WORKPLACE SAFETY, GOVERNMENT WORKPLACE SAFETY REGULATIONS, EMPLOYEE SAFETY ATTITUDES AND EMPLOYEES' PRODUCTIVITY IN MANUFACTURING FIRMS IN KENYA

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DECLARATION

This research thesis is my original work and has not been presented elsewhere for a degree or any other award.

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DEDICATION

I dedicate this work to my parents, Mr. and Mrs. Mutegi, for nurturing me, supporting my education from basic to higher education, and always surrounding me with love and support even in adulthood.

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ABBREVIATIONS AND ACRONYMS

BLS	Bureau of Labor Statistics
CBA	Collective Bargaining Agreement
CCTV	Closed-Circuit Television
COTU	Central Organization of Trade Unions
COVID 19	Corona Virus Disease 2019
EU-OSHA	European Agency for Safety and Health at Work
GDP	Gross Domestic Product
GoK	Government of Kenya
HRM	Human Resources Management
ILCI	International Loss Control Institute
ILO	International Labour Organization
ISO	International Organization for Standardization
ISRS	International Safety Rating System
KAM	Kenya Association of Manufacturers
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MCM	Manufacturing Certification Manual
NACOSTI	National Commission For Science, Technology & Innovation
NOSA	National Occupational Safety Association
OSHA	Occupational Safety and Health Administration Act
SHARP	Safety and Health Achievement Recognition Program
TGWU	Transport and General Workers Union
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
VPP	Volunteer Protection Program
WIBA	Work injury Benefits Act
WHO	World Health Organization

DEFINITION OF TERMS

Employee Productivity : Employees level of accomplishment of tasks, the actual hours worked out of the standard work hours and employees value added to the organisations output (Corgi, 2020).

Government Safety Regulations : Workplace safety obligations and guidelines to manufacturing companies (Mohamed, 2021).

Manufacturing Firms : Various sub-sectors mainly oriented towards the production of various goods (Hacamo, 2022)

Safety Attitudes : Employee response to safety practices and procedures positively or negatively (Li et al, 2020)

Safety Ergonomics : Designing an environment of employee safety through detection and minimization of safety hazards (Ravindran, 2020).

Safety Emergency : Mechanisms aimed to reduce the impact or severity of any work place risk. (Huang et al, 2022).

Safety Training : Programmes intended to create safety related awareness by communicating and sharing information while promoting safety for all employees (Huang et al, 2022).

Safety Transfer : Shifting the burden of safety risk to another competent individual. It occurs when the organization does not have adequate ability to deal with safety issues (Reese, 2018).

Workplace Safety : State of the workplace being protected against occupational accidents or harm. They are procedures taken as whole to alter the ratio of undesirable work risks(Kurdy et al, 2021).

ABSTRACT

The manufacturing sector in Kenya has been experiencing workplace safety and productivity issues despite adopting safety programmes and laws regulating workplace safety. Extant studies have yet to examine the relationship between workplace safety and employees' productivity. This study's general objective was to determine workplace safety's effect on employees' productivity. The study was grounded on the domino, homeostasis, tip of the iceberg, and Rasmussen's risk management theories. The study design was a cross-sectional survey guided by a positivist research philosophy. The target population was 853 manufacturing firms registered with the Kenya Association of Manufacturers. A sample of 234 firms distributed across the fourteen manufacturing sub-sectors was obtained using a statistical formula to ensure all sectors were represented. The sampled firms were then selected using a random sampling method. The target respondents were 234 heads of human resources in each sampled firm. The questionnaire was pre-tested in 24 manufacturing firms. The structured questionnaire reliability was checked using Cronbach's alpha which revealed a correlation coefficient of 0.897. To describe profiles of the firms and research variables, means and standard deviations were used. Multiple regressions were used to analyze objectives. The study established that workplace safety has a statistically significant influence on employees' productivity. Thus, each workplace safety construct; ergonomics, emergency management, safety training, and safety transfer statistically affects employees' productive time, value-added, and accomplishment of tasks. In addition, the study found that workplace safety affected employee productivity regardless of the manufacturing sector. Moreover, the study determined that the level of implementation of government regulation has a significant moderating effect on the relationship between workplace safety and employees' productivity. Further, it was established that employee safety attitude significantly intervened in the relationship between workplace safety and employees' productivity. Finally, the study found that workplace safety, implementation of government workplace safety regulations, and employee safety attitude jointly affect employees' productivity. The study recommended that firms that intend to improve their employees' productivity should invest in adequate workplace safety, fully implement government safety regulations, and launch programmes that foster positive employee safety attitudes. This will enable employees to accomplish tasks better, add value and productive time. The study's findings offer insight into the situational position of workplace safety, level of implementation of government workplace safety regulations, employee safety attitude, and employee productivity in manufacturing firms in Kenya, as well as managerial and epistemological insights for scholars in human resources management. The findings further expand existing theoretical frameworks; contribute to policy development and human resources management practices. The research had a few limitations; the selection of the study variables did not cover different psychological traits and personalities possessed by an employee, which led to varying safety attitudes and productivity. Future research should address these limitations by including additional psychological traits, personalities, and soft and hard human resources management approaches.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Organizations rely on employees to function and meet the set objectives; therefore, they use resources to sustain and maintain a productive workforce. Safety challenges may inhibit employee productivity (European employee productivity institute report, 2019). Globalization and technological revolution have major implications on human resource management; changing nature of work, changing workforce and workplaces, safety concerns, and consequently greater workforce expectations from the changes. The human resource practitioner now deals with a more complex and safety-prone workplace (Byarset, 2014). New technologies expose employees to new safety risks, while globalization has led to a diverse workforce with diverse safety attitudes. Further, organizations face new regulations on safety and quality of work life. These changes could be affecting the productivity of the employees. Further, Gupta (2016) adds that inadequate workplace safety exposes employees to workplace hazards that may affect their productivity at work.

All firms face safety challenges, which could have adverse productivity effects on their workforce (Society for Human Resource Management report, 2017). The problem of workplace safety and employee productivity has resulted in the International Labour Organization (ILO) adopting a new mission that indicates that reducing the risk of inadequate workplace safety is its top priority (ILO, 2018). Employees require optimal safety to be optimally productive; therefore, organizations require appropriate programmes to cover all possible contingencies without interrupting normal work operations. Goetzel (2018) notes that the employees of Cicna insurance company and Acco Corp in the United States became more productive when the institutions provided robust safety programmes. When Norwegian business schools in Europe offered accident compensation package, protective clothing, working postures training, safety consulting, and onsite medical attention, their employees became more productive; no lost workday cases, no cases of restricted work, and employees had positive risk attitudes.

On the other hand, Volvo manufacturing in Sweden stopped production in September 2017 after 20 employees were injured due to a lack of safety equipment. In February

2018, Toyota closed down 18 plants for two weeks due to a fire that led to a loss of 195 million US dollars (Goetzel, 2018). These incidents in Toyota and Volvo led to increased absenteeism and error cases, decreased bids for more work, and workers were less motivated in their work. Consequently, these workplace safety incidents led to decreased work productivity, which a good employee safety programme could have possibly prevented. Recent empirical studies done in developed countries, such as in the United Kingdom by Leber et al. (2018), in Turkey by Bayram(2022), and in the United States by Shockley(2022), have pointed out that proper workplace safety could solve employee productivity problems. Nevertheless, empirical evidence linking workplace safety and employees' productivity in developed countries is limited.

African companies are not an exception to major safety problems. OSHAfricans report (2018) and ILO (2018) indicate that the worst recorded workplace disasters have occurred in African firms; a raptured heat exchanger in Tedoro Refining Company, Liberia in 2014 killed seven workers, fire explosion and defective fire extinguishers in Amtext Corporation, South Africa in 2017 killed 13 workers, in 2019 seven workers in Top Cleaners LLC, Mozambique died of carbon monoxide poisoning, and inadequate ventilation contributed to the deaths. These incidents would have been prevented by proper safety equipment. World Economic Forum Report (2018) on global manufacturing competitiveness notes that some manufacturing companies in South Africa (Sasol chemicals), Egypt (Air Cairo), Ethiopia (Ethio Telcom), Morocco (Acio), Rwanda (Terracom), and Nigeria (Dangote Cement) have outperformed developed countries firms in terms of workplace safety. These companies have recorded a positive effect on employee productivity. The World economic forum report (2018) on global manufacturing competitiveness further notes that most companies in the African continent have recently adopted policies to boost workplace safety and enable employee productivity. Extant literature done in the context of African workplaces (Obong et al., 2021; Kamau, 2020; Yankson, 2017; Keraka, 2020), among others, have not adequately determined the effect of workplace safety on employees' productivity.

In Kenya, workplace safety and employee productivity are major issues. A report by the Government of Kenya-GoK (2017) indicated that back pain due to work activity

afflicts six out of ten Kenyan workers and nine out of ten workers in the manufacturing sector. Additionally, the report indicated that Kenyan workplaces are unsafe due to poor lighting, vibrations, poor ventilation, unsafe working equipment, noise, repetitive motions, extreme temperatures, and lack of employee safety training. These issues may be affecting the productivity of Kenyan workers. However, the GoK report (2018) reveals that Kenyan institutions have developed various safety management programmes to protect their workers from workplace injuries and boost their work productivity. Adopting workplace safety devices such as heat regulators, dust regulators, protective clothing, safety warnings, and proper lighting is rising in Kenyan manufacturing firms. These programmes aim to ensure employees are productive (Motorola, 2016). Previous studies done in Kenyan firms (Ndegwa *et al*., 2022); Kemei et al., 2016) and Otieno et al., 2022) have reported inappropriate and inadequate workplace safety programmes. This may be affecting employee productivity, but previous studies have not established the effect of the nature of workplace safety programmes on employee productivity.

1.1.1 Workplace Safety

There are several international guidelines for effective workplace safety for any institution: the International Loss Control Institute (ILCI) guidelines (2015); the International Labour Organization's (ILO) guidelines (2018); the National occupational safety association (NOSA) safety management system (2017); international safety rating system (2016); ISO (International Organization for Standardization):31000 (2009) revised by ISO 31000:2018; ISO:45001 (2018) guide on implementation of workplace safety and health and Heinrich (2017) three Es of workplace safety (engineering, education, enforcement). All these international guidelines posit that an effective safety management system should address ergonomics, emergency management, safety training, safety transfer, and enforcement through safety policies and programmes to create positive safety attitudes.

If these six areas are addressed, a safe workplace will be accomplished and, consequently, better employee productivity (Heinrich, 2017). Further, the theoretical perspective of Masaaki's Kaizen Theory (1986) postulated that organisations should incrementally adopt workplace programmes that quickly enable organisations to

detect and eliminate productivity loss. Extant studies have mainly focused on how workplace safety reduces employees and their dependents suffering. They have largely ignored the impact of workplace safety on overall employee productivity as the Kaizen theory principles proposed. Moreover, recent studies indicate challenges with workplace safety in Kenyan firms and point out possible employee productivity problems. Baicker (2018) notes that adopting workplace safety programmes could be faster, more guided by government regulations, and supported by ergonomic considerations. Abdallah (2017) states that no formal procedure for reporting accidents exists in Kenyan firms. There are no reviews of safety programmes, and safety committees are formed only when a major safety incident affects employees' productivity (Wazir, 2015). Gubler et al. (2022) note that investigations are not formal but superficial. This thesis empirically evaluated the effect of the nature of workplace safety programmes on employees' productivity in manufacturing firms in Kenya.

Workplace safety ergonomics involves the detection and elimination of hazards. Hulme et al. (2022) posit that workplace safety ergonomics reduces the risk factors that lead to injuries, ensuring employees' optimal productivity is not interfered with. Capodaglio's (2022) study adds that workplace safety ergonomics are expected to improve work activity comfort and reduce safety injuries and fatigue; ensuring employees accomplish their work tasks fully. Inadequate workplace safety ergonomics exposes employees to injury, rapid fatigue, and productivity loss (Ravindran, 2021). Despite previous research consistently identifying workplace safety ergonomics as a strategy to boost work safety and enable employee productivity, they have been faulted in four areas; first, the studies have not evaluated the three indicators of workplace safety ergonomics (hazard detectors, protective devices, and effects analysis) against employee productivity. For instance, Leber et al. (2018) related protective ergonomics on work efficiency for persons with disability; Ravindran (2021) investigated the impact of hazard ergonomics on work comfort while Sinno et al. (2020) and Pickson et al. (2017) focused on recognition of symptoms of overexposure and employee wellness. Second, the methodological rigor applied by previous studies did not conclusively establish the link between safety ergonomics and employee productivity; Chintada (2022) and Bayram (2022) did a critical literature review and thus failed to generate original findings, while Leber et

al. (2018) analyzed data using frequencies and percentages. Third, previous literature is anchored on different industries, firms, and countries; consequently, they have a minimal application to manufacturing firms in Kenya. Fourth, previous studies have not related workplace safety ergonomics with employee productivity measured by productive time, degree of accomplishment of tasks, and value-added.

Safety training educates employees on safe working and the identification of exposures (Mora et al., 2020). In Kenya, the Manufacturing Certification Manual (MCM, 2018) sets minimum workplace safety training standards, including developing a training checklist for each employee. Previous studies by Alonso et al. (2018) and Malavi et al. (2021) have noted that many manufacturing firms in Kenya do not fully comply with the safety training standards. The studies have noted that despite the (MCM, 2018) and other standards setting out explicit workplace safety training programmes such as safety seminars, safety manuals, safety rules and procedures, safety drills, and regular briefs, many manufacturing firms in Kenya still need to comply with the programmes.

Previous literatures opine that safety training could be an innovative way to boost employee productivity. A study by Ravindran (2021) posits that workplace safety-trained employees become sufficiently fit to perform tasks confidently, while a safety and productivity culture can be developed through formal training programmes. A study by Huang et al. (2022) noted that safety training enables workers to identify safety risks and communicate corrective action early enough; this can prevent the onset of productivity losses. Grabowski (2019) notes that safety training ensures desirable safety behaviours among employees, such as safe working and avoidance of severe errors. A study by Malavi et al. (2021) adds that workplace safety training gives employees the confidence to concentrate on their tasks without unnecessary phobias, especially in safety-prone workplaces such as manufacturing. A study by Mora et al. (2020) adds that workplace safety training programmes such as seminars, manuals, drills, and regular briefs enable employees to remember actions even in emergencies reducing productivity losses. A similar study by Alonso et al. (2018) suggested that it ensures that employees acquire usability experience and enhance their cognitive skills, synergy, and commitment toward productivity. For this reason,

safety training accompanied by proper ergonomics is expected to improve employees' productivity significantly.

The current study departs from extant literature in four ways. First, empirical evidence needs to be more conclusive on the effect of workplace safety training on employee productivity; some studies have contradicting findings; for instance, Bayram (2022) and Ravindran (2021) suggested that safety training influences positive culture but does not influence employee productivity and Shockley (2022) opined that safety training barely influences employee productivity as employees often forget what they learnt quickly and the hours spent in trainings reduce employee productive time while Obong et al. (2021) suggested that workplace safety training positively influences employee efficiency and confidence at work. In addition, Rajput et al. (2023) note that intuitively, many cautionary measures negatively affect actual productivity as they interfere with the routine way of carrying out tasks that may not be necessarily safe.

Secondly, prior studies did not assess the effect of safety training on productive time, task accomplishment, and employee value added. For example, Aluoch (2015) used employee perceptions of safety; Rosa (2019) checked company loyalty by employees, and Laura (2019) used employee turnover intentions. Third, each of these studies measured employee productivity differently. Fourth, existing literature has focused on worker safety awareness (Sawe, 2013; Adim & Mezeh,2020; Alonso et al., 2018; Malavi et al., 2021; Aluoch, 2015; and Ravindran, 2021) and largely ignored the existing safety training programmes put in place in organizations as posited by (MCM, 2018) and theoretical perspectives by Heinrich domino theory (1931). Extant empirical studies measured workplace safety training in terms of ex-ante perspective instead of safety interventions put in place for safety and productivity; these measures could have led to mistaken inferences. The current study filled these research gaps.

Proactive emergency management is now a global concern since adverse risks still occur despite the level of protection in place. Workplace safety emergency management reduces the extent of workers' disabilities, work disruption, and can potentially lower employee productivity losses. Prior studies by Drake (2018) and Reese (2018) have provided an understanding of the nature of a manufacturing sector

workplace and have identified workplace safety incidents as disruptive to employee productivity. The study posits that all firms need emergency programmes as they cannot attain a zero-incident rate because safety ergonomics are prone to human error and technology failure. Moreover, studies by Alariki and Al-Abed (2021) and Obrenovic et al. (2020) note that the problem of employee productivity in the manufacturing sector could be due to defective management of workplace safety emergencies. A study by Steen-Tveit et al. (2021) adds that safety emergency management addresses those risk incidents that bypass workplace safety ergonomics to limit potential productivity and other losses in organisations.

