Annual review of psychology*, *61*, 543-568.

Lowe, G. S. (1997). Computers in the workplace. *Perspectives on Labour and Income*, *9*(2), 29-36.

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: guided by information power. Qualitative health research, 26(13), 1753-1760.

Majchrzak, A., Faraj, S., Kane, G. C., & Azad, B. (2013). The contradictory influence of social media affordances on online communal knowledge sharing. Journal of Computer-Mediated Communication, 19(1), 38-55.

Mark, G., Czerwinski, M., & Iqbal, S. T. (2018). April. Effects of individual differences in blocking workplace distractions. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (pp. 1-12).

Mark, G., Gudith, D., & Klocke, U. (2008, April). The cost of interrupted work: more speed and stress. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems* (pp. 107-110).

Mark, G., Iqbal, S. T., Czerwinski, M., & Johns, P. (2018). Bored Mondays and focused afternoons: The rhythm of attention and online activity in the workplace. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (pp. 1-13). ACM.

Mark, G., Iqbal, S., & Czerwinski, M. (2017). September. How blocking distractions affects workplace focus and productivity. In *Proceedings of the 2017 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2017 ACM International Symposium on Wearable Computers* (pp. 928-934).

Markel, G. (2009). Keep technology distractions at bay. *T+ D*, *63*(9), pp.68-69.

Mathews, C., & Khann, I. K. (2016). Impact of work environment on performance of employees in manufacturing sector in India: Literature review. *International journal of science and research (IJSR)*, *5*(4), 852-855.

Mawson, A. (2002). The Workplace and its Impact on Productivity, Vol. 4, Advanced Workplace Associates, London, Publication No. 8, available at: www.occupier.org

McLeod, S. (2007). Maslow's hierarchy of needs. *Simply psychology*, *1*(1-18).

Mellul, C. (2018). Emerging technologies in higher education and the workplace: An assessment. THE FUTURE, 223.

Merriam-webster.com. (n.d.). Definition of attention span. [online] Available at https: / / www.merriam-webster.com / dictionary / attention span [Cited 25 Mar. 2022].

Merriam-webster.com. (n.d.). Definition of distraction. [online] Available at https://www.merriam- webster.com/dictionary/distraction [Cited 19 Mar. 2022].

Merriam-webster.com. (n.d.). *Definition of efficiency*. [online] Available at https: / / www.merriam- webster.com / dictionary / efficiency [Accessed 14 May. 2022].

Merriam-webster.com. (n.d.). Definition of methodology. [online] Available at https: / / www.merriam-webster.com / dictionary / methodology [Cited 19 Mar. 2022].

Merriam-webster.com. (n.d.). *Definition of self-regulation*. [online] Available at https: / / www.merriam-webster.com / dictionary / self-regulation [Accessed 10 Mar. 2022].

Merriam-webster.com. (n.d.). Definition of technology. [online] Available at https: / / www.merriam-webster.com / dictionary / technology [Accessed 10 Mar. 2022].

Milner, N., Burke, R. J., & Smith, C. S. (2019). Job Demands, Work-Related Strain, and Distractibility as Predictors of Presenteeism. Canadian Journal of Administrative Sciences / Revue Canadienne des Sciences de l'Administration, 36(1), 123–134.

Miltsov, A. (2019). Slacking, resisting, withdrawing? A comparative study of personal internet use at work. McGill University (Canada)

Moon, T. W., & Hur, W. M. (2011). Emotional intelligence, emotional exhaustion, and workplace efficiency. *Social Behavior and Personality: an international journal*, *39*(8), 1087-1096.

Morgeson, F. P., Delaney-Klinger, K., & Hemingway, M. A. (2005). The importance of job autonomy, cognitive ability, and job-related skill for predicting role breadth and workplace efficiency. *Journal of applied psychology*, *90*(2), 399.

Mozersky, J., Parsons, M., Walsh, H., Baldwin, K., McIntosh, T., & DuBois, J. M. (2020). Research participant views regarding qualitative data sharing. Ethics & human research, 42(2), 13-27.

Myers, M. D. (2019). Qualitative research in business and management. Sage.

Nadinloyi, K. B., Sadeghi, H., & Hajloo, N. (2013). Relationship between job satisfaction and employees mental health. *Procedia-Social and Behavioral Sciences*, *84*, pp.293-297.

Neely, A., & Hii, J. (1998). Innovation and business performance: a literature review. *The Judge Institute of Management Studies, University of Cambridge*, pp.0-65.

Nikkelen, S. W., Valkenburg, P. M., Huizinga, M., & Bushman, B. J. (2014). Media use and ADHD-related behaviors in children and adolescents: A meta-analysis. *Developmental psychology*, *50*(9), 2228.