A study by Leonhardsen et al. (2022) has provided a guideline for effective emergency management, including setting out rescue response and evacuation plans, emergency equipment and medical care, conspicuous display of emergency contacts, safe assembly and exit points, emergency logs, and documentation. Prior literature needs to evaluate these programs' effect on employee productivity adequately. Five aspects of extant literature have been faulted. First, the studies have yet to establish the link between manufacturing firms' workplace emergency management and employee productivity in terms of productive time, task accomplishment, and value-added. Second, prior studies by Wilson (2010) and Keraka (2020) did not examine the specific emergency management strategies put in place in organisations. Third the Obrenovic *et al*. (2020) and Young (2014) studies have largely employed qualitative methodology; Fourth, most studies conducted in different contexts have produced contradictory findings; for instance, Adjotor (2013) found that safety emergency programmes reduce the costs associated with illness but do not affect employee productivity while Cudjoe's (2017) and Obrenovic *et al*. (2020) associated safety emergency programmes with positive employee productivity outcomes. Moreover, the studies are contextualized in different sectors and countries hence have minimal application to developing countries manufacturing firms.It therefore made a contribution to the existing repository of literature on workplace safety and productivity

Workplace safety transfer to consultants and insurance companies assures the organization of its safety, improves employee morale and company pride, and reduces suffering by injured employees (Reese, 2018). Workplace safety incidents

put a significant financial and psychological burden on employees, which could affect their productivity at work (ILO, 2018). Previous studies by Kurdy et al. (2021) and Gubler et al. (2022) posit that workplace safety transfer reduces the financial and psychological burden associated with work incidents; hence employees are expected to be optimally productive without worrying about safety incidents. Reports by ILO (2018), OSHAfricans (2019), and literature by Reese (2018) have noted that the incident prone manufacturing workplace has recently been transferring their safety management to consultants and private security firms, who design, evaluate and review their safety programmes; the manufacturing firms are arranging health, disability, liability and accident insurances on behalf of their employees. Gubler et al. (2022) notes that the firms include external consultants in their safety committees to enhance organizations' safety and positive safety attitudes. Proper workplace safety transfer is thence expected to boost employee productivity; however, the influence of workplace safety transfer to insurance and consultants on employee productivity measured by productive time, degree of accomplishment of tasks, and value-added is yet to be systematically explored by prior empirical literature.

The existing literature has been faulted in several areas. First, the studies could have evaluated safety transfer completely based on its five constructs; group health insurance, private security, safety consultants, safety liability insurance, and personal accident insurance. For instance, studies by Owolabi et al. (2016), Nguyen & Zawacki (2019), and Peshawar (2014) focused on health insurance, while Gilje and Wittry (2021) focused on safety consultants. Second, the studies did not evaluate the effect of safety transfer on employee productivity based on the three measures of employee productivity (productive time, degree of accomplishment of tasks, and value-added). For instance, Owolabi et al. (2016) only used productive time, while Gilje and Wittry (2021) conceptualized labor productivity as value added. Third, the studies by Kurdy et al. (2021), Peshawar (2014), and Gubler et al. (2022) did not generate original findings on the effect of workplace safety transfer on employee productivity. Forth other studies had methodological limitations; for instance, a study by Otiso and Mutugi (2018) used chi-square tests to determine associations between variables and was limited to insurance safety transfer. Further, the study did not evaluate the effect of insurance safety transfer on employee productivity. Conversely, the current study addressed these research gaps.

1.1.2 Level of Implementation of Government Workplace Safety Regulations

Regardless of regulations in Kenya to address workplace safety challenges, the literature is deficient in explaining the extent to which compliance with these protocols influences the relationship between workplace safety and employee productivity. The two major regulations relating to workplace safety in Kenya are the Occupational Safety and Health Administration-OSHA(2007), repealed in 2013, and the Work Injury Benefits Act-WIBA (2007), repealed in year 2010. OSHA regulations (2007) promulgated standards requiring employers to protect their employees and train them on the safety aspects of their jobs. The OSHA subsidiary legislations of the year 2013 introduced specific rules for factories and manufacturing firms touching on mandatory adoption of safety programmes. Supplementarily, the WIBA (2007) promulgated mandatory legal benefits for employees who have an injury at work, while the repeal regulations of the year 2010 required all employers to get and maintain insurance from an insurer authorised by the cabinet secretary in charge of labour and extended the coverage to twenty-four hours. Correspondingly, WIBA regulations provide for payment of benefits in case an employee is accidentally injured, disabled, dies or contracts illness while executing the employer's business or any project.

Prior literature has noted challenges in implementing the regulations in manufacturing firms and pointed out possible workplace safety and employee productivity problems. A study by Baicker (2018) notes that implementing workplace safety regulations in Kenya is slow and not supported by ergonomic considerations. Moreover, a study by Abdallah (2017) noted that there are hardly any government inspections checking the implementation of these regulations. Research by Wazir (2015) added that compliance inspections are done only when there is a major safety incident affecting employees' safety and productivity. A similar study by Kamau (2020) found that the level of implementation of safety policy in Kenya was low due to a lack of adequate resources, while research by Kiura (2021) noted that there was minimal reporting of accidents and occupational diseases in Kenya.

Previous literature has noted four challenges relating to the regulations that may hamper their full implementation. First, Odero (2019) and Kiura (2021) found that compliance with WIBA is actualised at the time of accidents. Second, Nderitu et al.

(2019) and Odero (2019) added, despite that WIBA act being a strict liability statute, employers escape liability if they prove that they have kept abreast with OSHA and other regulations, resultantly, would not be held accountable under WIBA. Third, the director of occupational safety and health services, whose burden to deal with such cases solely falls, has only thirteen field stations countrywide; Kiura (2021) and Mohamed (2021) notes that with the number of workplaces and work injury claims countrywide, and with only thirteen field stations, it would be impossible to achieve the efficiency to check level of implementation and compensate the injured employees.

Fourth, Baicker (2018) notes that compliance inspections are only done after a reported major incident. Fifth, studies by Mohamed (2021) and Kiura (2021) noted that the legal benefit for employees who have any injury at work or work-related illness is limited to a maximum of 96 months' salary. This could be inadequate to replace the diminished earning capacity for employees or dependents after permanent injuries or death. Further, the studies noted that employers have occasionally protested legal claims on the basics of contributory negligence, fellow servant rule and assumption of risks doctrines. This discourages employees from claiming or reporting unsafe workplaces. Furthermore, this discourages employees from reporting unsafe workplaces and consequently may affect their morale and productivity at work. (Nderitu et al.2019; Mohamed 2021 and Kiura (2021).

Still, a study by Mohamed (2021) noted that several manufacturing companies in Kenya have fully complied with the safety regulations; the study added that such compliant firms are expected to have employees perform their duties confidently without fear of fear incidents hence giving superior productivity. Previous literature has yet to establish the moderating effect of the level of implementation of the government workplace safety regulations on the relationship between workplace safety and employee productivity. The studies have, however, pointed out the potential workplace safety and employee productivity outcomes due to fully implementing government workplace safety regulations. Studies by Hancock et al. (2013) and Pitts et al. (2011) opined that government safety regulations ensure that institutions have programmes that adequately protect employees; hence, a fully

compliant firm is expected to have employees perform their duties confidently without fear of incidents hence give superior productivity.

Additionally, studies by Baicker (2018) and Sinno et al. 2020) in support of the postulates of the Rasmussen's (1997) risk management framework opined that the level of implementation of workplace safety regulations is the cornerstone of the manufacturing firms' approach to the prevention of employee safety and productivity losses; these studies, did not empirically examine this assertion. A study by Corgi (2020) suggested that implementing these regulations is a fundamental step contributing to reducing productivity consequences of unsafe workplaces and pointed out that manufacturing firms may compromise between implementing risk protections as per the law and the costs involved in instituting the programmes. Data by ILO (2018) has shown that most safety losses occur in those firms that still need to implement government regulations fully. Therefore, despite workplace safety and employee productivity being important concerns, extant theoretical frameworks have not explained how level of implementation to government safety regulations can link both employee productivity and workplace safety together. The findings of this study contribute to the development of the Rasmussen's risk management theory.

Further, a study by Alariki and Al-Abed (2021) submitted that workplace safety and productivity losses are reported to be more severe in those firms that do not regularly train their employees and update their safety programmes as per the requirements of the regulations. Moreover, a study by Owolabi et al. (2016) noted that full implementation of government regulations influences positive productivity behaviour without safety phobias. Obrenovic et al. (2020 posit that government policy guides the kind of safety programmes adopted by institutions; consequently, safety and productivity problems may persist because of their level of implementation. The current study has provided empirical evidence of the moderating effect of the level of implementation of the government workplace safety regulations on the relationship between workplace safety and employee productivity.

1.1.3 Employee Safety Attitudes

Extant literature (Cohn et al., 2022; Li et al., 2020; Gilje & Wittry, 2021; Rosa, 2019) has explored various employee safety attitude factors that potentially affect workplace safety and employee productivity. However, empirical evidence on the

intervening effect of employee safety attitudes on the relationship between workplace safety and employee productivity is limited. A study by Cohn et al. (2022) opined that employee safety attitudes are the response to safety practices either positively or negatively. Research by Rosa (2019) observed that employees with negative safety attitudes take unnecessary risks, ignore the safety procedures, exhibit low work engagement, reduce loyalty, exhibit toxic behaviours such as retaliation and aggressiveness and avoid going the extra mile to boost productivity. Li et al. (2020) research adds that workers' safety attitudes are depicted through their safety behaviours. Aswathappa (2015) and the postulates of the domino theory developed by Heinrich (1931) posit that worker safety attitudes emanate from inherited traits and the work environment. Both the domino theory and the risk homeostasis theory by Wilde (1998) posit that workers' negative safety attitude can be influenced by safety training and the kind of protection in the workplace. Wilde (1998) further noted that employees adjust their safety and productivity behaviours based on the kind of protections available in the workplace.

The nature of work in the manufacturing sector exposes the employees to adverse workplace incidents, which may lead to negative safety attitudes (Jenter & Lewellen, 2020). Studies by (Li et al., 2020; Gilje & Wittry, 2021); Rosa (2019) observed that many manufacturing firms had adopted workplace safety programmes to protect workers effectively from workplace hazards and boost employee productivity. The studies added that these safety programmes might fail to guarantee workplace safety and productivity if employees have undesirable attitudes towards safety. Literature by Aswathappa (2015) noted that many firms did not involve their employees in designing and executing workplace safety programmes; consequently, the employees did not exhibit any investment in them, took unnecessary risks and ignored the safety procedures leading to potential employee productivity issues.

A similar study by Schultz (2017) added that workplace programmes in the firms were inadequate and were only commissioned when a major safety incident occurred. Research by Lencioni (2019) suggested that inadequate safety ergonomics, safety training and safety transfer to insurance and consultants leads to undesirable safety attitudes, such as phobias and overconfidence that lead to employees taking unnecessary risks or avoiding work that is perceived to be risky. The problem of

workplace safety and employee productivity persists despite manufacturing firms having promulgated safety programmes. Previous literature (Baicker (2018); Prinsloo & Hofmeyr (2022); Rosa (2019); Li et al., 2020); Pitts, Marvel & Fernandez (2011) suggest that the problem could be due to employee safety attitudes.

Extant empirical evidence was faulted in four aspects. First prior literature explored workplace safety attitudes as an important factor for workplace safety and employee productivity but did not empirically examine workplace safety attitudes as a potential intervener (Kao, 2019; Rosa 2019; Rahiman & Kodikal, 2017). Second, the studies by Schultz (2017), Cox and Cox (2018) and Jahangiri (2017) reviewed relevant literature but did not generate original findings. Third, the studies by Cohn et al. (2022), Laura (2019) and Jenter and Lewellen (2020) did not conceptualize workplace safety based on the programmes put in place for workplace safety (workplace safety ergonomics, emergency management, safety training and safety transfer); further none of the studies measured employee productivity based on productive time, degree of accomplishment of tasks and value-added. Fourth the studies conceptualized workplace safety attitudes differently from the current study; Cohn et al. (2022) and Laura (2019) used commitment to attend safety training, while the current study focused on the response to safety procedures either positively or negatively. The approach of this study filled these gaps.

1.1.4 Employee Productivity

The productivity of employees is an essential concern to every institution worldwide. Employee productivity is employees' ability to accomplish tasks within the standard work hours as described in a work description (Samnani & Singh, 2017). While extant literature has explored measures of employee productivity and the fundamental factors that influence employee productivity, empirical evidence on how workplace safety affects employee productivity outcomes is limited. Studies by Cole (2016), Yankson (2018), and the world employee experience report (2018) posited that employee productivity is influenced by two main factors. First is the management, including organizational plans, job content, access to the management, benefits, safety policies, and training. The second category is the working premises factors, including tools, noise, workspace, light intensity, hygiene, weather, vibration, temperature, ventilation and welfare facilities. Workplace safety is a

management factor and also originates from the nature of workplaces and hence may impact employee productivity. Goal-Freedom Alertness Theory, posited by Kerr (1954), and Distractions theory, posited by Hinze (1997), suggested that work productivity results from a psychologically rewarding and safe workplace. Data by the ILO (2018) observed that despite business firms and governments developing policies and programmes to alleviate hazards and accidents at the workplace, employee productivity and workplace safety remain major issues.

This study adopted three employee productivity measures; the accomplishment of tasks, productive time, and value-added. The first employee productivity measure adopted was the degree of accomplishment of tasks by employees. This measure was proposed by the European employee productivity institute report (2019), which posited that employee productivity could be measured by the degree to which employees produce the required output. Similarly, Laffont and Martimort (2009) and Drucker (2002) proposed that employee productivity can be assessed by considering the degree of accomplishment of tasks. The current study assessed the accomplishment of tasks through the total number of employees who met their set performance targets per employee dashboard/ performance contracts. Extant literature has pointed out that workplace safety may affect employee accomplishment of tasks, but this assertion is yet to be empirically tested. A study by Karaboga et al. (2022) opined that workplace safety through protection and training leads to work efficiency and accelerated employee adaptation of tasks. Henkel et al. (2019) add that workplace programmes may lead to behavioral changes that may affect the degree to which employees perform routine tasks. Previous studies have further reported inadequate workplace safety in manufacturing firms in Kenya (Mwaruta, 2022, Mburu & Kiiyukia (2017), while others have noted increased employee error rates in the firms (Corgi, 2020; Mwaruta, 2022). Other studies (Osoro & Kanyajua, 2019; Keraka, 2020; Simiyu et al., 2020) have noted that fewer employees were meeting their performance targets per the employee dashboard.

The second employee productivity measure adopted by the study was value added. Drucker (2002) stated that the value added by employees could measure employee productivity. Value added is computed by dividing total revenues by the number of employees. Extant literature has asserted that workplace safety may affect

employees' value added; however, these assertions are yet to be empirically tested. For instance, a study by Kabir et al. (2017) posited that adverse workplace safety incidents such as lost workday cases, liability costs, and restricted duties due to injuries dwindle the employees' value added. A study by Hacamo (2022) adds that manufacturing firms have over-invested in workplace safety, ergonomics and emergency management, negatively impacting the firm's revenues. Current study determined workplace safety effect on value added by employees using manufacturing firms' data.

The third employee productivity measure adopted by the study was productive time. European employee productivity institute report (2019) and Hacamo (2022) stated that worker productivity is measured by comparing the actual hours worked by an employee and the standard work hours during a period. This study evaluated workplace safety programmes against lost work time due to safety incidences. Previous studies have pointed out workplace safety and productivity problems in manufacturing firms. For instance, Bureau of Labor Statistics (BLS) report (2019) reported 5.7 million workplace injuries in public and private workplaces worldwide, with manufacturing industries ranking first with 3.2 million employee injuries. About 2.8 million were lost workday cases requiring recuperation, restricted work duties, or both. These incidents are experienced even after installation of various safety management programmes (Society for Human Resource Management Report, 2017).

1.1.5 The Kenyan Manufacturing Sector

This thesis focused on the manufacturing sector in Kenya due to the sector's inherent safety and productivity concerns in the sector. Further the sector receives significant scrutiny by the directorate of occupational safety over workplace safety practices and compliance with government regulations. The manufacturing sector in Kenya is comprised of 14 sub-sectors mainly oriented toward the production of consumer goods. Over 80 percent of the firms are based in Nairobi, while the rest are located in other major towns in Kenya (Kenya Association of Manufacturers (KAM), 2018). The United Nations Industrial Development Organization (UNIDO) report (2019) ranks Kenya's manufacturing sector's competitiveness at 112 out of 150 economies. Despite the Kenyan manufacturing sector being the largest among the East African countries, growth in the sector has been slow at 4.6% in 2018, 3.1% in 2019, and

average growth of 3.4% in the last five years. The sector contributes an average of 10.3% to the gross domestic product (GDP) and therefore is considered critical in attaining the country's economic development goals (KNBS, 2019). The employee safety and productivity problem in the sector could inhibit the government bottom up economic transformation agenda 2022-2027 that seeks to increase the GDP contribution of the sector to 20% by 2027. Since, the sector in Kenya is predominantly labour intensive; workplace emergencies such as the COVID-19 (Corona Virus Disease 2019) pandemic could greatly worsen employee productivity problems in cases where there is deficient workplace safety programmes.

Employee productivity in the Kenyan manufacturing sector is low, with an output of 2700 dollars per employee compared to the average African output of 3300 dollars per employee and the international standard of 6500 output per worker (ILO, 2018). Kenya Institute for Public Policy Research and Analysis (KIPPRA) report (2023) indicated that workplace incidents in the manufacturing sector had increased by more than 65 percent in 2022. The safety of manufacturing companies has been contested by Employee unions, including the central organization of trade unions (COTU) report (2018), the Transport and general workers union (TGWU) report (2018), and the National Union of Mineworkers report (2018). These unions have raised questions about the adequacy of employee safety in manufacturing companies which has led to the inclusion of protective clothing, tools, and working conditions in the collective bargaining agreement between the manufacturing companies' staff union and the management of manufacturing companies (CBA, 2018). Employee productivity in manufacturing firms in Kenya is low, despite the industry developing safety management programs such as Safety and Health Achievement Recognition Program (SHARP) and OSHA Challenge Program, which recognize employers for their voluntary safety efforts (KAM, 2018). The manufacturing firms' standards and guidelines on safety (2017) and the MCM (2018) provide a guideline for effective workplace safety in Kenya's manufacturing sector. Against the foregoing background, the statement of the problem was formulated as follows.