Oakman, J., Kinsman, N., Stuckey, R., Graham, M., & Weale, V. (2020). A rapid review of mental and physical health effects of working at home: how do we optimise health?. BMC public health, 20, 1-13.

Oates, B. (2006). Researching information systems and computing. Los Angeles: Sage, p.245- 280.

Ones, D. S., Dilchert, S., & Viswesvaran, C. (2012). 10 Cognitive Abilities. Oxf. Handb. Pers. Assess. Sel, 179.

Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. Nature human behaviour, 3(2), 173-182.

Orhan, M. A., Castellano, S., Khelladi, I., Marinelli, L., & Monge, F. (2021). Technology distraction at work. Impacts on self-regulation and work engagement. Journal of Business Research, 126, 341-349.

Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. Personal and Ubiquitous computing, 16, 105-114.

Özsomer, A., Calantone, R. J., & Di Bonetto, A. (1997). What makes firms more innovative? A look at organizational and environmental factors. *Journal of business & industrial marketing*.

Papoutsi, C., Drigas, A., & Skianis, C. (2021). Virtual and augmented reality for developing emotional intelligence skills. Int. J. Recent Contrib. Eng. Sci. IT (IJES), 9(3), 35-53.

Pârjoleanu, R. (2020). Work motivation efficiency in the workplace. Postmodern Openings, 11(4), 293-309.

Parmenter, D. (2015). *Key performance indicators: developing, implementing, and using winning KPIs*. John Wiley & Sons.

Porter, L. W., & Steers, R. M. (1973). Organizational, work, and personal factors in employee turnover and absenteeism. *Psychological bulletin*, *80*(2), 151.

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS quarterly*, 665-694.

Roethlisberger, F. J., & Dickson, W. J. (1939). Management and the Worker, Harvard University Press, Cambridge, MA.

Romer, D., Duckworth, A. L., Sznitman, S., & Park, S. (2010). Can adolescents learn self-control? Delay of gratification in the development of control over risk taking. Prevention science, 11, 319-330.

Roper, K. O., & Juneja, P. (2008). Distractions in the workplace revisited. *Journal of Facilities management*.

Rothstein, M. G., McLarnon, M. J., & King, G. (2016). The role of self-regulation in workplace resiliency. *Industrial and Organizational Psychology*, *9*(2), pp.416-421.

Rubinstein, J. S., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of experimental psychology: human perception and performance*, *27*(4), 763.

Sageer, A., Rafat, S., & Agarwal, P. (2012). Identification of variables affecting employee satisfaction and their impact on the organization. *IOSR Journal of business and management*, *5*(1), 32-39.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, cognition and personality*, *9*(3), 185-211.

Samsung au. (2022). Using Focus Mode. [online] Available at: <https://www.samsung.com/au/support/mobile-devices/using-focus-mode/> [Accessed 19 March 2022].

Saunders, M., Lewis, P. H. I. L. I. P., & Thornhill, A. D. R. I. A. N. (2009). Research methods. *Business Students 5th edition Pearson Education Limited, England*.

Selwyn, N., & Aagaard, J. (2021). Banning mobile phones from classrooms—An opportunity to advance understandings of technology addiction, distraction and cyberbullying. British journal of educational technology, 52(1), 8-19.

Schmeichel, B. J., Volokhov, R. N., & Demaree, H. A. (2008). Working memory capacity and the self-regulation of emotional expression and experience. *Journal of personality and social psychology*, *95*(6), 1526.

Seidman, I. (2013). Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences (4th ed.). Teachers College Press.

Shahzadi, I., Javed, A., Pirzada, S. S., Nasreen, S., & Khanam, F. (2014). Impact of employee motivation on employee performance. *European Journal of Business and Management*, *6*(23), 159-166.

Shaw, M. (2002). What makes good research in software engineering?. *International Journal on Software Tools for Technology Transfer*, *4*(1), 1-7.

Sink, D. (1985). Productivity Management: Planning, Measurement and Evaluation, Control and Improvement, Wiley, New York, NY.

Sitzmann, T., Bell, B. S., Kraiger, K., & Kanar, A. M. (2009). A multilevel analysis of the effect of prompting self-regulation in technology-delivered instruction. Personnel Psychology, 62, 697-734.

Smith, C. (2018). An employee's best friend? How AI can boost employee engagement and performance. *Strategic HR Review*.

Smith, J. K. (2021). Research Methods for Scientists: An Introduction. Cambridge University Press.

Sohmen, V. S. (2013). Leadership and teamwork: Two sides of the same coin. *Journal of IT and Economic Development*, *4*(2), pp.1-18.