1.2 Statement of the Problem

Although adopting workplace safety programmes has been on the rise, employee productivity remains a problem in manufacturing companies in Kenya. Bureau of

Labour Statistics report (2019) established that Kenyan manufacturing firm workers produce less than workers in other non-manufacturing sectors at 130,000 work hours per year, while workers in other industries produce an average of 168,000 work hours per year. Moreover, employee productivity in the sector is less than 150,000 in an average African manufacturing firm and the internationally accepted standard of 200,000 work hours per year (Bureau of Labour Statistics report, 2019). OSHA Africa report (2019) opines that low worker productivity can be attributed to flawed workplace safety. Moreover, ILO (2018) statistics showed that employee productivity in the Kenyan manufacturing sector is low, with an output of 2700 dollars per employee compared to the average African output of 3300 dollars per employee and the international standard of 6500 output per worker. The lost work time could be due to workplace safety incidents. Kenya's Directorate of occupational safety and Health report (2018) ranked the manufacturing sector as leading in workplace safety issues, with 87% of occupational deaths and injuries reported. Kenya National Profile on occupational safety and health report (2018) revealed that 9 out of 10 manufacturing sector workers complain of unsafe working conditions. KIPPRA report (2023) adds that workplace incidents in the manufacturing sector in Kenya had increased by more than 65 percent in 2022. Moreover, studies by Osoro & Kanyajua (2019), Keraka (2020), and Simiyu et al. (2020) determined that fewer employees in the manufacturing sector were meeting their performance targets per the employee dashboard.

The safety and productivity issues are reported despite legal mandates and standards set forth to provide a safe workplace; Government of Kenya OSHA regulations (2013), Government of Kenya WIBA regulations (2014), and the Government of Kenya manufacturing sector safety standards and guidelines(2016). Extant empirical evidence needs to evaluate the relationship between workplace safety and employee productivity adequately. Further, the studies have not established the intervening effect of employee safety attitudes and the moderating effect of the level of implementation of government workplace safety regulations on the relationship between employee safety and employee productivity. More to that, extant empirical studies have shown contradicting findings, conceptualization challenges, and methodological limitations. Consequently, the relationships between the variables

have yet to be studied, especially in the manufacturing sector of a developing country. This study, therefore, filled this knowledge gap.

1.3 Objectives of the Study

The study was guided by the following objectives.

1.3.1 General Objective

To investigate the relationship among workplace safety, the level of implementation of government workplace safety regulations, employee safety attitude, and employee productivity in manufacturing firms in Kenya.

1.3.2 Specific Objectives

i. To investigate the effect of workplace safety on employee productivity in manufacturing firms in Kenya.
ii. To determine the moderating effect of level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.
iii. To evaluate the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.
iv. To assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya.

1.4 Hypotheses of the Study

H_{01}: Workplace safety has no effect on employee productivity in manufacturing firms in Kenya.

H_{02}: Level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.

H_{03}: Employee safety attitude has no intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.

H_{04}: Workplace safety, level of implementation of government workplace safety regulations and employee safety attitudes have no significant joint effect on employee productivity in manufacturing firms in Kenya.

1.5 Justification of the Study

The study's findings are expected to inform the government and other manufacturing sector players on the effect of workplace safety and fully implementing government workplace safety regulations on employee productivity. The results determined that compliance with workplace safety regulations affected workplace safety and employee productivity. This is expected to help the government in planning policies to be put in place to enhance employee productivity and protect workers against adverse effects of workplace safety incidents. The productivity of employees in the manufacturing sector is critical in attaining Kenyan economic development blueprints; vision 2030, the bottom-up economic agenda, and the Big Four Agenda blueprint. The study is expected to inform the community, especially employees, potential investors, employers, insurance companies, and other stakeholders, on the nature of workplace safety and productivity in manufacturing firms. It will help companies design suitable workplace insurance, employees adopt better safety attitudes, and employers correct safety and productivity deficiencies. Moreover, the study finding provides information for making sound decisions for potential investors. Academicians and researchers are expected to benefit from the literature and results on the effect of workplace safety and employee productivity, which remain critical issues. Further, the study makes suggestions for further research which future studies could result in, and also makes recommendations for the advancement of existing theoretical frameworks, which are expected to benefit academicians and theorists in human resource management.

1.6 Scope of the Study

The study was conducted in manufacturing firms registered with the Kenya Association of Manufacturers (KAM) Kenya. According to the (KAM) directory (2020), there were 853 manufacturing firms in Kenya. The study sampled 234 manufacturing firms. The manufacturing firms in Kenya were selected for the study because they reported more adverse workplace safety and employee productivity issues than other sectors. The target respondents were the heads of human resources

in the manufacturing firms. The human resource department headed by the head of human resource management is the cornerstone of all workplace safety efforts in a firm; therefore was able to provide pertinent information concerning workplace safety, level of implementation of government regulations, employee safety attitudes, and employees' productivity. The study focused on the effect of workplace safety, particularly ergonomics, emergency management, safety training, and safety transfer to insurance and consultants, on employee productivity in the manufacturing sector in Kenya. Employee productivity was measured through the degree of accomplishment of tasks, value-added, and employees' productive time. Further, the study focused on the moderating effect of the level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity and the intervening effect of employee safety attitudes on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.

1.7 Limitations of the Study

The study used a cross-sectional survey design and hence did not consider historically contextualised analyses to examine the evolutionary effect of workplace safety on employee productivity in manufacturing firms in Kenya. To counter this limitation, the study used different methods for measuring variables, and the manufacturing firms were chosen randomly to avoid getting only positive or negative answers due to the sociability of the respondents. Moreover, Harman's single-factor test was conducted to check for measurement bias. The results showed no evidence of the dataset being contaminated by common bias, implying that the study results are credible and can be relied upon. The study relied on the responses of the human resource manager as the key respondent in each firm. The human resource manager might not have first-hand usability experience in applying workplace safety programmes in manufacturing firms in Kenya. To counter this limitation, the study collaborated with their responses by observing the workplace safety programmes present in manufacturing firms therefore minimising this effect. The respondents might have shielded information in matters that they considered sensitive. However, assurance of confidentially by the researcher in handling the data was given to the respondent minimising the effect.

1.8 Assumptions of the Study

The study assumed that the human resource managers were familiar with the workplace safety programmes present in their workplaces and were well able to rate their firm's implementation of workplace safety regulations and employee safety attitudes and productivity. Additionally, the study assumed normality of the data, independence of the data, and homoscedasticity of variance of the data. The study assumed that the relationship between independent and dependent variables was linear and that the manufacturing firms adopted a stable workplace safety management system. Besides that, the study assumed that implementation of workplace safety regulations was consistent across the periods and that the information given was correct and free of bias.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature on workplace safety and employee productivity. The chapter covered theoretical review, empirical review, conceptual framework, summary of literature and summary of research gaps.

2.2 Theoretical Review

This study was grounded on the domino, homeostasis, tip of the iceberg, and Rasmussen's risk management theories. The first two theories explain the rationale for workplace safety and its influence on employee safety attitudes and employees' productivity; the third indicates that the effect of workplace safety on employee productivity could be more significant than seen at face value, while the fourth theory points out that failure to implement government safety regulations may hinder reactiveness of workplace safety and its provision of value to the organization.

2.2.1 The Domino Theory

This theory was developed by Heinrich (1931). Domino theory posits that workplace safety incidents result from sequential events which trigger one incident after the other. The theory posits that protection programmes prevents the onset of adversity. According to the Domino theory, all adversities are directly related to a lack of safety programmes such as ergonomics, emergency, transfer, and safety training. The theory posits that two combining factors lead to unsafe workplaces; faults of the person (personal and ancestry) and the environment or work-related factors. The person's fault is due to inherited or acquired faults that are proximate reasons for unsafe acts, such as excitability, recklessness, nervousness, ignorance, temper, and inconsiderateness. Work-related factors include work overload, wear and tear, low-quality equipment, and bad design or maintenance. These two proximate causes of adversity can be eliminated by safety programmes reducing potential productivity losses. When employees are safe, they will likely produce better in the organization (Michael & Merson, 2016).

This theory is relevant to this study because protective factors (safety ergonomics, emergency management, safety training, and safety transfer to insurance and consultants) reduce the effects of exposure to diversity. The more protective factors

are available, the more resilient institutions are to risk, and the more the employees are likely to perform productively without worrying about safety issues. Decreased workplace incidents often lead to a transformed culture that leads to higher productivity and employee satisfaction (Aswathappa, 2015). Reese (2018) critiques the domino theory for only focusing on the causes and ways to minimize workplace incidents. It needs to indicate the employee productivity gains derived from a safe workplace (Bayram, 2022). A study by Hacamo (2022) adds that the theory did not explain how undesirable employee safety behaviours may affect workplace safety and employee productivity. To counter this, this thesis is also grounded on the homeostasis theory that demonstrated how a safe workplace and safety behaviours might impact employee productivity. Moreover, a study by Sabet et al. (2021) explained that the domino theory is overly detailed but needs more clarity on how safety protections influence employee outcomes. The current study's findings have provided empirical evidence of the significance of employee safety protections on employee productivity measured by the employees' degree of accomplishment of tasks, productive time and value added. Therefore the current study contributes to development of the theory.

2.2.2 The Risk Homeostasis Theory

This theory was developed by Wilde (1998). According to this theory, when engaging in any workplace activity, people are willing to bear a certain amount of subjectively judged risk (physical harm and property loss) in exchange for the benefits they anticipate gaining from doing so. Nevertheless, as subjectively perceived danger rises, people change their work behaviour, which could lower their productivity. The theory opines that employees adjust their work risk behaviour based on four factors: firstly, the percieved gain of risky behaviour, for example, gaining work time by speeding, and secondly, the perceived costs of risky behaviour, for example, insurance surcharges. Thirdly, the expected benefits of safe behaviour, for example, insurance discounts, and fourthly, the expected costs of safe behaviour, for example, time loss. The four factors became prominent in this thesis because employee risk behavior which results from employee safety attitudes and productivity are influenced by the level of workplace protection (Bontis, 2014). This supports the independent variable's effect on the study's dependent variable and explains that safety attitudes intervene in this relationship.

This theory is significant to this study because it pointed out that a lack of safety factors may limit workers' full potential making them unable to perform their duties appropriately. In the manufacturing industry, employees will only do the bare minimum when they feel they are not protected from workplace incidents. The theory posits that safety incidents and productivity losses result from flawed interactions between safety programmes and people within the organisations. Probst *et al*.,(2019) critiqued the homeostasis theory for not fully explaining the effect of safety mechanisms on employee productivity and for not indicating how employee productivity behaviour is boosted in cases where there are enough safety protections. The current study findings have addressed this limitation; further to counter this limitation, the study also used the tip of the iceberg theory postulates, which indicated employee productivity benefits and costs due to work safety.

2.2.3 Tip of The Iceberg Theory

This theory was developed by McCllelland (2000). It is also referred to as the theory of omission. This theory posits that the factors that allowed employees to excel did not appear on the surface. The theory posits that simple incidences like lighting, back pains, bad smells, and bad postures greatly affect employee productivity in terms of error rates, value-added, work time and tasks but are ignored by most employers. Unsafe workplaces are expensive because of productivity costs, time lost in investigating incidences, replacing skilled workers, lower morale, medical and indemnity payments, lost time to implement corrective action, increased absenteeism, and poor customer relations (Lencioni, 2019). Organisations ignore most near-miss incidents because they do not result in serious accidents; however, they are likely to seriously impact the employees' safety attitudes and productivity (Dessler, 2015). In support of the theory, Armstrong and Taylor (2023) add that organisations often underestimate the potential employee productivity losses due to defective workplace safety. The tip of the iceberg theory adds that the safety structures in place in a workplace influence patterns of behaviour by the employees, which influences their productivity at work. Most workplaces focus on what is seen in terms of incidences but ignore what is not seen, such as employees' attitudes, potential employee productivity losses and patterns of behaviour, which may be effectively eliminated by proper workplace safety.

Every serious injury and huge productivity losses often preceded by numerous warnings in the form of near-miss incidents, close calls, high-risk actions, and other hazardous situations (Aswathappa, 2015). The tip of the iceberg theory posits that serious injuries and huge productivity losses are what most organisations see and react to. Many close calls, near-miss incidents, and other deviations occur but remain hidden below the waterline. High-risk acts, unsafe conditions, and huge employee productivity losses are deep beneath these events. This theory is applicable in the current study because it demonstrates that a lack of a safety programme or omission to properly implement the programme in the form of safety ergonomics, safety emergency management, safety training, and safety transfer may result in serious employee productivity problems.

The theory also explains that when workplace safety is lacking, the institution may suffer productivity losses such as time lost, production losses and a low degree of accomplishment of tasks by employees. The theory is critiqued by Capodaglio (2022) for relying on the personal interpretation of the theorist and not on statistical analysis. The current study determined that workplace safety affects employees' productivity (degree of accomplishment of tasks, productive time and value-added) using empirical evidence from manufacturing firms in Kenya. Consequently, this study added to developing the tip of the iceberg theory McCllelland (2000). Workplace safety is, therefore, critical for influencing employee productivity. Organisations that adopt proper workplace safety will benefit from increased employee accomplishment of tasks, increased productive time and value added by employees. Further, as posited by the McCllelland (2000), when organisations adopt proper workplace safety structures, as in the case of the current study (safety ergonomics, safety emergency management, safety training, and safety transfer), employees' undesirable mental models (as in the case of the current study; employees attitudes) are influenced positively, reducing productivity losses.

2.2.4 Rasmussen's Risk Management Theory

Rasmussen's Risk Management theory was developed by (Rasmussen, 1997). The theory stipulates that compliance with regulations is required for the organization's safety systems to function and provide value to the organization. The theory provides a decision-making framework that ensures safety programmes protect and produce

the required outcomes. The theory posits that decision-making should propagate down from: first, the government developing safety regulations targeted to achieve the highest value in the organisations, that is, workplace safety and employee productivity, as in the case of the current study. Second, the industry implements standards based on government regulations. Third, the company develops company policies based on industry standards, and lastly, the management implements companies' policies and procedures. The theory posits that when government regulations are implemented appropriately across all levels, deficiencies in work, activities, and safety are prevented. The theory adds that threats to the value gained in terms of safety and productivity gains may result from implementation deficiencies at any level. Compliance with the regulations protects the value stream from threats that hinder the creation of value (Rasmussen, 1997).

Studies by Reese (2018) and Drake (2018) add that full implementation of government policy prevents disruptions in employee productivity. In Kenya, for instance, the theory postulates are implemented in four stages, but extant literature still needs to evaluate how the implementation affects the safety and productivity of employees in the manufacturing sector. In the first stage, as per the postulates of Rasmussen's Risk Management Framework, Kenya has developed the OSHA(2007) regulations, repealed in 2013, and the Work Injury Benefits Act-WIBA (2007), repealed in 2010, whose implementation is checked by the government directorate of occupational safety. Further from the OSHA and WIBA regulations, the government directorate of occupational safety has developed mandatory safety requirements for the manufacturing sector (2016). In the second stage, the Kenya Association of Manufacturers developed the Manufacturing Certification Manual (MCM, 2018), which sets minimum workplace safety standards for its members. However, extant literature needs to be more sufficient in explaining how government regulations are implemented at firm levels and the moderating effect of such implementation on the relationship between safety and employee productivity.

Therefore the third objective of this study was to empirically explore moderating role of the level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity. A previous study by Mohamed (2021) critiqued this theory for not fully explaining the productivity

gains organizations get from the full implementation of government policy. Further, a study by Obrenovic et al. (2020) critiques the theory for not explaining specific safety protections that enhance workplace safety and firm value. Lastly, Alariki and Al-Abed (2021) critiqued the theory for relying entirely on subjective data, not statistical analysis or field data. The findings of this study add to the development of this theory by revealing, from empirical evidence in manufacturing firms in Kenya, that the level of implementation of government workplace protections moderates the relationship between workplace safety and employee productivity measured by productive time, degree of accomplishment of tasks by employees, and value-added. Therefore the findings of this study add to the development of the theory.

2.3 Empirical Literature

This section reviewed literature on workplace safety and employee productivity. Additionally, literature on the moderating impact of government workplace safety regulation and the intervening effect of employee safety attitude was evaluated.

2.3.1 Workplace Safety and Employee Productivity

This section reviewed the literature on workplace safety mechanisms, namely safety ergonomics, safety emergency management, safety training and safety transfer and their effect on employee productivity.

2.3.1.1 Workplace Safety Ergonomics and Employee Productivity

Writers in human resource management have conceptualised safety ergonomics as a critical construct for workplace safety. Further, the literature has attempted to link safety ergonomics to employee productivity. For instance, Armstrong and Taylor (2020) posited that safety ergonomics involves designing an environment of workplace safety through the detection and elimination of safety hazards. Laura (2019) adds that safety ergonomics involves properly designing the workplace, tools, and devices. The international ergonomics association report (2019), Reese (2018), and the international safety rating system report (2016) have laid out guidelines for safety ergonomics. The reports posit that practical safety ergonomics should address areas of hazard detection, protective devices, and effects analysis. The current study adopted these measures of safety ergonomics. Dessler (2015) and Huang et al. (2022), note that safety ergonomics, including safety audits, robotics, safe working tools, sanitary conveniences, and facility designing for safety, among others, may

eliminate negative safety attitudes, reduce chances of accidents, and influence the productivity of employees.