Song, Q., Wang, Y., Chen, Y., Benitez, J., & Hu, J. (2019). Impact of the social media use in the workplace on team and employee performance. Information & Management, 56(8), 103160.

Stake, R. E. (1995). The art of case study research. sage.

Sterling, C. (2018). Distraction management in the workplace: The role of workspace design and technology. Journal of Organizational Psychology, 18(2), 87–102.

Stoeckl, N. (2004). The private costs and benefits of environmental self-regulation: which firms have most to gain?. *Business strategy and the environment*, *13*(3), 135-155.

Stone, D. H. (1993). Design a questionnaire. *British Medical Journal*, *307*(6914), pp.1264-1266.

Stotsny, S. (2011). *Self-Regulation*. Psychology Today. Retrieved 10 May 2022, from https://www.psychologytoday.com/za/blog/anger-in-the-age-entitlement/201110/self-regulation.

Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of educational research*, *79*(2), 625-649.

Sung, J., & Ashton, D. N. (2005). *High Performance Work Practices: linking strategy and skills to performance outcomes*. London: Department of Trade and Industry.

Taylor, F. W. (1911). Principles of Scientific Management, Harper and Brothers, New York, NY. Weisbord, M.R. (1987), Productive Workplaces: Organizing and Managing for Dignity, Meaning and Community, Jossey Bass, San Francisco, CA.

Thomas, D., Maraston, C., Schawinski, K., Sarzi, M., & Silk, J. (2010). Environment and self-regulation in galaxy formation. *Monthly Notices of the Royal Astronomical Society*, *404*(4), 1775-1789.

Townsend, K., & Batchelor, L. (2005). Managing mobile phones: a work/non-work collision in small business. *New Technology, Work and Employment*, *20*(3), 259-267.

Vancouver, J. B., & Day, D. V. (2005). Industrial and organisation research on self-regulation: From constructs to applications. Applied Psychology, 54(2), 155-185.

Vitak, J., Crouse, J., & LaRose, R. (2011). Personal Internet use at work: Understanding cyberslacking. *Computers in Human Behavior*, *27*(5), 1751-1759.

Vohs, K. D., & Baumeister, R. F. (eds) (2016). Handbook of self-regulation: Research, theory, and applications. Guilford Publications.

Wagner, M. (2003). *The Porter hypothesis revisited: a literature review of theoretical models and empirical tests*. CSM.

Wang, H., Wang, S., Ma, J., & Wang, L. (2019). The effects of personality traits and goal commitment on technology acceptance and use behavior. International Journal of Information Management, 47, 228-238.

Wickens, C.D. (1980). The structure of attentional resources. Atten and performance VIII, 8.

Wigmore, I. (2022). *What is productivity software? - Definition from WhatIs.com*. WhatIs.com. Retrieved 24 May 2022, from https://www.techtarget.com/whatis/definition/productivity- software.

Wu, J., Mei, W., Liu, L., & Ugrin, J. C. (2020). The bright and dark sides of social cyberloafing: Effects on employee mental health in China. Journal of Business Research, 112, 56-64.

Yot-Domínguez, C., & Marcelo, C. (2017). University students' self-regulated learning using digital technologies. International Journal of Educational Technology in Higher Education, 14(1), 1-18.

Zukriyani, F. A. M., & Azizan, N. (2023). Student Academic Planner System: A Review. Malaysian Journal of Science, Health & Technology (MJoSHT).

APPENDICES

Appendix A: Semi-structured interview

The following semi-structured interview was held between the different participants and the main researcher. A general introduction into what self-regulating technologies is provided to each individual participating in the interview to ensure that they have full competence and knowledge of what self-regulating technologies entail.

The effect of self-regulating technology on workplace efficiency

Self-regulation technologies refer to diverse types of technological applications, software, or equipment that enable users to manage and control their own technology use. These technologies give users the ability to regulate and govern their use of digital devices and services according to their own preferences and needs.
These technologies can be useful in helping individuals manage and control potentially addictive or distracting technologies, such as social media platforms or video games. By providing users with tools to monitor and manage their use, self-regulation technologies can promote healthier and more responsible technology use.

Some examples of these technologies include:

- **Forest:** An app that encourages users to remain focused by growing a virtual tree when they stay away from their phone. If they leave the app or use their phone, the tree dies.
- **Freedom:** An app that blocks distracting websites and apps for a set amount of time to help users remain focused.

After the introduction into self-regulating technologies was provided, the research consent form was given and displayed to the research participant. The participant needed to accept the consent form to continue with the interview.

After the research participant has accepted the consent form, the interview will be done by the researcher. Each question pertains to the proposed theoretical framework depicted in this study.