Despite evidence of the potential effect of safety ergonomics on employee productivity, the previous empirical literature has failed to investigate this effect adequately. For instance, empirical studies done outside Africa on the relationship between workplace safety ergonomics and employee productivity had several research gaps; a survey by Leber et al. (2018) compared the adoption of safety ergonomics for persons with disability in three countries: Poland, the UK (United Kingdom), and Slovenia. The study found that ergonomics enhanced work efficiency and accelerated employee adaptation of tasks leading to better productivity. The study was, however, limited to safety ergonomics for persons with disability and failed to test the empirical relationship between employee safety ergonomics and productivity. A similar study by Ravindran (2021) investigated the impact of safety ergonomics on employees' work performance in Co-operative Hospital India. The study was a critical literature review which found that lack of safety ergonomics leads to increased absenteeism, errors, and sick leaves, which reduces employee productivity. The study was faulted for only focusing on sanitary conveniences ergonomics, was conceptualised in a different sector from the current study, and failed to generate original research findings.

Studies on safety ergonomics and employee productivity in African workplaces revealed various research gaps. In two workplaces in Lebanon, Sinno et al. (2020) investigated the effect of ergonomics on workers' productivity. The study conceptualised safety ergonomics in terms of protective devices, while the current study used three measures of safety ergonomics; hazard detection, protective devices, and effects analysis. The study found that ergonomics programmes did not significantly affect employee productivity, but lack of ergonomics led to employee stress. The study contradicted findings from those of Leber et al. (2018) and Ravindran (2021). The study purposely focused on two firms and analysed data using frequencies and percentages, making it difficult to generalise the findings. In Ghana, Pickson, Bannerman, and Ahwireng (2017) studied the impact of food cannery ergonomics on worker productivity. The study focused on employee satisfaction with ergonomic risks, unlike the current study that focused on safety ergonomic

programmes and their effect on productivity. The study established that safety ergonomics positively correlates with employee productivity. The study failed to show how employee productivity was measured but recommended empirical research to be done on the impact of ergonomic training on employee productivity.

Ergonomics awareness and employee performance were examined by a study by Olabode et al. (2017), which focused on ergonomics awareness and factors that hindered ergonomics adoption in Nigerian organisations. This study reviewed the literature on factors hindering the adoption of comfort and safety ergonomics. Still, it did not evaluate safety ergonomics in place in organisations and employee productivity. The study findings indicated that employees could not be productive when physically uncomfortable or unsafe. The study did not analyse primary data and did not generate actual results. In a petroleum corporation in Ghana, Kingsley (2012) examined how employee performance is inhibited by office ergonomics. The study revealed that employees were dissatisfied with the office safety designs, finishes and furnishing. This study failed to specify what aspects of safety ergonomics the employees were dissatisfied with and failed to link this to employee productivity. Further, the study did not show how employee productivity was conceptualised.

Similar empirical studies in Kenya that attempted to link workplace safety ergonomics to employee productivity have been faulted for several reasons. First, a study by (Corgi, 2020) focused on ergonomics and employee performance in Kemya chemical manufacturing plant. The study was a critical literature review and found that the manufacturing company had moderately adopted ergonomics, leading to fewer errors, injuries and risks of defective products. The study found that the implementation of safety programmes was not supported by ergonomic considerations leading to workers' injuries and several errors and defects by employees. The study, however, failed to collect original findings on the topic. Second, a study by Osoro and Kanyajua (2019) investigated ergonomics and employee performance in state corporations. The study only focused on office arrangement and lighting ergonomics, while the current research conceptualised safety ergonomics using a broader scope. The study found low adoption of ergonomics in state corporations. The study focused on a single firm which was non-

manufacturing. Thirdly, a study by Kimwomi (2015) focused on organisational traits and performance in manufacturing firms in Kenya. The study revealed that safety ergonomics such as shutoff controls, industrial robots, temperature, light, and sound controls have become quite common in Kenyan manufacturing companies. However, the study did not relate these programmes to employee productivity, yet a study by Kingley (2012) opined that robotics safety programmes diminish employee morale lowering their productivity.

2.3.1.2 Workplace Safety Emergency Management and Employee Productivity

Previous literature has laid out safety emergency recommendations for manufacturing firms. First, the American organization of safety standard (2017) and Drake (2018) posits that manufacturing firms should have rescue response and evacuation for workplace safety emergencies. Second, the volunteer protection program (2018), Reese (2018), and international loss control institute (ILCI) guidelines (2015) posit that workplace safety emergency programmes should include elaborate evacuation plans, safe assembly points, exit points and emergency equipment such as first aid facilities. ILO report (2018) opines that lack of workplace safety emergency management often leads to work disruptions, lost work time, and fear of accidents by employees hence may hinder the accomplishment of tasks and value added by employees.

Previous empirical studies have not linked workplace safety emergency management adequately to employee productivity. First, empirical studies done in workplaces outside Africa revealed several gaps; a study by Alariki and Al-Abed (2021) focused on the impact of crisis management in Yemeni gas industry and employee performance. The study conceptualized workplace emergency management in terms of crisis planning and preparedness. Employee performance was conceptualized in terms of task performance. The study found that employees associate emergency workplace emergency management with performance. The study did not show which programmes were used for crisis planning and preparedness while the current study used expanded measures of workplace safety emergency management and employee productivity. COVID-19 pandemic emergency management and the sustainability of staff productivity were examined in a study by Obrenovic et al. (2020). The study was a critical literature review and did not generate original findings. The study

recommended safety emergency management as an innovative approach to enhancing employee productivity at work during the COVID-19 pandemic. A study by Wilson (2010) investigated emergency preparedness at American education institutions. Telephone interviews were used to collect data among employees who manage emergency programs. The study found that 30% of the organizations did not have emergency plans and equipment. The study lacked objectives and did not establish the link between emergency plans and employee productivity.

Second, workplace safety emergency management and employee productivity have been investigated by studies done in African workplaces. For instance, Cudjoe (2017) studied workplace safety practices and medical labour productivity at a Memorial Hospital in Ghana. Results indicated that emergency plans such as safe exits make employees feel comfortable on their job and hence be more productive. The study did not show how labour productivity was measured. The results only focused on adopting workplace safety emergency programmes but did not investigate the effect of the programmes on employee productivity; hence the findings cannot be generalized. Further, a study by Adjotor (2013) evaluated adoption of occupational safety and health programmes by selected firms in Ghana and labour productivity. The study evaluated employee productivity based on concentration and efforts of employees, while the current study measured employee productivity using the three recommended measures of employee productivity; value-added, degree of accomplishment of tasks and productivity time. The study was also limited because it focused on emerging risks, not emergency safety programmes. The study found that safety emergency programmes reduce the costs associated with illness but do not affect employee productivity. This finding contradicted Cudjoe's (2017) and Obrenovic *et al*. (2020) results that associated safety emergency programmes with positive employee productivity outcomes.

Third, the current study identified research gaps in similar studies done in the Kenyan context. For instance, a study by Keraka(2020) conducted in textile manufacturing firms in Kenya, investigated emergency safety management systems and employee performance. The study conceptualized safety emergency management in terms of workers' knowledge, safety promotional policies and employee participation in implementing safety standards. The study assessed employee performance based on meeting customer demands and creativity. The current study

focuses on the safety emergency programmes put in place for safety and their effect on employee productivity in manufacturing firms in Kenya. Simiyu et al. (2020) investigated the effects of the occupational environment on employee performance in sugar industries in Kenya. The study conceptualized the workplace environment in terms of programmes in place and emergency preparedness. Employee performance was measured in terms of work pact obligations. The study only focused on firefighting emergency equipment, while the current study focused on all emergency programmes; rescue response, emergency equipment, evacuation plans, safe assembly, exit points, and first aid facilities. The study findings were descriptive but suggested that appropriate fire emergency management enhances a better workplace productivity environment. Young (2014) researched the management of safety in Kenyan institutions. The study lacked specific objectives, and its findings did not indicate which variables were being tested. The study recommended that research should be done on safety emergency management and its effect on employee performance.

2.3.1.3 Workplace Safety Training and Employee Productivity

Literature on the relationship between workplace safety training and employee productivity was reviewed in various contextual backgrounds. Firstly, a review of related studies was done in countries outside Africa. A study in the USA by Huang et al. (2022) assessed supervisors' safety training association with safety behaviour among long truck drivers in the USA. The study found that safety training improves safety communication. The study was limited by lacking objectives. The sampling method was non-probabilistic, and data was analysed using frequency and percentages. Therefore, it did not allow the testing of relationships between variables. Further, the study focused on supervisors' perception of safety training rather than on the actual safety training programmes in place in institutions.

A similar study in France by Bieder et al. (2018) investigated safety training and employee professional skills in the transportation industry. The study reviewed 16 studies on safety training and found that organisations conduct safety training to comply with external stakeholders' expectations and not to improve workplace productivity. The study opined that safety training might boost employee productivity by addressing attitude to risk (chronic unease). This study was limited

because it did not collect primary data allowing for original findings. Consequently, it presented a research gap that the link between employee productivity and safety training is relatively unexplored by the academic world.

Similarly, a study by Bayram (2022) investigated the factors affecting employee safety and productivity in an OHSAS 18001-certified organization in Turkey. The study used the ability to cooperate better as a measure of employee productivity and safety knowledge to measure workplace safety training. The study found a significant relationship between safety knowledge and productivity. The study, however, did not address the relationship between safety programmes and employee productivity. Safety knowledge may lead to mistaken inferences since as posited by Mazorodze and Buckley (2019) most employees consider themselves inherently knowledgeable, whereas safety training helps impact new skills and clarify misconceptions and shape productivity behavior. Whereas these studies opined that workplace safety training is associated with positive employee productivity outcomes; a study conducted in the United States by (Shockley, 2022) opined that safety training does not influence productivity as employees often forget what they learnt quickly and the hours spent in trainings reduce employee productive time. Unlike the current study the study measured employee productivity using job satisfaction and organizational commitment. Conversely, the current study addressed these research gaps using a larger sample, robust statistical techniques and expanded measures of workplace safety training and employee productivity.

Secondly, studies done in the context of African countries revealed several research gaps. For instance, the effect of safety training on employee productivity was evaluated by Obong *et al.* (2021). The study sought to determine the effect of safety training on employee efficiency in manufacturing firms in Nigeria. Regression analysis revealed that workplace safety awareness had a statistically significant positive effect on employee efficiency. Safety training improved worker productivity skills and confidence. The study focused on one manufacturing firm; it did not show how it conceptualised safety training and employee productivity and only used primary data. Conversely, the current study used primary and secondary data and focused on one hundred and ninety two firms in all 14 sectors of manufacturing firms in Kenya.

A related study by Adim and Mezeh (2020) examined the impact of health and safety awareness on employee performance in Nigerian oil and gas companies. The study conceptualised employee performance in terms of task accomplishment, while workplace safety training was conceptualised in terms of induction training. The study's correlation analysis found a positive association between staff productivity and safety training during induction. In contrast, workplace safety training in the current study was conceptualised in terms of all its measures; safety induction training, safety seminars, talks and workshops, safety committee, safety manuals, safety rules, procedures and policies, safety drills and regular briefs. In addition, the current study used both correlation and regression analysis and assessed employee productivity using three recommended measures.

Thirdly related studies done in the context of Kenyan workplaces revealed several gaps. For instance, the effect of safety training on employee productivity was evaluated by a study by Sawe (2013). The study evaluated how workplace safety procedures affected workers' productivity at Kenya's Mumias Sugar Company. The literature review identified that safety awareness might improve employees' productivity by saving work time. The study revealed that safety training was conducted well in the firm. The employees were adequately trained on selecting the right tool for the job, informed on the hazards of the tool and how to use tools correctly. Data was analysed using percentages and therefore did not empirically test variables inferential relationships. Further, the objectives and results of the study do not address what safety training programmes the organisation had put in place for workplace safety and their influence on employee productivity.

Further, safety training and employee productivity in Kenya was evaluated by a study by Aluoch (2015). The Kenya Power and Lighting Company's employees' performance was examined in relation to occupational safety and health programs. The study revealed that safety training was done wrongly in Kenyan firms. Top management did not embrace an appropriate safety philosophy and did not alert staff on safety issues across the company leading to undesirable employee behaviours. The study lacked specific objectives and only focused on one aspect of OSHA regulations (employee awareness) of safety programmes. The study fails to address what safety training programmes have been implemented in the firms.

2.3.1.4 Workplace Safety Transfer to Insurance and Consultants and Employee Productivity

Safety transfer involves shifting the burden of safety risk to more competent bodies. In the manufacturing context, safety can be transferred to insurance companies and safety consultants. Safety transfer through health insurance and employee productivity were studied by Owolabi et al., (2016) in Kwara State, Nigeria. Data collection was done using questionnaires while correlation analysis was used for the data analysis. Productive time was used to measure of employee productivity. The study results positively related health insurance and employee's productivity. The study explained that insurance ensures employees are healthy and less worried about risk hence attain greater work productivity. The study focused only on health insurance in one organisation while the current study focused on safety transfer to through group health insurances, private security, safety consultants, safety liability insurance and personal accident insurance. Further the current study used more measures of employee productivity; productive time, degree of accomplishment of tasks and value added.

A study conducted on workplace safety and labor productivity by Gilje and Wittry (2021) in the U.S. coal industry found that that that failure to adequately transfer safety issues to safety consultants led to deterioration of productive time by employees through increased safety incidents. Further the study explained that lack of safety transfer makes the organisations fail to benefit from wide and diverse experience of the safety consultants who objectively identifies and defines the existing problems without politics and allegiance. The study was faulted on several aspects; it conceptualized labor productivity using one measure- value added. Workplace safety was conceptualized in terms of number of work fatalities which may lead to mistaken inferences because it an after loss perspective. Further, the study did not show the methodology used hence its results cannot be generalized.

Similarly, a study by Peshawar (2014), investigated the relationship between university safety transfer and productivity in England. The study literature noted that organizations offer insurance transfer as a fringe benefit for employees hence may boost their productivity. The study lacked objectives and only reviewed literature on existing studies therefore did not accord opportunity for original findings. Further the study reviewed literature on only insurance transfer through personal accident

insurance. Nevertheless, other safety risk transfer mechanisms have been barely pursued by the study. The current study filled this gap.

In addition, the assertion that safety transfer may influence employee productivity was collaborated by a study by Otiso and Mutugi (2018) which evaluated risk prevention and theft in hospitals. The study found that insurance has become a trend in many modern organizations. The study opined that medical, disability and accidental costs as a result of workplace activity may be affecting employee productivity. An effective way to avoid constant worries by the employees and boost productivity is to insure the safety risk. The study used chi square tests determine associations between variables and was limited to insurance safety transfer. Further the study did not evaluate the effect of insurance safety transfer on employee productivity.

This assertion by Otiso and Mutugi (2018) and Peshawar (2014) that workplace safety transfer influences employee productivity has been contradicted by the findings of a review study by Perrow (2014) which investigated the link between business performance and workplace safety. The study found that organisations with higher safety risk hire safety consultants to design and inspect their programmes. The study concluded that safety consultants create an environment of safety which ensures employee productivity; however recent introduction of safety transfer to robotics may make employees more stressed about their job tenure hence diminishing employee productivity. Further the study noted that safety programmes are costly to purchase hence may diminish employee value added.

Nguyen and Zawacki (2019) studied health insurance and labour productivity in the manufacturing sector. Study used value added to measure labour productivity. The study used correlation analysis to analyse data. The results of the study established that employer sponsored health insurance is positively related to productivity. The study only focused on one aspect of safety transfer and used only one employee productivity measurement hence leaving a conceptual gap on the topic. Further the results of the study collaborated the findings of Owolabi et al., (2016) , Otiso and Mutugi (2018) and Peshawar (2014) but contradicted the findings of a review study by Perrow (2014). Extant literature on effect of workplace safety transfer on employee productivity therefore had contradictory results, conceptualized variables

differently. It had methodological flaws failing to produce definitive findings about the connection between workplace safety and worker productivity. Conversely, the current study addressed these research gaps.

2.3.2 Workplace Safety Regulations, Workplace Safety and Employee Productivity

Kenyan Government enforces workplace safety through regulations; the work injury benefits act (2010) and the occupational health and safety Act (2013). Despite these policies, workplace safety and employee productivity remain pervasive issues. There is scanty and inconclusive empirical evidence on the moderating effect of the level of implementation of government policy on the relationship between workplace safety and employee productivity; this section reviews related literature while identifying gaps in the extant literature.

A study by Dwomoh et al. (2016) examines how the performance of employees is affected by occupational safety policies in Ghana's timber sector. The study argued that effective workplace safety consisted of interventions in the form of safety ergonomics and safety training. This measure is similar to that of many studies such as (Corgi 2020, Bayram 2022) and Sinno et al. 2020) but distinct from the measures of other studies such as Alariki and Al-Abed (2021), Obrenovic et al. (2020 and Owolabi et al., (2016) which measured workplace safety in terms of emergency management and safety transfer. Conversely, the current study combined these workplace safety measures to fully collect data missing from the extant literature. The study by Dwomoh et al. (2016) established that these workplace safety interventions might be ineffective if done short of government regulations specifications. Therefore the study concluded that government workplace safety policies significantly impacted the adoption of safety programmes and employee performance. This finding was not based on original findings.

This finding and conclusion was confirmed by a study by Katsuro et al. (2018), who positively associated worker productivity with workplace safety and the degree of implementation of workplace safety regulation. Unlike the current study, the study was contextualized in the Zimbabwe food industry and used the Chi-square test to show the association between variables. The study posited that workplace safety and productivity problems persisted because of OSHA violations and irregular workplace

safety inspections by the government. The study established that food firms upgrading their safety programmes per government requirements recorded better worker productivity. The study measured workplace safety in terms of productive time. It did not investigate the moderating effect of the level of government safety regulations on the relationship between workplace safety and employee productivity. Conversely, the current study used regression analysis and a combination of employee productivity measures: level of accomplishment of tasks, value-added and productive time.