#	**Question**
1	How old are you?
2	What type of work do you do?
3	What type of industry do you work in?
4	What type of office layout do you work in? A) A cubicle layout B) Team based office C) Open plan office D) I work from home
5	What different types of self-regulating technologies do you make use of during your typical workday?
6	Can you describe your experience with using self-regulating technologies in the workplace? How have these technologies influenced your productivity, time management, or work habits?
7	How has self-regulating technologies helped you address potential issues such as information overload, distraction, or work-life-balance?
8	Can you share your experiences on how self-regulating technologies have helped improve your attention, focus, or memory while at work?
9	In what ways have self-regulating technologies supported your decision-making at work? Could you provide examples of how these technologies have improved your ability to prioritize tasks, remain focused, or manage complex information?
10	How do you feel has self-regulating technologies contributed to your ability to recognize, understand, and manage emotions both in yourself and in others?

#	Question
11	Do you feel that self-regulating technologies have supported the development of your emotional intelligence skills at work? Could you provide examples of how these technologies have helped you enhance self-awareness, empathy, or interpersonal relationships in the workplace?
12	How do you navigate potential issues such as reliance on technology for emotional regulation, maintaining authentic connections with others, or balancing the technology use with face-to-face interactions? Please share any insights you have developed to address these challenges effectively.
13	How does your individual personality characteristics, such as being organized, self-disciplined, or adaptable, align with or diverge from the features and functionalities provided by self-regulating technologies?
14	Can you share how your personality traits influence the way you utilize self-regulating technologies in the workplace? In what specific ways do your individual characteristics, such as being introverted or extroverted, detail-oriented, or big-picture-focused, impact how you engage with these technologies?
15	Have you encountered any situations where your personality traits have clashed with the use of self-regulating technologies in the workplace?
16	How do you feel about implementing mandatory workplace self-regulation technologies?
17	Would you be more likely to use self-regulating technologies if your manager/team lead/co-workers used it?
18	How do you think self-regulation technologies can be incorporated into workplace policies or culture to reduce distractions and improve productivity?

#	Question
19	Do you find your work environment distracting?
20	How often do you experience distractions while working? A) Never B) Rarely C) Sometimes D) Often E) Always
21	Throughout the workday, when distractions occur, do you find it hard to re-concentrate on work assignments? A) Yes B) No
22	How long does it typically take you to refocus after a distraction? A) Less than a minute B) 1-5 minutes C) 6-10 minutes D) 11-20 minutes E) More than 20 minutes
23	Do you feel that distractions hinder your work efficiency? Please explain.
24	How capable are you at screening out distractions in your daily work environment? A) Good B) Moderately good. C) Neutral D) Not good at it. E) I struggle with this.
25	What would you see as your biggest distraction in your working environment?
26	Have you ever missed a work deadline or made a mistake due to distractions? A) Yes, often B) Yes, sometimes C) Rarely D) Never

#	Question
27	In a typical workday, how often do you use your mobile device/laptop for non-work-related activities? A) Rarely B) Sometimes C) Often D) Not at all
28	How easy or difficult is it for you to integrate self-regulation technologies into your daily work routine, please explain?
29	What motivates you to use self-regulation technologies at work? Is it to reduce stress, improve focus, or enhance your overall work efficiency?
30	How effective do you find self-regulating technologies in helping you improve your work efficiency?
31	What barriers or challenges do you see in the widespread adoption of self-regulation technologies for work efficiency improvement?
32	Can you describe a time when you felt particularly overwhelmed or distracted at work, and how could self-regulating technology have helped in that situation?
35	Do you have any additional comments or suggestions regarding the use of self-regulation technologies in the workplace?
36	What features or improvements would you like to see in self-regulation technologies to better address workplace distractions?

This semi-structured interview strives to address the research questions posed in the main research and provides areas for open-ended questions, so quantitative and qualitative data can be obtained to help support the research question.

Appendix B: Research code of conduct

This code of conduct depicts the ethical considerations and the rights of the participants; it identifies the responsibility of the researcher and portrays how access to the data will be acquired, collected, stored, and used.

Access to data

For this research on how the use of self-regulating technology can promote workplace efficiency, access to the data will be obtained through physical or electronic consent by the subject and the right to this data will remain the subject's own until provided to the researcher.

How the data will be collected

The data acquired in this research was done through the means of interviews, the data obtained from these means were electronically captured. And the rights of each subject were adhered to.

How the data will be stored

The data will be stored electronically and securely by the researcher, and all means acceptable were taken to ensure data security and privacy.

How the data will be used

The data collected will be analyzed statistically to create a relationship between how the use of self-regulating technology can promote workplace efficiency. These figures and graphical representations are available in this research.