Further highlighting the potential relationship between these variables, a study by Kamau (2020), which focused on enforcing occupational safety measures in industries in Kiambu County, Kenya, found that the safety policy implementation level was low due to inadequate resources. The study collected data from twenty-five respondents. Percentages were used to analyze data. The study concluded that underinvestment in workplace safety and government safety regulations violations negatively impacted employees' productivity. The current study used multiple regression models and a larger sample of one hundred and ninety-two manufacturing firms to test the relationship between workplace safety, level of implementation of government regulations and employee productivity, therefore filling the gaps identified in the study by Kamau (2020).

Conversely, a study by Karakhan et al. (2019) found a negative relationship between the high level of implementation of government safety regulations and employee productivity. The study explained that many other factors, not just heightened government regulations, led to decreased productivity. Lower employee productivity was reported following the passing of OSHA regulations in construction firms. Further, the study established that employees and employers did not understand government safety regulations. The study did not generate original findings and did not investigate how the level of implementation of government safety regulations moderated the relationship between employee productivity and workplace safety.

A similar study by Yankson (2017) studied health and safety standards set by the government and productivity in Rubber Estates Limited in Ghana. The study established that there was a high implementation of safety policies. Still, it did not indicate specifically which safety policies were being investigated and how their

level of implementation moderated the relationship between workplace safety and employee productivity. Further, the study focused on one firm, while the current study collected data from one hundred and ninety-two manufacturing firms. The study recommended that firms fully comply with specific aspects of government workplace safety regulations to boost employee safety and productivity. The current study, therefore, sought to investigate this assertion using empirical data.

Other empirical studies that attempted to measure moderating effect of the level of implementation of government policy were faulted on the choice of measures of variables. For instance, Kelwon (2021) and Taofeeq (2019) measured workplace safety by negative outcomes such as low incidence rates. Still, this measure has a shortfall as posited by theoretical perspective by Wilde (1998); that a low incidence of injury does not necessarily mean adequate safety interventions are in place. Further, the studies were conceptualized in different sectors and countries from the current study. Kelwon (2021) was contextualized in the police headquarters in Kenya, while Taofeeq (2019) studied Construction Companies in Malaysia. These studies suggested that implementation of government policy may have a moderating role but did not empirically evaluate it. Finally, a study by Umoh and Torbira (2013) studied safety practices and employees' productivity in Nigerian manufacturing firms. The study found a significant relationship between employers' safety compliance and employees personal work hours. The study did not show what safety practices were being studied. It did not evaluate moderating effect of the implementation of safety policy.

2.3.3 Employee Safety Attitude, Workplace Safety and Employee Productivity

Existing HRM (Human Resources Management) literature identifies dimensions of employee safety attitudes and also attempts to link employee safety attitudes to workplace safety and employee productivity. The literature has not empirically determined the intervening effect of workplace safety attitudes on the relationship between workplace safety and employee productivity. For instance, Aswathappa (2015) notes that employees with positive safety attitudes pay attention to safety training know and urge their co-workers to follow safety procedures. (Li *et al*., 2020) observes that employees with negative safety attitudes take unnecessary risks and ignore safety procedures. Laura (2019) adds that despite the commitment of

employers to create safe workplaces and boost employee productivity, accidents and employee productivity problems may persist due to negative employee safety attitudes. Kundu (2016) opines that negative safety attitudes can be addressed by developing safety programmes such as safety training and safety control.

A study by Lencioni (2019) suggested that inadequate safety ergonomics, safety training and safety transfer to insurance and consultants leads to undesirable safety attitudes such as phobias and overconfidence that lead to employees taking unnecessary risks or avoiding work that is perceived to be risky. This may lead to increased accidents and less production time and may affect employees' degree of accomplishment of tasks. Huang et al. (2022) opine that safety training programmes such as training audits, safety drills, safety rules, talks, and seminars, among others, may eliminate negative safety attitudes, reduce the chances of accidents, and influence the productivity of employees. Dessler (2015) asserts that employee safety attitude determines whether employees follow existing safety procedures and rules; this determines their safety and productivity at work. Therefore previous HRM literature suggests that positive safety attitudes may reduce work interruptions and increase employee accomplishment of tasks and value-added.

Despite HRM literature pointing out the potential intervention of employee safety attitudes on the relationship between workplace safety and employee productivity, previous empirical evidence is not conclusive on these assertions. For instance, the relationship between safety attitudes, knowledge and behavior was examined by Kao (2019). The study collected data from supervisors and workers in construction firms in the United States. The study did not show how it conceptualized its constructs. The study found that safety knowledge mediated the relationship between safety attitudes and behaviours. The study did not link workplace safety in terms of ergonomics, emergency management, safety training, and safety transfer to workplace safety attitudes and employee productivity outcomes as conceptualized in the current study.

Similarly, a study by Laura (2019) studied the mediation effect of workplace safety climate on the relationship between safety performance and organizational climate. The study used questionnaires to collect data from nurses in two hospitals in Italy. The study conceptualized safety in terms of manager values and participation in

safety training which are partial measures of workplace safety, while the current study measured workplace safety in terms of programmes for protection. The study hypothesis, which was evaluated using regression models, found that safety climate (attitudes) mediates the relationship between organizational climate (work performance) and safety participation (training attendance). The study was conceptualized in a different sector from the current study. The present study adopted the measure of workplace safety attitude (safety behaviour in terms of response to safety programmes) as applied by the study Laura (2019) and other measures proposed by (Wilde, 1998; Fine, 2017; Lencioni, 2019; Gao et al., 2019 and NOSA safety management system 2017).

A study by Rosa (2019) study investigated how generalized work efficacy is affected by safety attitudes and safety training. The study conceptualized work efficacy as the conviction to successfully complete a task. In contrast, the current study measures work productivity using three criteria (value-added, degree of accomplishment of tasks, and productive time. Safety attitudes were conceptualized in terms of perceptions of safety climate, while the current study conceptualized safety attitudes in terms of response to safety programmes. The study did not show how safety training was conceptualized. The sample comprised 140 workers from three tile manufacturing firms and one in the public sector in Spain. The regression results found that safety training was positively associated with safety attitude and work efficacy. The study was faulted for collecting data from employees who might have been biased when asked to rank their work efficacy and attitude. In contrast, the current study collected data from head of human resources and focused on the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity.

A similar study by Rahiman and Kodikal (2017) studied the relationship between employee work-related attitudes (safety attitudes, work commitment, and job involvement) and job performance (commitment and involvement). The variables for the study seemed similar; therefore, the study suffered from a multicollinearity problem. The study sampled 110 respondents in some selected hospitals in Kerala state, India. Data analysis using correlation and regression showed a significant relationship between employees' attitudes and performances. Further, the study found

that the level of productivity in hospitals that posted better work attitudes were better than in those industries where employees had poor employee attitudes. The study was unclear on how employee productivity and job-related attitudes were measured and did not assess the intervening effect of employee safety attitudes.

A study by Saleh (2015) investigated employees' attitudes and behaviour toward safety in manufacturing industries in Malaysia. The study purposely selected one large manufacturing firm and issued ninety-six questionnaires to the employees. The study found a significant relationship between employee safety attitudes, employee performance, and employee safety. The study was based in a different country and conceptualized employee safety attitudes in terms of personal involvement, communication, and physical work environment, while the current study used conceptualized employee safety attitudes in terms of; response to safety practices as posited by (Fine, 2017), Gao *et al*.,(2019) and NOSA (2017). The current study filled these research gaps.

Lastly, the methodological rigour used in other related studies resulted in inconclusive findings. For instance, a study by Schultz (2017) opined that safety training, workplace safety analysis, and safety transfer to insurance companies and consultants affect the behaviour of the employees by influencing their response to safety programmes positively. A study by Cox and Cox (2018) found that safety programmes demonstrate organizational commitment to safety and therefore lead to the safety of the work environment, which enhances positive safety culture and attitudes among employees. Jahangiri (2017) did a critical literature review on attitudes that affect employee productivity of construction workers and identified safety perception and attitudes of employees as significant factors influencing employee productivity. These three studies were critical literature reviews but did not generate original findings on the subject. To bridge these gaps, this study investigated the intervening effect of workplace safety attitudes on the relationship between workplace safety and employees' productivity in the manufacturing sector.

2.3.4 Employee Productivity Measurements

European employee productivity institute report (2019) defined worker productivity as the degree at which a group of individuals produce the required output. This report posits that worker productivity is measured by comparing the actual hours worked by

an employee and the standard work hours during a period. The study adopted this employee productivity measurement by evaluating the workplace safety programmes present in firm against lost work time due to safety incidences such as cases of restricted work only and severity of ergonomic-related incidents such as heat exhaustion, fatigue and strained back muscles to work time of employees. The current study assessed employee productivity using value added as recommended by Drucker (2002). Value added is computed by dividing total revenues by the number of employees in the firm. ILO Report (2018) and Principle agent model proposed by Laffont and Martimort (2009) posited that employee productivity can also be assessed by considering the degree of accomplishment of tasks. The principal-agent model illustrates that the principal (here the head of human resources), is able to observe the agent's action (here the employee) and infer from observing output from the employee considering the level of safety protections around the employee. Previous studies have used similar measurements but none has used a combination of the three employee productivity measurements. Zakayo (2018) used defects per unit and task accomplishment. Manurung, Harlen and Amril (2019) used degree of accomplishment of tasks. Brown (2013) who assessed effect of cash performance award program on employees' productivity in general Motors Company in Detroit used worktime and contributed value. Olatunji, Lawal, Badmus, and Tejideen (2016) used level of fulfilment of task and target meeting to assess employee productivity.

2.3.5 Role of Human Resource Managers in Workplace Safety

Extant studies have identified workplace safety as critical to organizational outcomes and employee welfare. To succeed in workplace safety, literature by International Labour Organization Guidelines- ILO-OSH (2001), Aswathappa (2015), Armstrong and Taylor (2020), and Rajput et al. (2023) posits that the job of workplace safety must be assigned to specific individuals within organisations. However, there needs to be a consensus in the extant literature on which department the workplace safety job can be effectively assigned. Extant literature has varied on this perspective. ISO: 45001 (2018) posits senior leadership's responsibility to approve workplace safety strategies and policies and explore future opportunities. The human resource office, operations, and safety committees design policies and improvement suggestions for consideration by top management.

Literature by Curcuruto and Griffin (2023) adds that top management has to foresee the formation of safety committees; the study insists that the committees must consist of the head of human resources and operations as core committee members. The ISO: 45001 (2018) standard adds that the best practice is for the safety committees to appoint workplace safety champions in various sections which should channel workplace safety improvement recommendations to the human resource department or the committee. Moreover, literature by Curcuruto and Griffin (2023) adds that another fundamental duty of the human resource department is to promote worker participation in identifying, eliminating, and making suggestions for improving and reporting hazards. Literature by Armstrong and Taylor (2020) adds that this approach enhances positive safety culture and risk minimization resulting in enhanced employee productivity. Literature by Mielly et al. (2023) and ILO-OSH (2001) opines that in the context of an organization; especially safety-prone workplaces such as manufacturing; safety management should be a continuous process that ideally begins with the senior management laying down explicit workplace safety objectives, after being advised by the safety committees, safety champions, operations department, and human resource office. The support and operations department should implement the board's plans; but to succeed in the execution of the plans, the human resources department must be involved throughout the process (Curcuruto & Griffin, 2023).

Reviews and performance evaluations of the workplace safety programmes should be a collective responsibility conducted jointly by the operations, support, audit, and human resource department and must involve worker participation. Additional literature by Armstrong and Taylor (2023) adds that since the human resource department is the custodian of workplace safety risk registers; their critical duty is advising top management on workplace safety programmes. Moreover, the department should develop programmes that educate workers about workplace safety management.

Additional literature by Farndale et al. (2023) and Annex SL of the ISO 45001(2018) adds that safety audits are critical duties for successful workplace safety. First-party audits should be commissioned by the human resource office through to the internal audit department for reporting to top management. This is meant to assess new risks,

determine safety programmes effectiveness and compliance with organizational standards and legal obligations then propose improvement opportunities. External audits by the regulators should commence through the human resource department (Armstrong & Taylor, 2023). Organizations also may seek the services of external consultants to validate their workplace safety and suggest improvements. Moreover, certification bodies such as the Directorate of occupational safety, the international organization for Standardization, and the Kenya association of manufacturers may also commission safety audits for accreditation. Literature by Barbu et al. (2019) notes that such accreditation audits commence at the top management. However, the human resources department still plays a crucial role since the human resource department is the custodian of all workplace safety documented information, including safety committee and management meeting minutes, incident statistics, and interventions.

Therefore, extant literature and standards view the human resource department as the cornerstone of all workplace safety efforts. With this justification, this study, therefore, collected workplace safety data from the head of human resources. This data was collaborated by observing the workplace safety programmes present in manufacturing firms. Employee productivity data was obtained from the head of human resources and other manufacturing firms' data. Data on the accomplishment of tasks was obtained from the head of human resources as per the employees' dashboard and performance targets. Data on productive time was also provided by the head of human resources as provided to the Directorate of occupational safety, and value-added data was obtained from the firm data. Previous studies on workplace safety have also collected similar data from the heads of human resources (Oluoch, 2015; Mielly et al., 2023; Park, 2018).

2.4 Conceptual Framework

The conceptual framework diagrammatically presents the relationship among independent, moderating, intervening and dependent variables. Workplace safety comprising of safety ergonomics, emergency management, training and transfer was the independent variable that affected employee productivity, which was the dependent variable. Employee safety attitude was the intervening variable while level of implementation of government workplace safety regulations was the moderating variable. The model in Figure 1 depicts the relationships of the pertinent variables of the study.

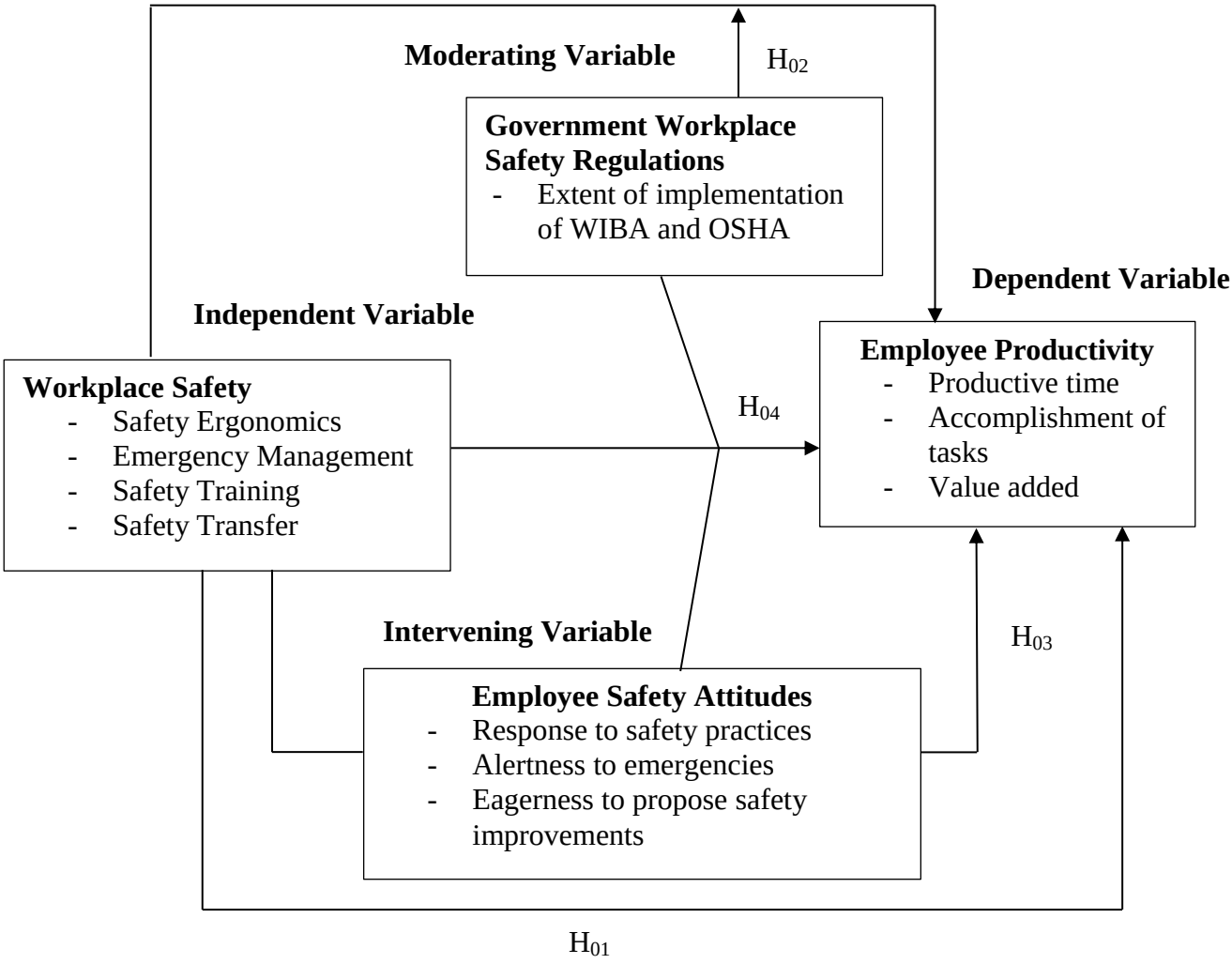

Figure 2.1: Conceptual Framework

2.5 Summary of the Literature

The literature brings forth the four theories this study was grounded on; the domino theory, homeostasis theory, Rasmussen's risk management theory, and the tip of the iceberg theory. The domino theory (Heinrich, 1931) posits that a protective system

(dominoes) eliminates workplace safety incidents, possibly hindering total employee productivity. The theory views safety as the kind of safety protection in a workplace. When these protections are in place, the causes of losses are eliminated, including the risks from the nature of work and employee faults; hence, better productivity outcomes are expected from the employees. This theory was critical because manufacturing firms in Kenya have adopted workplace safety programmes in the form of ergonomics, emergency management, safety training, and safety transfer. The programmes are meant to reduce work disruptions and enhance employee welfare and are expected to improve employee productivity. Homeostasis theory (Wilde, 1998) posits that safety is a state of mind; therefore, employees adjust their behavior based on the risks they are exposed to and the kind of protection in the workplace. Moreover, the theory explains that workplace safety and productivity can be ensured by alleviating the consequences of risky behavior by employees. This theory predicts that employee safety attitudes manifested through their behavior may influence workplace safety and productivity. The theory advances four risk behaviors that may lead to workplace safety and employee productivity fluctuations. This study empirically determined the intervening effect of employee safety attitudes on the relationship between workplace safety and employee productivity.