The rights of research subjects

Each participant (called subject) of this study has these rights, as described by Oates (2006):

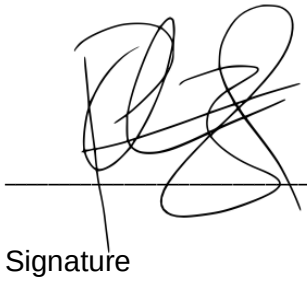
- **The right to decline participation:** The subject of the research has the right to choose whether they want to participate in the research or not.
- **The right of withdrawal:** The subject has the right to withdraw their participation from the research at any point. If the subject withdraws their participation all data collected from the participant will be discarded.

- **The right to informed consent:** The subject has the right to all information regarding to participation in the research and all information must be provided to them.
- **The right to anonymity:** The subject has the right to anonymity, meaning that no personal information will be used in the research.
- **The right of confidentiality:** The subject has the right to abstain confidential information at any point. Meaning that confidential information must be removed from the study when and if the subject specifies this.

The responsibilities of the researcher

The researcher has these responsibilities as described by Oates (2006):

- No confidential or proprietary information will be obtained by the researcher.
- No information will be collected, which is irrelevant to the research.
- The researcher will behave with integrity to the information obtained.
- The researcher will adhere to the rights of each participant.
- The researcher will always act responsibly and ethically under all circumstances.
- The researcher will abstain from plagiarism.



Signature

5 July 2023

Date

Appendix C: Literature analysis

Table 0-1: Literature analysis

#	Literature title	Reference	Paradigm used	Strategy used
1.	Performance distributions: Measuring employee performance using total quality management principles.	Deadrick, D. L., & Gardner, D. G. (1999). Performance distributions: measuring employee performance using total quality management principles. *Journal of Quality Management*, *4*(2), 225-241.	Interpretivism Paradigm	Design Science Strategy
2.	Factors Influencing Government Employee Performance via Information Systems Use: An Empirical Study.	Luarn, P., & Huang, K. L. (2009). Factors influencing government employee performance via information systems use: an empirical study. *Electronic Journal of e-Government*, *7*(3), pp227-240.	Interpretivism Paradigm	Survey Strategy
3.	The Role of Technology, Organizational Culture, and Job Satisfaction in Improving Employee Performance during the Covid-19 Pandemic.	Sapta, I., MUAFI, M., & SETINI, N. M. (2021). The role of technology, organizational culture, and job satisfaction in improving employee performance during the Covid-19 pandemic.	Positivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
		The Journal of Asian Finance, Economics, and Business, *8*(1), 495-505.		
4.	Dimensions of cultural intelligence and technology skills on employee performance.	Setiawan, A., Hasibuan, H. A., Siahaan, A. P. U., Indrawan, M. I., Rusiadi, I. F., Wakhyuni, E.,... & Rahayu, S. (2018). Dimensions of cultural intelligence and technology skills on employee performance. *International Journal of Civil Engineering and Technology*, *9*(10), 50-60.	Positivism Paradigm	Experiment Strategy
5.	Impact of Employee Motivation on Employee Performance.	Shahzadi, I., Javed, A., Pirzada, S. S., Nasreen, S., & Khanam, F. (2014). Impact of employee motivation on employee performance. *European Journal of Business and Management*, *6*(23), 159-166.	Interpretivism Paradigm	Survey Strategy
6.	Factors affecting employee performance: an empirical approach.	Diamantidis, A. D., & Chatzoglou, P. (2018). Factors affecting employee performance: an empirical approach. *International Journal of Productivity and Performance Management*.	Positivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
7.	Factors affecting employee performance of PT.	Pawirosumarto, S., Sarjana, P. K., & Muchtar, M. (2017). Factors affecting employee performance of PT. Kiyokuni Indonesia. *International journal of law and management*.	Positivism Paradigm	Survey Strategy
8.	A study on the drivers of employee engagement impacting employee performance.	Bedarkar, M., & Pandita, D. (2014). A study on the drivers of employee engagement impacting employee performance. *Procedia- Social and Behavioral Sciences*, *133*, 106-115.	Interpretivism Paradigm	Case Study Strategy
9.	Employee performance evaluation by the AHP: A case study.	Islam, R., & bin Mohd Rasad, S. (2006). Employee performance evaluation by the AHP: A case study. *Asia Pacific Management Review*, *11*(3).	Interpretivism Paradigm	Case Study Strategy
10.	Employee performance Evaluation: A fuzzy approach	Ahmed, I., Sultana, I., Paul, S. K., & Azeem, A. (2013). Employee performance evaluation: A fuzzy approach. *International Journal of Productivity and*	Pragmatism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
		Performance Management.		
11.	Factors affecting employee performance: a systematic literature review	Atatsi, E. A., Stoffers, J., & Kil, A. (2019). Factors affecting employee performance: a systematic literature review. *Journal of Advances in Management Research*.	Interpretivism Paradigm	Case Study Strategy
12.	The relationship among work-related perceptions, employee attitudes, and employee performance: The integral role of communications	Rodwell, J. J., Kienzle, R., & Shadur, M. A. (1998). The relationship among work-related perceptions, employee attitudes, and employee performance: The integral role of communications. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, *37*(3-4), 277-293.	Interpretivism Paradigm	Survey Strategy
13.	Effect of teamwork on employee performance.	Manzoor, S. R., Ullah, H., Hussain, M., & Ahmad, Z. M. (2011). Effect of teamwork on employee	Positivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
		performance. *International Journal of Learning and Development*, *1*(1), 110-126.		
14.	Employee performance at workplace: Conceptual model and empirical validation	Pradhan, R. K., & Jena, L. K. (2017). Employee performance at workplace: Conceptual model and empirical validation. *Business Perspectives and Research*, *5*(1), 69-85.	Interpretivism Paradigm	Design Science Strategy
15.	Impact of rewards on employee performance: With special reference to ElectriCo	Edirisooriya, W. A. (2014, February). Impact of rewards on employee performance: With special reference to ElectriCo. In *Proceedings of the 3rd International Conference on Management and Economics* (Vol. 26, No. 1, pp. 311-318).	Positivism Paradigm	Survey Strategy
16.	An entrepreneurial mindset: Self-regulating mechanisms for goal attainment	Lindh, I. (2017). *An entrepreneurial mindset: Self-regulating mechanisms for goal attainment* (Doctoral dissertation, Luleå University of Technology).	Interpretivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
17.	Towards an understanding of identity and technology in the workplace.	Stein, M. K., Galliers, R. D., & Markus, M. L. (2013). Towards an understanding of identity and technology in the workplace. *Journal of Information Technology*, *28*(3), 167-182.	Interpretivism Paradigm	Design Science Strategy
18.	Employee acceptance of wearable technology in the workplace	Jacobs, J. V., Hettinger, L. J., Huang, Y. H., Jeffries, S., Lesch, M. F., Simmons, L. A.,... & Willetts, J. L. (2019). Employee acceptance of wearable technology in the workplace. *Applied ergonomics*, *78*, 148-156.	Interpretivism Paradigm	Survey Strategy
19.	Technostress dark side of technology in the workplace: A scientometric analysis	Bondanini, G., Giorgi, G., Ariza- Montes, A., Vega-Muñoz, A., & Andreucci-Annunziata, P. (2020). Technostress dark side of technology in the workplace: A scientometric analysis. *International journal of environmental research and public health*, *17*(21), 8013.	Positivism Paradigm	Case Study Strategy
20.	Knowledge structures for integrating	Ley, T. (2020). Knowledge structures for integrating working and learning: A	Interpretivism Paradigm	Case Study Strategy