The tip of the iceberg theory (McCllelland, 2000) opines that lack of workplace safety has more serious employee productivity problems than most employers realize. The theory was vital as it demonstrated that lack of workplace safety and behavior patterns brought about by undesirable employee safety attitudes underlie productivity losses than institutions realize. The theory posits that what are seen above the surface are seemingly unimportant minor incidents, inadequate safety programmes and behavior patterns, but deep beneath these ignored events lays substantial productivity losses. Rasmussen's Risk Management theory (Rasmussen, 1997) stipulates that compliance with regulations is required for the organization's safety systems to function and provide value to the organization. The theory posits that implementing the postulates of government regulations at the organizational level ensures that structures, behavioral patterns, and mental models work towards delivering the highest value in workplace safety and employee productivity.

The empirical review examined the relationship between workplace safety ergonomics, emergency safety training, safety transfer, employee safety attitudes, level of implementation to government safety regulations, and employee productivity. The reviewed literature was deficient in explaining the relationships between these variables. The extant literature was faulted in several aspects. First, the studies needed to conceptualize workplace safety as per the recommendations of international guidelines; NOSA (2017), ILCI guidelines (2015), ILO guidelines on occupational safety (2018), and ISO 31000 (2018). The current study found that Heinrich (2017) and Reese (2018) also advocated these workplace safety constructs.

Second, extant empirical studies measured workplace safety in terms of employee perceptions and challenges (Huang et al., 2022) and ex-ante perspectives such as; overexposure symptoms (Ravindran, 2021), turnover (Laura,2019), company loyalty (Rosa (2019), work comfort (Leber et al., 2018; Sinno et al., 2020) instead of interventions put in place for workplace safety. These measures could have led to mistaken inferences, and each study measured workplace safety differently hence was difficult to generalize quantifiable observations. Third, some of the studies reviewed recommended a study to be conducted investigating the relationship between workplace safety and employee productivity (Kingsley, 2012; Young, 2014; Aluoch, 2015; Yankson, 2018 and Michael & Merson, 2016). Fourth, the studies did not examine the effect of control variables such as employee safety attitudes and degree of implementation of government regulations.

The literature by (Cohn et al., 2022; Li et al., 2020; Gilje & Wittry, 2021; Rosa, 2019) pointed out various employee safety attitude factors that could potentially affect the relationship between workplace safety and employee productivity. However, they did not evaluate the effect of these safety attitudes on workplace safety and employee productivity. Studies by Alariki and Al-Abed (2021), Kamau (2020), Karakhan et al.(2019), Owolabi et al. (2016) and Obrenovic et al. (2020 posited that the level of implementation of government workplace safety regulations could link workplace safety and employee productivity together yet the studies did not provide empirical evidence of the moderating effect of the level of implementation of the government workplace safety regulations on the relationship between workplace safety and employee productivity.

Lastly, the studies did not measure employee productivity in terms of productive time, value-added, and the degree of accomplishment of tasks; for example, Aluoch (2014) used employee perceptions of safety; Rosa (2019) checked company loyalty by employees; Otiso (2018) and Sawe (2013) used frequency and severity of incidents and Kingsley (2012), and Laura (2019) used employee turnover intentions to measure employee productivity. Further, each of these studies suffered from methodological limitations and measured employee productivity differently, which made their studies incapable of conclusive recommendations. The current study measured employee productivity using a broader scope of measures (productive time, value-added, and degree of accomplishment of tasks). This was analyzed from the same population to enable comparison.

2.6 Research Gaps

The study identified several research gaps in the reviewed literature. First, despite extant studies and reports by government and internationally recognized bodies having reported significant workplace safety and employee productivity issues in manufacturing firms in Kenya, the existing literature was deficient in explaining the relationship between workplace safety on employee productivity in manufacturing firms in Kenya. As such, extant studies are yet to establish the effect of the nature of workplace safety programmes on employee productivity. Extant studies have further reported defective workplace safety programmes in manufacturing firms, while others have noted increased adoption of workplace safety programmes meant to reduce incidents and boost employee productivity. Moreover, the studies that have tried to examine the relationship between workplace safety and employee productivity have been contextualized in different sectors and countries and hence have a minimal application to developing countries' manufacturing firms.

Second, existing studies have left out conceptual gaps; as such, the extant studies could have provided a better perspective on how each component of workplace safety (ergonomics, emergency management, training, and transfer to insurance and consultants) affected employees' productivity. The studies have mainly focused on the challenges to workplace safety, workplace risks, and employee awareness and perceptions of workplace safety. Internationally recognized bodies have advocated for ergonomics, emergency management, training, and transfer to insurance and

consultants as the objective measures of workplace safety yet prior studies are yet to establish their effect on employee productivity. While extant studies have linked these measures to better employee outcomes such as morale, diminished turnover intentions, and job satisfaction, existing studies have not linked them to employee productivity. Moreover, existing theoretical literature, such as the domino theory, which postulated adopting workplace safety protections to stabilize the causes of workplace loss, did not provide empirical evidence on the effect of workplace safety on employee productivity. This study, therefore, contributed to the extant literature and the development of this theory by determining the effect of workplace programmes on employee productivity.

Third, extant literature is yet to determine the conceptual role of the possible workplace safety and employee productivity determinants, such as employee safety attitudes and the level of implementation of workplace safety regulations, as possible moderating and mediating factors. The moderating effect of the extent of implementation of government workplace safety policies on the relationship between workplace safety and employee productivity was lacking. Regardless of the workplace safety regulations in Kenya, the Kenyan manufacturing sector still faces workplace safety and productivity challenges. Extant studies have noted problems that may hinder the full implementation of workplace safety regulations. Other studies reported safety and productivity problems in those firms that are yet to fully implement government regulations. The extant theoretical literature on Rasmussen's risk management theory posited that failure to implement government safety regulations might hinder the reactiveness of workplace safety and its provision of value to the organization, yet the theory did not empirically examine how the level of implementation of government safety regulations can link both employee productivity and workplace safety together. The original findings of the current study contribute to the development of Rasmussen's risk management framework theory.

The literature reviewed showed that empirical evidence on the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity was missing. While extant literature opines that the nature of work in the manufacturing sector exposes the employees to adverse workplace incidents, which may lead to negative safety attitudes, empirical evidence linking employee

safety attitudes to workplace safety and employee productivity is lacking. Prior literature has only explored varying workplace safety attitudes but did not empirically examine workplace safety attitudes as a potential intervener. Lastly, existing studies have been faulted in several areas, including contradicting findings, with some studies indicating that workplace safety does not influence productivity while others point out the possible effect of workplace safety on employee productivity. In addition, some extant studies have suffered from methodological limitations because the rigor applied in the data analysis made it difficult to generalize the findings. For instance, some studies used frequencies and percentages, which did not allow testing of relationships between variables, while others only reviewed relevant literature and hence did not generate original findings. The approach of this study filled these gaps.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The research philosophy, design, theoretical models, target population, sampling strategies, data collection tools, pilot testing, and data analysis procedures adopted by the study are described in this chapter.

3.2 Research Philosophy

This study adopted a positivist research paradigm which adopts a quantitative approach to investigating phenomena (Bonache, 2021). The philosophy seeks facts on causes of social phenomena. This philosophy indicates that universal scientific propositions are valid only if they have been verified by empirical tests (Park et al., 2020). The current study adopted this philosophy because the entire research was based on objectivity and only collected and interpreted data as it was, thereby ensuring that the findings were quantifiable and observable. According to Alharahsheh and Pius (2020), the positivist paradigm investigates the social world as a natural science. This study collected quantitative facts associated with the relationships of the variables through a questionnaire, then the results were evaluated quantitatively, and the hypothesis was tested statistically. According to Igwenagu (2016), the positivist research paradigm also advocates for the use of available evidence to support the results. The current study used existing theoretical and empirical foundations to support its findings.

3.3 Research Design

This study adopted a cross-sectional survey design. Cross-sectional survey designs are either descriptive or analytical (Bryman & Bell, 2022). This study adopted both descriptive and analytical cross-sectional survey designs. The cross-sectional survey design was adopted because existing data among the manufacturing companies was collected retrospectively. In other words, data on the research variables was collected at a single point in time from sample units to examine relationships among the variables. Cross-sectional survey design involves choosing and studying samples from large populations to determine the relative occurrence, distribution, and relationships between variables (Igwenagu, 2016). The descriptive cross-sectional design was adopted since it allowed for the simultaneous collection of data and the

description of relationships between variables under study. Analytical cross-sectional design involves studying and analysing the population and suggesting a basis for action based on observed data (Indu & Vidhukumar, 2019). The analytical design was adopted since employee productivity data was collected and analyzed from company internal records. More so, productive time data was obtained from company records provided to the government directorate of occupational safety. Data on the accomplishment of tasks and value-added was obtained from the human resources employees' dashboard.

3.4 Theoretical Models

The study was modeled on the concepts drawn from the theoretical and empirical literature presented. The first objective was anchored on the Domino theory that postulated workplace safety as the kind of protection present in a workplace. The theory suggests that these protections stabilize the workplace, leading to better organizational outcomes such as employee productivity, as posited by the tip of the iceberg theory. The workplace safety constructs were informed by the suggestions of Heinrichs' Domino theory(1931), NOSA (2017), ILCI guidelines (2015), ILO guidelines (2018), ISO: 45001 (2018), and Heinrich (2017). Employee productivity measures were informed by the theoretical literature by the McClellands' tip of the iceberg theory(2000) and empirical literature by the European employee productivity institute report (2019), Drucker (2002), Laffont and Martimort (2009), Reese (2018) and Hacamo (2022).

Cobb and Douglas's (1928) theory of production guided the study to derive the models that examined the objectives of this study. Therefore, based on the theory that assumes that variables have an input and output relationship, employee productivity in manufacturing firms was regarded as the output achieved through a combination of inputs: employee safety as the independent variable, employee safety attitudes as the intervening variable, and the level of implementation of government workplace safety regulations as the moderating variable.

The prediction level of the general model for predicting effect of workplace safety on employee productivity was therefore specified as shown in equation 3.1

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_4 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Where: Y is the employee productivity, β_0 is regression constant, β_1,..β_4 are coefficients, X_1 was safety ergonomics, X_2 was safety emergency management, X_3 was safety training, X_4 safety transfer to insurance and consultants and ε_4 is error term.

Moreover, based on the literature by Hong et al. (2018) and the OSHA Africans Report (2019) suggestion, there could be significant differences in the relationship between workplace safety and employee productivity across different sectors of manufacturing firms. Still, it was further suggested by Rahiman and Mahat (2018) that by adopting the domino approach to workplace safety, studies should consider exploring dummy variables representing different sectors. Accordingly, to determine the differences in the relationship between workplace safety and employee productivity in different sectors of manufacturing firms, dummy variables were introduced. The general regression model was expressed as shown in equation 3.2

$$Y = \beta_0 + \beta_1 X_1 + \beta_1 d_1 + \beta_2 d_2 + \beta_3 d_3 + \beta_4 d_4 + \cdots \beta_{14} d_{14} + \varepsilon_5 \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.2$$

Whereby: Y = dependent variable; β_0 = intercept constant; β_1,..β_{14} = regression coefficients showing rate of change of dependent variable with a change in independent variable X_1 and dummy variables representing different sectors d_1,d_2, d_3, d_4… d_{14} ; Where d_1 = 1 and 0 if *if* otherwise, d_2 = 1 and 0 if *if* otherwise , d_3 = 1 and 0 otherwise … d_{14} = 1 and 0 if *if* otherwise; and ε_5 = random error.

The study also developed a model to assess objective two, which sought to determine the moderating effect of the implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. Measures of the moderator were the critical aspects of the workplace safety regulations in Kenya. The second objective was anchored on Rasmussen's risk management theory which guided in picking the critical aspects of government safety regulations. Further literature by MCM (2018) checklist, Kiura (2021), Kamau(2020), Kelwon (2021), Odero (2019), Mohamed (2021), and Corgi

(2020) guided the selection of constructs for the moderating variable. The general regression model was expressed as shown in equation 3.3.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_1 X_5 + \beta_7 X_2 X_5 + \beta_8 X_3 X_5 + \beta_9 X_4 X_5 + \varepsilon_6 \quad \ldots\ldots 3.3$$

Where:Y is Employee productivity; β_0 is regression constant, $\beta_1 \ldots B_5$ = Coefficients X_1 is safety ergonomics; X_2 is emergency management; $X_3$is safety training; X_4 is safety transfer; X_5 is level of implementation of government workplace safety regulations and ε_6 is error term.

To evaluate the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. Regression was done in four steps, as suggested by Baron and Kenny (1986), Hayes (2009), and Hayes and Rockwood (2017). The selection of the constructs of the moderator was guided by theoretical literature by Wilde's risk homeostasis theory (1998) and empirical literature by Dessler (2015), Huang et al.(2022), Fine(2017), Rosa(2019) and NOSA safety management system(2019). The models were expressed as shown in equations 3.4 to 3.7.

The first step was to evaluate the relationship between the independent variable and dependent variable which may be intervened. The regression model was expressed as shown in equation 3.4.

$$Y = \alpha_0 + \beta_1 X_1 + \varepsilon_0 \quad \ldots\ldots 3.4$$

Where Y is the dependent variable (employee productivity), $\alpha_0$is the y intercept, β_1 is the regression coefficient, X_1 is the independent variable (workplace safety) and ε_0 is the regression error term.

The second step was to examine whether the independent variable was related to the potential intervenor. The regression model was expressed as shown in equation 3.5

$$M = \alpha_1 + \beta_2 X_1 + \varepsilon_1 \quad \ldots\ldots 3.5$$

Where M is the intervening variable, α_1 is the y intercept, β_2 is the regression coefficient, $X_1$is the independent variable (workplace safety) and ε_1 is the error term.

The third step was to determine whether the potential intervener was related to the dependent variable. The regression model was expressed as shown in equation 3.6

$$Y = \alpha_2 + \beta_3 M + \varepsilon_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.6$$

Where: Y is the dependent variable, α_2 is the y intercept, β_3 is the regression coefficient, M is the intervening variable and ε_2 is the regression error term.

In the fourth and final step, the dependent variable was regressed on the independent variable and the potential intervener in blocks. The regression model was expressed as shown in equation 3.7

$$Y = \alpha_3 + \beta_4 X_1 + \beta_5 M + \varepsilon_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.7$$

Where: Y is the dependent variable (Employee productivity), α_3 is the y intercept, β_4 and β_5 are regression coefficients, X_1 is the independent variable (workplace safety), M is the intervening variable (employee safety attitudes) and ε_3 is the regression error term.

To assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. The regression model was expressed as shown in equation 3.8

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_7 \ldots\ldots\ldots\ldots 3.8$$

Where: Y is employee productivity; a_0 is regression constant; $\beta_1 \ldots \beta_6$ are coefficients; X_1 is safety ergonomics; X_2 is emergency management; X_3 is safety training; X_4 is safety transfer; X_5 is level of implementation of government workplace safety regulations; X_6 is employee workplace safety attitudes and ε_7 is error term.

3.5 Target Population

The target population was the 853 manufacturing firms in Kenya that are registered with Kenya Association of Manufacturers (KAM) and that have been operation for the last three years. Data collection and analysis was done at firm level with target respondents being the heads of human resource. The firms were classified into 14

key sectors of manufacturing based of the products they manufacture. A list of the study population was obtained from (KAM Manufacturers and Exporters Directory, 2019/2020) and is provided in Appendix VI.

3.6 Sampling Procedure and Sample Size

Out of a population of 853 manufacturing firms in Kenya, a representative sample of 234 was obtained using a statistical formula suggested by Nassiuma (2010), as shown in equation 3.9.

$$\text{Sample size} = \frac{\text{Population of manufacturing firms} * 26\%^{2}}{26\%^{2} + (\text{Population of manufacturing firms} - 1)0.05^{2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.9$$

Where: The coefficient of variation was fixed at 26% and standard error was fixed at 5%. The firms were selected randomly.

This sampling formula was selected because it involved probabilistic sampling using a fixed coefficient of variation and standard error at each level, ensuring that all sectors were equally represented. Martinez et al. (2017) indicated that to sample a target population with five or more subgroups, the sampling method should involve the application of a fixed coefficient of variation and standard error at each subgroup to enable a detailed examination of each of the subgroups in the population. The sample obtained further met the representativeness criteria set out by Babbie and Edgerton (2023), Smith and Yung (2023) and Martinez et al. (2017). Moreover, the study used G-power statistical software, as suggested by Rahman (2023); this was meant to ascertain whether a larger sample would yield a less or more significant result. G-power software artificially amplifies the sample by a factor of two to check whether a larger sample would yield less or more significant results. The results generated suggested that a future larger sample might not be able to generate a different result, therefore, confirming that the sample achieved was a good representation of the population of manufacturing firms in Kenya.

The tabulation of the sample size per sector is presented in table 3.1.

Table 3.1: Sample Size per Sector

Firm Listing by Sector	N	n
Services and Consultancy	101	22
Building, Mining and Construction	29	14
Chemical and Allied Sector	79	20
Energy electrical and electronics	45	17
Foods and Beverage	187	24
Leather and Footwear	9	7
Metal and Allied Sector	83	21
Motor Vehicle and Accessories	51	18
Paper and Board	74	20
Pharmaceutical and Medical	24	13
Plastic and Rubber	77	20
Fresh Produce	11	8
Textiles and Apparels	64	19
Timber, wood and furniture	19	11
Total	853	234

Therefore the target respondents were 234 heads of human resources in each sampled firm.

3.7 Data Collection Procedures

Before commencing data collection, the proposal for this study was approved by the board of postgraduate studies, University of Embu. Further, research clearance was granted by the National Commission for Science, Technology and Innovation. Then the researcher trained data collection assistants'. Both primary and secondary data were collected through questionnaires. The target respondent (head of human resources in the manufacturing firm) was able to provide both sets of data. Primary data was sought from the head of human resources in the manufacturing firms. The researcher and research assistants helped respondents complete the questionnaires while clarifying the information through observation. Secondary data was also provided by the head of human resources in the manufacturing firms as the firms provided to the government directorate of occupational safety. A sample of the questionnaire used in data collection is provided in Appendix 1.

3.8 Pretesting of the Research Instrument

To help to detect possible flaws in the measurement procedure, the questionnaire was assessed for its reliability and validity. The questionnaire had closed-ended questions to enable data coding for the parameter estimation. The questionnaire had eight parts;

part one collected respondents' and organizations' demographic data. Part two to five collected data on each workplace safety construct. Part six collected data on the level of implementation of government workplace safety regulations, part seven was on employee safety attitudes and part eight was on employee productivity.

3.8.1 Validity of Research Instrument

During questionnaire formulation, content validity was assessed through discussions with experts in the field of study, especially human resource practitioners. Further, the instrument was subjected to a panel of experts from the department of business studies who scrutinized it for adequacy and representativeness in terms of concepts under study. Construct validity was ensured by basing the constructs on relevant standards and theories. Criterion-related validity was ensured by analyzing collected data using SPSS, Smart PLS and STATA statistical software.

3.8.2 Reliability of Research Instruments

A pilot survey was carried out in 24 manufacturing firms. These firms were excluded from the final sample. This was 10% of the sample population as recommended by Cooper and Schindler (2014). Cronbach alpha was used to assess the reliability of the instrument. Reliability results are shown in table 4.2.

3.9 Data Processing and Analysis

Descriptive statistics were used to summarize data and inferential statistics were used to test hypotheses. Descriptive statistics, specifically frequencies and percentages were used to describe the profiles of the firms and respondents. Further, mean and standard deviations were used to describe the research variables. The relationship between variables was tested using correlation. Regression analysis was used to estimate the regression coefficients and test hypothesis for each study objective independently as recommended by (Harrell Jr, 2017). After the analysis data was presented in tables and figures.

3.10 Diagnostic Tests

The study tested whether the relationship between the dependent variable and the independent variable satisfied the ordinary least square assumptions of normality, homogeneity of variance (heteroscedasticity), autocorrelation and multicollinearity. The diagnostic tests that were carried out are discussed in detail in Appendix IV.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter discusses the results in relation to the objectives of the study. It describes the response rate, diagnostic tests, demographic characteristics, descriptive analysis, hypothesis tests as well as discussion of the findings.

4.2 Response Rate

The study targeted 234 heads of human resources in manufacturing firms in Kenya, and of these, 192 manufacturing firms' human resources heads successfully filled out the questionnaires, giving a response rate of 82.05 %. Babbie and Edgerton (2023) assert that a response rate of over 70 percent is excellent. The response rate of the current study falls above the threshold, allowing for different estimations and data analysis. The response rate is presented in figure 4.1.

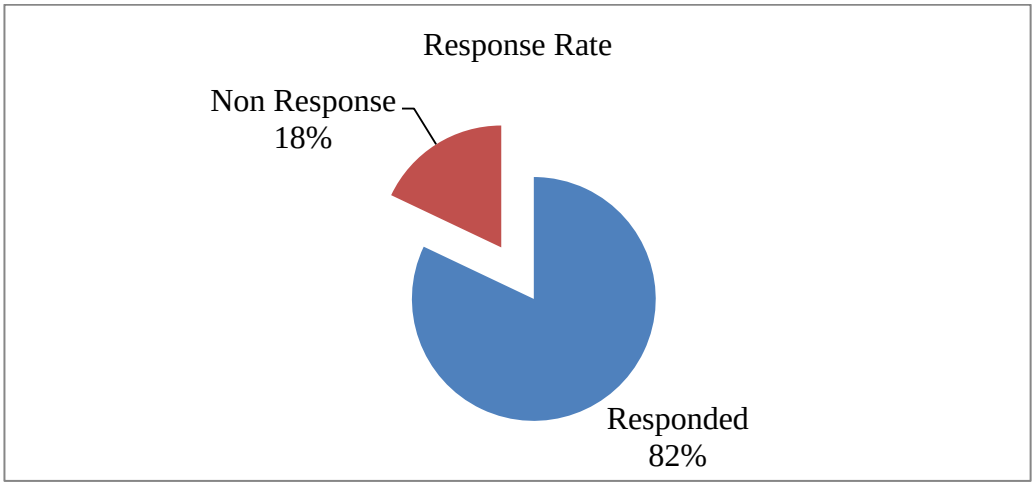

Figure 4.1: Response Rate

The high response rate in the current study could be attributed to good logistical preparations prior to and during data collection, which enhanced the respondents' social acceptability of the researcher and data collection assistants.

The study further sought to determine the manufacturing subsector which the manufacturing firms belonged to. It was also important to show that the results are representative of all the sectors of manufacturing firms in Kenya. This is presented in Table 4.1.

Table 4.1: Manufacturing Sub Sector in Which the Firm Falls

Manufacturing subsector	Expected Respondents	Actual Responses	Response rate	Sector Percentage
Services and Consultancy	22	18	81.8%	9.3%
Building, Mining and Construction	14	13	92.9%	6.8%
Chemical and Allied Sector	20	18	90%	9.4%
Energy electrical and electronics	17	14	82.4%	7.3%
Foods and Beverage	24	20	83.3%	10.4%
Leather and Footwear	7	5	71.4%	2.6%
Metal and Allied Sector	21	17	76.2%	8.9%
Motor Vehicle and Accessories	18	15	83.3%	7.8%
Paper and Board	20	16	80%	8.3%
Pharmaceutical and Medical	13	9	76.9%	4.7%
Plastic and Rubber	20	17	85%	8.9%
Fresh Produce	8	6	75%	3.1%
Textiles and Apparels	19	15	78.9%	7.8%
Timber, wood and furniture	11	9	81.8%	4.7%
Total	234	192	82.05%	100%

The results in Table 4.1 showed that the findings were drawn from 192 manufacturing firms in Kenya distributed across the 14 subsectors. The results show that the current study's results represent all manufacturing sectors since each sector response rate over 70 percent are recommended by Babbie and Edgerton (2023). The highest numbers of respondents were drawn from the food and beverage sector (10.4%) and chemical and allied sectors 9.4). The services and consultancy sector, consisting of assembly and other firms primarily manufacturing products that support providing services to the mother business firms, consisted of (9.3%). In comparison, the least number of respondents was drawn from the leather and footwear sector (2.6%) and fresh produce (3.1%). Respondents drawn from paper and board consisted (9.3%), Textiles and apparel (7.8%), timber, wood, and the furniture consisted (4.7%) of firms. The Kenya Association of Manufacturers uses these classifications adopted from the manufacturing firms categories by the United Nations Industrial Development Organization (UNIDO). This response rate is higher

than that obtained in recent studies conducted in manufacturing firms in Kenya by (Mutiso & Gatari, 2023; Karuga et al., 2023; Alavi & Aghakhani, 2023 and Mutisya & Obonyo, 2023) among others.

4.3 Reliability of Study Measures

Cronbach's alpha coefficient was computed to evaluate the psychometric properties of the study constructs. Reliability tests pre-tested the extent to which research tool questions were homogeneous and measured the underlying constructs. The reliability results are shown in table 4.2.

Table 4.2: Results of Reliability Coefficients Test

Variable	Number of items	Cronbach's Alpha coefficients	Comments
Workplace Safety Ergonomics	16	.979	Reliable
Workplace Safety Emergency Management	6	.960	Reliable
Workplace Safety Training	9	.967	Reliable
Workplace Safety Transfer	5	.967	Reliable
Index of Workplace Safety Indicators	36	.895	Reliable
Level of Implementation of Workplace Safety Regulations	13	.933	Reliable
Workplace Safety Attitude	9	.867	Reliable

The results in table 4.2 show that the study obtained a Cronbach Alpha of above 0.70 for all variables. Cronbach's alpha coefficient ranges from 0 to 1, and the nearer the coefficient is to one, the more the inner consistency. Cronbach (1951) recommended an acceptable minimum value of above 0.60. Literature by Wooldridge (2015) recommended a value of above 0.7. Reliability coefficients below 0.5 are unacceptable; those above 0.8 are good, and those greater than 0.9 are considered excellent (Sharma, 2016). Therefore data obtained by the current study was reliable. The highest reliability was reported by workplace safety ergonomics (0.979), followed by factors that determine the level of implementation of workplace safety regulations (0.933), followed by workplace safety transfer and workplace safety training with reliability coefficients of (0.967). The index of workplace safety elements had a reliability coefficient of (0.895) and workplace safety attitude had a reliability coefficient of 0.867. This means the study instrument can produce consistent results every time it is administered. The instrument's internal consistency

was therefore considered to be satisfactory for further data analysis to meet the study's objectives.

4.4 Respondents Characteristics

The study sought to determine the years the respondents had been working in the manufacturing firms. The respondents were asked to indicate the time in years that they had served in their institution. This was important as employees who have worked longer can better rate workplace safety and its influence on employee productivity. Findings are presented in Table 4.3.

Table 4.3: Years Respondents Have Been Working in the Institution

Years worked in the Institution	Frequency	Percent	Cumulative Percent
Below 2 years	30	15.6	15.6
2-5 Years	55	28.7	44.3
Over 5 Years	107	55.7	100.0
Total	192	100.0	

The findings in table 4.3 show that the respondents who worked in the manufacturing firms for over five years were the majority at 55.7%. Those that had worked for less than five years in the manufacturing firms had a cumulative percent of 44.3%. Only 15.6% of the respondents had worked in the firms for less than two years. The implication of this finding was that majority of the respondents had worked long enough in their respective manufacturing firms therefore were well able to rate workplace safety programmes present in their workplace and their effect on employee productivity. Secondly, the results imply that majority respondents have been in the institution before and after the publishing of mandatory safety requirements for the manufacturing sector (2016) by the government directorate of occupational safety. This shows that majority respondents are able to rate the level of implementation of government safety policy on employee productivity.

4.5 Descriptive Analysis of the Study Variables

This section contains descriptive analysis of the study variables summarized by use of mean and standard deviation summary statistics.

4.5.1 Workplace Safety Ergonomics Descriptive Analysis

Respondents were required to respond to a Likert rating scale on the workplace safety ergonomics present. Sixteen parameters were considered. The results obtained are shown in table 4.4. Where 5 is Strongly agree, 4 is Agree, 3 is Neutral, 2 is Disagree while 1 is Strongly Disagree).

Table 4.4 : Workplace Safety Ergonomics Descriptive Analysis

Workplace Safety Ergonomics	N	Mean	Std. Deviation
My firm has a separate budget for employee safety	192	3.4074	1.07683
My firm does safety audits to determine workplace, procedure and equipment safety	192	1.9537	1.04465
My firm has a hazard reporting programme	192	3.9630	.91637
There is sufficient illumination in our workplace	192	4.2870	.88657
My firm has noise diversion controls to protect employees from the sound energy	192	3.2130	1.24593
My firm has anti vibration equipment	192	2.7037	1.34136
My firm uses robotics to reduce dangers of contact and to ease work procedures	192	2.0463	1.29257
Adequate security cameras are used to deter unsafe incidents	192	4.0463	1.24843
There are metal detectors at entry points to reduce security threats on employees	192	3.0833	1.58925
My firm has heat, smoke and combustion gas detectors	192	3.4167	1.53541
There are warning signs at the location of the hazard and other conspicuous locations	192	3.8981	1.26742
My firm has gas, fumes, exhaust regulators	192	3.8519	1.50894
My firm has ventilation and temperature regulators	192	4.0370	1.21460
Personal protective equipment is provided and worn at all time	192	4.2593	1.20257
There is sufficient cleanliness and disinfecting to reduce exposure to incidents	192	4.5278	.71641
My firm designs the job effectively to prevent harmful occurrences.	192	4.3981	.87477
Aggregate Score	192	3.5683	1.18513

Table 4.4 shows that workplace safety ergonomics had an aggregate score of (Mean =3.5683, SD= 1.18513). This indicates that, on average, manufacturing firms' heads of human resources agreed on various statements on safety ergonomics in place in their firms with variations as indicated by the standard deviation value. The standard deviation value was 1.18513, therefore showing that respondents varied much in their views on workplace ergonomics in the manufacturing firms in Kenya. This finding implied that since most firms adopted workplace safety ergonomics, better

employee productivity would be expected from such firms. Moreover, as opined by Pandey (2017), firms that have safety ergonomics in place demonstrate their commitment to workplace safety. Since the current study determined that manufacturing firms had adopted safety ergonomics programmes slightly more than moderately, then this indicated a fair commitment to alleviating possible diverse effects of workplace hazards on employee productivity.

These results are positive because, according to the Bureau of Labour Statistics report (2019), over 50% of reported disabling injuries in workplaces are related to a lack of safety ergonomics. OSHA Africa report (2019) notes that when safety ergonomics are present, organisations report fewer injury cases, increased employee morale, decreased claims and lower employee turnover intentions. These outcomes are associated with positive employee productivity outcomes. Further, the results align with the recommendations of Azambuja Viana *et al*. (2021) on workplace ergonomics considerations for the COVID-19 pandemic on workplace cleanliness, use of robotics, sufficient ventilation, proper job designs and hazard assessment and control. Despite the current study results showing that most respondents indicated that their firms did not use robotics and safety audits to assess safety hazards, they agreed with all the other constructs of workplace safety ergonomics; manufacturing firms in Kenya are expected to have better employee productivity.

These results are similar to the findings of (Corgi, 2020), who focused on one firm and did not generate original findings but opined that Kenya's manufacturing plant company had adopted safety ergonomic programmes. The results contradict the results of Osoro and Kanyajua (2019), who found low adoption of ergonomics in state commercial corporations in Kenya. The study focused on a sector that was not manufacturing and only concentrated on one firm. Moreover, the results of the current study are contrary to findings by Kingsley (2012) that workplace safety ergonomics in the manufacturing sector were hardly in existence. The contrary results of Kingsley (2012) can be explained by the fact that the study is not current, was contextualised in a different country from the current study and focused on one manufacturing company. These findings therefore add to the existing repository on use of workplace safety ergonomics in modern workplaces.

4.5.2 Workplace Safety Emergency Management Descriptive Analysis

Respondents were required to respond to a Likert rating scale on the workplace safety emergency management programmes present in their workplace. Six parameters were considered. The results obtained are shown in table 4.5. Where 5 is Strongly agree, 4 is Agree, 3 is Neutral, 2 is Disagree while 1 is Strongly Disagree).

Table 4.5 Workplace Safety Emergency Management Descriptive Analysis

	Descriptive Statistics		
Workplace Safety Emergency Management	N	Mean	Std. Deviation
My firm has a written emergency response and evacuation plan	192	3.7870	1.16049
Facility is fully equipped for emergencies; systems and equipment are in place; e.g firefighting, first aid & medical care	192	4.1852	1.06031
Emergency phones and directions are in place in case of emergencies	192	3.9352	1.17825
We have arrangements with medical providers such as emergency transport services, and health care providers incase more extensive medical care is needed for workers	192	3.2870	1.27559
My firm maintains a first-aid log, which provides a record of injuries that could have been potentially worse or recordable for OSHA record keeping	192	3.6111	1.15065
Evacuation exits are wide enough, clear and unobstructed	192	4.0093	.99057
Aggregate Score	192	3.8025	1.13598

Table 4.5 shows that the workplace safety emergency management programmes had an aggregate score of (Mean =3.8025, SD= 1.13598). This indicates that manufacturing firms in Kenya use workplace safety emergency management programmes with variations as indicated by the standard deviation value. Standard deviation value showed that respondents varied on their views on workplace safety emergency management programmes in the manufacturing firms in Kenya. These results imply that manufacturing companies in Kenya have safety emergency programmes in place. This is positive because the companies can respond effectively to safety emergencies such as the COVID 19 and other workplace safety problems. Even so, respondents were neutral or undecided (Mean =3.2870, SD= 1.27559) on whether their firm had made arrangements with medical providers such as hospitals, emergency transport services, and health care providers incase more extensive medical care is needed for workers. This implies that the firms need to be more proactive on their emergency coordination with emergency service organisations to

be in line with Ministry of Health Guidelines on handling emergencies in workplaces (2021) and the mandatory safety requirements for the manufacturing sector (2016) by the government directorate of occupational safety. The findings add to extant literature in emergency management in workplace. Prior literatures have not assessed extent of adoption of workplace emergency management programmes in firms using the expanded measures investigated by the current study. A study by Wilson (2010) found that over 30% of firms did not have emergency equipment; the study focused on only fire emergency programmes while current study used all workplace risks emergency programmes.