#	Literature title	Reference	Paradigm used	Strategy used
	working and learning: A reflection on a decade of learning technology research for workplace learning.	reflection on a decade of learning technology research for workplace learning. *British Journal of Educational Technology*, *51*(2), 331-346.		
21.	User frustration with technology in the workplace.	Lazar, J., Jones, A., Bessiere, K., Ceaparu, I., & Shneiderman, B. (2003). User frustration with technology in the workplace.	Interpretivism Paradigm	Survey Strategy
22.	Computer-mediated communication and organizational communication: The use of new communication technology in the workplace.	Ean, L.C. (2011). Computer-mediated communication and organizational communication: The use of new communication technology in the workplace. *The journal of The South East Asia Research Centre for Communication and Humanities, (3)*, 1-12.	Interpretivism Paradigm	Survey Strategy
23.	A longitudinal examination of individual, organizational,	Jelinek, R., Ahearne, M., Mathieu, J., & Schillewaert, N. (2006). A longitudinal examination of individual,	Interpretivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
	and contextual factors on sales technology adoption and workplace efficiency.	organizational, and contextual factors on sales technology adoption and workplace efficiency. *Journal of Marketing Theory and Practice*, *14*(1), 7-23.		
24.	Introducing new technology into the operating room: measuring the impact on workplace efficiency and satisfaction.	Stahl, J. E., Egan, M. T., Goldman, J. M., Tenney, D., Wiklund, R. A., Sandberg, W. S.,... & Rattner, D. W. (2005). Introducing new technology into the operating room: measuring the impact on workplace efficiency and satisfaction. *Surgery*, *137*(5), 518- 526.	Positivism Paradigm	Experiment Strategy
25.	The impact of information technology on job-related factors like health and safety, job satisfaction, performance, productivity and work-life-balance.	Ratna, R., & Kaur, T. (2016). The impact of information technology on job-related factors like health and safety, job satisfaction, performance, productivity, and work-life-balance. *Journal of Business & Financial Affairs*, *5*(1), 2-9.	Pragmatic Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
26.	Social media-induced technostress: Its impact on the workplace efficiency of IT professionals and the moderating role of job characteristics.	Brooks, S., & Califf, C. (2017). Social media-induced technostress: Its impact on the workplace efficiency of it professionals and the moderating role of job characteristics. *Computer networks*, *114*, 143-153.	Positivism Paradigm	Experiment Strategy
27.	Usage and impact of technology enabled job learning.	Torkzadeh, G., Chang, J. C. J., & Hardin, A. M. (2011). Usage and impact of technology enabled job learning. *European Journal of Information Systems*, *20*(1), 69-86.	Interpretivism Paradigm	Survey Strategy
28.	Organizational members' use of social networking sites and workplace efficiency: An exploratory study	Moqbel, M., Nevo, S., & Kock, N. (2013). Organizational members' use of social networking sites and workplace efficiency: An exploratory study. *Information Technology & People*.	Interpretivism Paradigm	Survey Strategy
29.	Excessive social media use at work: Exploring the effects of social media	Yu, L., Cao, X., Liu, Z., & Wang, J. (2018). Excessive social media use at work: Exploring the effects of social media overload on	Interpretivism Paradigm	Survey Strategy

#	Literature title	Reference	Paradigm used	Strategy used
	overload on workplace efficiency	workplace efficiency. *Information technology & people*.		
30.	Adaptation to information technology: A holistic nomological network from implementation to job outcomes.	Bala, H., & Venkatesh, V. (2016). Adaptation to information technology: A holistic nomological network from implementation to job outcomes. *Management Science*, *62*(1), 156-179.	Pragmatism Paradigm	Design Science Strategy

Appendix D: Research consent form

RESEARCH CONSENT FORM

Please read the following document and sign the last page.

Study title: The effect of self-regulating technology on workplace efficiency.

Principal investigator: Petrus Arnoldus van Zyl.

Supervisor: Prof. Marié Hattingh.

Institution: University of Pretoria, Department of Informatics.

Contact number (daytime and after hours): +27833421217.

Date and time of first informed consent discussion:

Day	Month	Year	Time

Estimated Duration: 35 minutes.

Introduction

You are invited to volunteer for a research study. I am doing this research for MCom Informatics degree purposes at the University of Pretoria. This document gives information about the study to help you decide if you would like to participate. Before you agree to take part in this study, you should fully understand what is involved. If you have any questions, which are not fully explained in this document, do not hesitate to ask the investigator. You should not agree to take part unless you are completely happy about what we will be discussing during the interview.

The Nature and Purpose of this study

The aim of the research is to establish the extent self-regulating technology has on workplace efficiency. Main Research Question: What impact does the daily use of mobile self-regulating technology have on workplace efficiency? The objective of this question is to help identify and explain what the effect self-regulatory technologies have on employees and how this impacts their workplace efficiency.

Sub-Research Question 1: *What is the effect of workplace distractions on workplace efficiency?*
The objective of this sub-question is to help identify and explain what the impact of distractions through mobile devices has on an employee's attentional cognitive resources.

Sub-Research Question 2: *How do self-regulation applications help employees maintain focus by limiting distractions?*
The objective of this sub-question is to help identify and explain how limiting distractions through self-regulation technologies can help employees maintain their focus on job-specific activities.

The main research question and sub-questions identified will help guide the research into a general direction and will ensure that the research addresses the gap identified in the scientific body of knowledge around business and self-regulatory technologies.

Ethical approval

This study was submitted to the Research Ethics Committee of the Faculty of Health Sciences at the University of Pretoria, Medical Campus, Tswelopele Building, Level 4-59, telephone numbers 012 356 3084 / 012 356 3085 and written approval has been given by that committee. The study will follow the Declaration of Helsinki (last update: October 2013), which guides doctors on how to do research in people. The researcher can give you a copy of the Declaration if you wish to read it.

Voluntary participation

The decision to take part in the study is yours and yours alone. You do not have to take part if you do not want to. You can also stop at any time during the interview without giving a reason. If you refuse to take part in the study, this will not affect you in any way.

Risks and discomforts involved

We do not think that taking part in the study will cause any physical or emotional discomfort or risk.

Benefits of the study

You will not benefit directly by being part of this study. But your participation is important for us to better understand and improve the practice and literature associated to information technology.

Compensation

You will not be paid to take part in the study. There are no costs involved for you to be part of the study.

Explanation of procedures

If you agree to participate, you will be asked to participate in an individual interview, which will take about 35 minutes. The individual interview will be a one-on-one meeting between the two of us. I will ask you several questions about the research topic. This study involves answering some questions such as Can you describe your experience with using self-regulating technologies in the workplace? How have these technologies influenced your productivity,

time management, or work habits? With your permission, the interview will be recorded on a recording device to ensure that no information is missed.

Confidentiality

We will not record your name anywhere and no one will be able to connect you to the answers you give. Your answers will be linked to a fictitious code number, or a pseudonym (another name) and we will refer to you in this way in the data, any publication, report, or other research output.

All records from this study will be regarded as confidential. Results will be published in medical journals or presented at conferences in such a way that it will not be possible for people to know that you were part of the study.

The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Research Ethics Committee. All these people are required to keep your identity confidential. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

All hard copy information will be kept in a locked facility at the University of Pretoria, for a minimum of 10 years and only the research team will have access to this information.

Research consent

I hereby certify, declare, agree, and undertake the following towards the research conducted by Petrus Arnoldus van Zyl (student number u16040768) with proposed title: The effect of self-regulating technology on workplace efficiency.

Consent statement

- I have read (or someone has read to me) the information in this consent form.
- I understand the purpose and procedures and the possible risks and benefits of the study.
- I was given sufficient time to think about it.
- I had the opportunity to ask questions and have received satisfactory answers.
- I understand that I am free to withdraw from this study at any time for any reason and the decision to stop taking part will not affect my future relationships.
- I give permission to the use and disclosure of my de-identified information collected for use in this study, as described in this form.
- I understand that by signing this document I do not waive any of my legal rights.
- I will be given a signed copy of this consent form.

Research code of conduct

This code of conduct depicts the ethical considerations and the rights of the participants in this study, it identifies the responsibility of the researcher and portrays how access to the data will be acquired, how the data will be collected, how the data will be stored and how the data will be used.

Access to data

For this research on the effect of self-regulating technology on workplace efficiency, access to the data will be obtained through physical or electronic consent by the subject and the right to this data will remain the subject's own until provided to the researcher. The only individuals with access to the data throughout the research are the main research investigator and the supervisor accompanying the main investigator. In the case of this study, the main research investigator is Mr. Petrus Arnoldus van Zyl, accompanied by his supervisor, Prof. Marié Hattingh.

How the data will be collected

the data required for this research was acquired through the use of semi-structured interviews, a link to participate in the study was shared through the use of social media and an online interview was securely held through the use of *Google Meet*, the information and discussions conducted in the interview was then recorded using *Apple Dictation* and the data was then copied into a password-encrypted *Excel* file which was securely stored on *Google Drive*.

How the data will be stored

The data will be stored electronically and securely by the researcher, and all means acceptable were taken to ensure data security and privacy. The data will be captured in encrypted Excel files and stored on Google Drive using encrypted storage. Google Drive's access will also be restricted to only the main researcher and supervisor of the research. Google Drive provides a safe and secure way to store the research's associated data since this service offers encryption, multi-factor authentication, and backup options to ensure the safety of the relevant data.

How the data will be used

The data collected will be analyzed statistically to create a relationship between how the use of self-regulating technology can promote workplace efficiency, these figures and graphical representations are available in this research.

The rights of research subjects

Each participant (referred to as subject) of this study has the following rights:

- **The right to decline participation**: The subject of the research has the right to choose whether they want to participate in the research or not.
- **The right of withdrawal:** The subject has the right to withdraw their participation from the research at any point in time. If the subject withdraws their participation all data collected from the participant will be discarded.
- **The right to informed consent:** The subject has the right to all information regarding to participation in the research and all information must be made available to them.
- **The right to anonymity:** The subject has the right to anonymity, meaning that no personal information will be used in the research.
- **The right of confidentiality:** The subject has the right to abstain confidential information at any point in time. Meaning that confidential information must be removed from the study when and if the subject specifies this.

The responsibilities of the researcher

The researcher has the following responsibilities:

- No confidential or proprietary information will be obtained by the researcher.
- No information will be collected which is irrelevant to the research.
- The researcher will behave with integrity to the information obtained.
- The researcher will adhere to the rights of each participant.
- The researcher will always act responsibly and ethically under all circumstances.
- The researcher will abstain from plagiarism.

Petrus Arnoldus van Zyl	05 July 2023
Researcher's name	Date

05 July 2023

Signature of Principal Researcher | Date

Participant's name (Please Print) | Date

Signature of Participant | Date