4.5.3 Workplace Safety Training Descriptive Analysis

Respondents were required to respond to a Likert rating scale on the workplace safety training programmes present in their workplace. Nine parameters were considered. The results obtained are shown in table 4.6. Where 5 is Strongly agree, 4 is Agree, 3 is Neutral, 2 is Disagree while 1 is Strongly Disagree).

Table 4.6 Workplace Safety Training Descriptive Analysis

	Descriptive Statistics		
Workplace Safety Training	N	Mean	Std. Deviation
My firm does safety training audits to determine employee comprehension of procedures and rules	192	3.4167	.86603
My firm has a written safety policy statement that educates employees on the safety aspects of their job	192	3.6296	.88172
My firm conducts safety drills as part of our training	192	3.3611	1.15571
Employees are trained to identify the symptoms of occupational over exposure to chemicals and other risks	192	3.2685	1.15691
My firm does safety training for new hires(employees)	192	3.4907	1.13150
Safety rules and procedures are incorporated into jobsite operations	192	4.0185	.89632
My firm has safety rules regarding dress code, conduct, and expectations	192	3.9907	1.08080
My firm conducts safety talks, conferences and seminars which are well documented as with other safety training	192	2.9259	1.11660
A safety committee conducts risk assessments, education sessions, safety guidelines and announcements.	192	3.0185	1.26773
Aggregate Score	192	3.4578	1.061

Table 4.6 shows that the safety training programmes in the manufacturing sector in Kenya had an aggregate score of (Mean =3.4578, SD= 1.061). This indicated that on average manufacturing firms agreed on various statements on workplace safety

trainings programmes in place with variations as indicated by the standard deviation value. These results imply that more than average of the manufacturing firm in Kenya have safety training programmes. This is positive because safety training helps employees familiarize themselves with its safety programmes, as well as their individual role in a crisis response hence are better equipped to respond to all manner of safety incidents that may interfere with their individual productivity at work.

These findings bridge the knowledge gaps identified in the extant empirical literature reviewed. It addresses the safety training programmes that are in place in the manufacturing sector in Kenya. Sawe (2013) study failed to address safety training programmes present in the manufacturing sector. The current study showed that respondents agreed that manufacturing firms conducted safety training programmes such as training audits, safety drills, safety rules, talks and seminars among others. Huang *et al*., (2022) had similar findings but the study was in a different sector and country. The study only assessed management views on safety training and found that safety training enhances safety behavior and communication among long truck drivers in the USA. Bieder *et al*., (2018) did a critical literature review on safety training but failed to collect original findings on the area while the current study used primary findings with probabilistic sampling of respondents.

4.5.4 Workplace Safety Transfer Descriptive Analysis

Respondents were required to respond to a Likert rating scale on the workplace safety transfer programmes present in their workplace. Five parameters were considered. The results obtained are shown in table 4.7. Where 5 is Strongly agree, 4 is Agree, 3 is Neutral, 2 is Disagree while 1 is Strongly Disagree).

Table 4.7Workplace Safety Transfer Descriptive Analysis

	Descriptive Statistics		
Workplace Safety Transfer Programmes	N	Mean	Std. Deviation
My firm has a group health insurance for staff	192	3.3426	1.22407
My firm has personal accident insurance covers	192	2.8241	1.29578
Employees are covered in the companies liability insurance covers	192	3.9167	.97755
My firm has hired private security to guarantee safety of all employees and their property at work	192	3.0093	1.39086
My firm uses external safety consultants to survey our workplace and suggest corrective actions	192	3.1019	1.41382
Aggregate Score	192	3.2389	1.2604

Table 4.7 shows that the workplace safety transfer programmes in the manufacturing sector in Kenya had an aggregate score of (Mean =3.2389, SD= 1.2604). This indicates that on average manufacturing firms were undecided on various statements on workplace safety transfer programmes in place in their workplace with variations as indicated by the standard deviation value. Standard deviation showed that respondents varied on their views on workplace safety transfer programmes in the manufacturing firms in Kenya. These results imply that manufacturing companies in Kenya have moderately employed safety transfer programmes in their workplaces. Workplace transfer such as safety insurance through group health covers, personal accident and liability covers were adopted moderately in the manufacturing sector in Kenya. Respondents were undecided on use of private security and external consultants to design their safety programmes.

The implications of these results as posited by Reese (2018) is that when manufacturing companies are not fully covered by insurance employees have problems such as schedule delays, added administrative time, lower morale, increased absenteeism, and poorer customer relations. These outcomes are associated with decreased employee productivity; yet extant literature has yet to establish the effect of workplace safety transfer to insurance and consultants on employees' productivity. Gilje and Wittry (2021) posit that failure to adequately transfer safety issues to health and safety consultants makes the organisations fail to benefit from wide and diverse experience of the safety consultants who are able to objectively identify and define the existing problems without politics and allegiance. Moreover, safety consultants are resourceful in providing expert witness during legal actions. Insurance companies also make use of consultants while rating risks and the manufacturing sector can attract premium discounts when they make use of them (Gupta, 2016). Therefore, safety transfer programmes as noted by Owolabi et al., (2016) are expected to lead to employees who strive for excellence and productivity, still this assertion is yet to be systematically explored by prior literature. Prior literature has not addressed adoption of safety transfer fully based on its five constructs; group health insurance, private security, safety consultants, safety liability insurance, and personal accident insurance. This study has addressed this research gap.

4.5.6 Level of Implementation of Government Workplace Regulations Descriptive Analysis

Respondents were required to respond to a Likert rating scale on the level of implementation of government workplace safety regulations in the manufacturing companies. Thirteen parameters were considered. The results obtained are shown in table 4.8. Where 5 is Strongly agree, 4 is Agree, 3 is Neutral, 2 is Disagree while 1 is Strongly Disagree).

Table 4.8 : Level of Implementation of Government Workplace Regulations

	Descriptive Statistics		
Level of Implementation of Government Workplace Regulations	N	Mean	Std. Deviation
Personnel concerned with the work site are regularly trained on safety aspects in compliance with OSHA rules	192	3.6111	1.29581
The directorate of occupational safety officers has approved my firms compliance with OSHA rules	192	3.6667	1.19187
My firm has inventory of procedures and responsibilities for the identification and correction of workplace hazards	192	3.6296	1.1323
Firm examines new machines and procedures for safety before they are used in the workplace	192	3.8333	1.02765
My firm Checks employee compliance with OSHA rules	192	3.4907	1.17207
We have an Hazard communication plan as required by OSHA regulation	192	3.2685	1.09891
All occupational safety reportable incidents are investigated and effective prevention is implemented	192	3.7037	0.96924
We us appropriate labels and other forms of hazard warning as required by OSHA	192	3.5741	1.11241
Employees are provided with personal protective equipment (PPE) which are OSHA approved	192	3.713	1.21556
Our employees have frequently filed safety complaints with OSHA and requested an inspection	192	2.8333	1.35688
Our WIBA pays workmen injured or who meet death in accident arising out of an in the course of employment.	192	3.6389	1.28586
Our WIBA policies pay medical expenses of the employee as a result of workplace incidents.	192	3.6296	1.22736
My organization imposes compulsory personal accident cover for all employees as required by law	192	2.713	1.0856
Aggregate Score	192	3.4850	1.1670

Table 4.8 shows that generally respondents agreed that manufacturing firms in Kenya had implemented government workplace safety regulations with an aggregate score of (Mean =3.4850, SD= 1.1670). Standard deviation showed that head of human resources varied on their views on implementation of government workplace safety regulations in the manufacturing firms in Kenya. The results indicate

manufacturing companies had complied with government workplace regulations with variations. Therefore there was compliance with work injury benefits act (2010), occupational health and safety Act (2013) and the mandatory safety requirements for the manufacturing sector (2016) by the government directorate of occupational safety. Respondents were undecided on several aspects such as on whether their firm had hazard communication plan as required by OSHA regulation (Mean =3.2685, SD= 1.09891), whether their employees had frequently filed safety complaints with OSHA and requested an inspection (Mean =2.8333, SD= 1.35688) and whether the firms had imposed compulsory personal accident cover for all employees as required by law (Mean =2.713, SD= 1.0856).

These findings are contrary to findings of a study by Kamau (2020) that found that the level of implementation of safety policy was low due to lack of adequate resources. The study focused on firms in one county in Kenya (Kiambu County), while the current study results are for 192 manufacturing firms in Kenya. Karakhan *et al*., (2019) study findings found that the level of implementation of safety policy was low. The study failed to collect original findings on the area while the current study is based on original findings in manufacturing firms in Kenya. The current study findings collaborate the findings by Yankson (2017) on the effect of health and safety standards on productivity in Ghana Rubber Estates Limited. The study established that there was high implementation of safety policies but failed to indicate specifically which safety policies were being investigated, this gap has been addressed by the findings of the current study.

4.5.7 Workplace Safety Attitude Descriptive Analysis

Respondents were required to respond to a Likert rating scale on workplace safety attitudes in the manufacturing companies. Nine parameters were considered. Where 5 is Strongly Disagree, 4 is Disagree, 3 is Neutral, 2 is agree while 1 is Strongly agree). The results obtained are shown in table 4.9.

Table 4.9 Workplace Safety Attitude Descriptive Analysis

	Descriptive Statistics		
Employees are aggressive and overconfident while operating machines, leading to machine breakdown and endangering their safety.	192	2.1111	1.09658
Employees take unnecessary risks and ignore safety procedures.	192	2.6204	1.33057
Employees are not alert for any emergencies	192	2.2222	1.04419
Employees avoid work that seems risky due to safety phobias.	192	2.713	1.22322
Employees are selfish and exhibit behaviour that may endanger others.	192	2.0926	1.1724
Employees over speed at work to be productive.	192	2.3241	1.17472
Employees are not eager to propose safety improvements	192	2.2333	1.35688
Employees do not ask questions about any unclear safety procedures or precautions.	192	2.3241	1.29578
Employees do not pay attention to safety training or follow trained procedures.	192	1.9167	.97755
Aggregate Score	192	2.2904	1.18454

Table 4.9 shows that the workplace safety attitude in the manufacturing sector in Kenya had an aggregate score of (Mean =2.2904, SD= 1.18454). This indicates that, on average, manufacturing firms' head of human resources agreed on all statements regarding their safety attitudes with variations as indicated by the standard deviation value. Thus, these results implied that employees in manufacturing companies in Kenya have negative safety attitudes. This indicates that despite the firms having good safety programmes, employee productivity and adherence to the safety programmes may be inhibited by worker attitude toward safety. The implication of these findings, as pointed out by the risk homeostasis theory by Wilde (1998), was that employees' safety behaviors might influence workplace safety. These behaviours may lead to work adjustments which might influence employees' productivity. Further negative workplace safety attitudes such as safety phobias, carelessness and selfishness which may endanger other employees; adversely affecting full productivity of employees. Extant literature by Reese (2018) opines

that when employees have a poor attitude towards risk they exhibit a behavior that keeps them unsafe in the performance of their jobs. A study by Probst *et al*., (2019) opines that employee safety behavioral pattern and attitudes toward the standard practice can be explained by their level of involvement in procedures, practices and policy making. Li *et al*., (2020) opines that a workforce that is not involved in safety and health has no ownership and thus feels no investment, responsibility, or accountability for it. In the subsequent findings of the current study, it was empirically determined that employee safety attitudes intervened in the relationship between workplace safety and employee productivity. It was concluded that to attain enhanced workplace safety and employee productivity; firms must launch programmes that enhance positive employee safety attitudes.

4.5.8 Summary Statistics

The study computed the range, minimum, maximum, means and standard deviations in the data for each variable to check for any anomalies in the data. The results are presented in table 4.10.

Table 4.10: Summary Descriptive Statistics

Descriptive Statistics						
	N	Range	Min	Max	Mean	Std. Deviation
Index of Workplace Safety	192	3.18	1.45	4.64	3.517	.40417
Level of implementation of government workplace safety policy	192	3.23	1.23	4.46	3.4850	1.1670
Workplace Safety Attitude	192	3.67	1.00	4.67	2.2904	.66731
Value Added	192	7259343.6	50515.46	7309859	3090579.975	1.0706
Productive Time	192					
• Period in Days	192	98.00	5.00	103	24.3241	.9462
Accomplishment of tasks	192					
• Targets Met	192	76.000	2.000	78	10.83333	.9462
Valid N (listwise)	192					

Results in Table 4.10 showed that 192 manufacturing firms in Kenya were included in the study. The average workplace safety statistic consisting of all workplace safety constructs (ergonomics, emergency management, safety training, safety transfer to insurance and consultants) for all the manufacturing firms was 3.517, and the standard deviation was 0.40417, implying that the firms had slightly more than moderately adopted workplace safety programmes with an average deviation of

40.41%. Workplace safety was not constant across all manufacturing firms, with a minimum recorded score of 1.45 and a maximum of 4.64 (range of 3.18). A study by Debela et al. (2023) reported a lower workplace safety statistic for manufacturing firms in Kenya. Similarly, a study by Akbari et al. (2023) also reported less than-average adoption of workplace safety programmes in manufacturing firms in Iran. In Kenya, a study by Abanga (2023) reported a similar finding (slightly high than average workplace safety) for vehicle body manufacturing firms. A study comparing workplace safety programmes in manufacturing firms in Spain and the United Kingdom by Martínez-Aires et al. (2016) found higher adoption of the programmes compared to what is reported by the current study. This finding addresses two gaps in extant literature. First, no previous studies reviewed have used more comprehensive workplace safety constructs, second, none of the extant studies done in a developing country's manufacturing sector have reported adopting of workplace safety programmes using an index of all workplace safety measures.

The average level of implementation of workplace safety policies was 3.4850, and the standard deviation was 1.1670, implying that the firms had slightly more than moderately implemented government workplace safety programmes. This was positive as prior literature by Baicker (2018) and Abdallah (2021) noted challenges affecting the implementation of workplace safety regulations in Kenya, while studies by Kamau (2020) and Kiura (2021) reported low implementation of workplace safety regulations in firms in Kenya. The lower adoption reported by previous studies was because they focused on one aspect of OSHA regulations. In contrast, the current study focused on the key dictates of OSHA and WIBA regulations. This result, therefore, fills the gap identified in extant literature. The statistics obtained for workplace safety attitude was mean (2.2904) and standard deviation of was 1.18454; implying that employees in manufacturing firms in Kenya had negative safety attitudes with an average deviation of 66.73%. Workplace safety attitudes were not constant and fluctuated from a minimum of 1.00 to a maximum of 4.67. The implication of this finding as posited by Li et al., (2020) was that employees with negative safety attitudes exhibit behavior that keeps them unsafe in the workplace and this could affect their productivity as suggested by Prinsloo& Hofmer (2022) and Baicker (2018).

Value added was determined by dividing the total firm revenues by the number of employees to determine the value added by employees to the organisation's output. The study found that the employees' average value added by the workers in the manufacturing firms in Kenya was 3090579.975, with a standard deviation of 1.0706. This indicated that the average value added per unit of employee input was Ksh 3,090,579.975 per year. This employee productivity was lower than what was found in a study done in the united states (Syverson, 2020) and a similar study in the United Kingdom by (Sheehan and Garavan (2022), also it is lower than what a study by Signé (2020) reports for Ghana manufacturing firms and the statistics by Bureau of Labour Statistics report(2019) for Africa.

Employees' productive time was determined by deducting the number of lost workdays (unproductive time) from the standard workdays in a year. The average unproductive time resulting from safety incidents was 24 days, with a standard deviation of 0.9462. This indicated that the average productive time out of the standard 260 days in the manufacturing sector in Kenya was 236 days. The firm with the most lost work days had 103 days lost due to safety incidents, while the firm with the least lost work time had five lost workdays. The 24 lost workdays translated to an average of 192 work hours yearly due to workplace safety incidents. This employee productivity is similar to the Bureau of Labour Statistics report (2019), which established that Kenyan manufacturing firm workers produce an average of 1888 work hours per year compared to the internationally acceptable standards of 2080 work hours per year (Bureau of Labour Statistics report, 2019).

The employees' accomplishment of tasks was determined by the total number of employees who met their set performance targets as per the employee dashboard or performance contracts out of the total number of employees in the firms—the number of employees who failed to meet targets averaged at 10.83333 per year. The highest number of employees who failed to meet targets was 78, while the least number who failed to meet targets was 2; therefore range was 76, implying that the employee accomplishment of tasks was not constant across all firms. The data collected on the number of defects and cost of defects as measures of employee productivity were largely incomplete, with one hundred and seventy-five non-responses out of one hundred and ninety-two manufacturing firms' questionnaires.

Thus, it was difficult to generalize the data for these measures and give comparative information. Therefore, these measures were dropped. The accomplishment of tasks was measured by the total number of employees who met their set performance targets per the employee dashboard or performance contracts. Data from the three measures of employee productivity (value added, productive time, and degree of accomplishment of tasks) was combined by computing an index using Smart PLS, as posited by Sarstedt (2019). The figure obtained was used as the overall measure of employee productivity. The operationalization and measurement of the study variables is shown in appendix v.

4.6 Diagnostic Tests Results

To ascertain fitness of the models normality, heteroscedasticity, multicollinearity and autocorrelation diagnostic tests were carried. This was to ascertain whether the assumptions of the ordinary Least Squares hold. The diagnostic test results are presented in the subsequent subsections.

4.6.1 Test for Normality

While testing for normality, the null hypothesis was that the model residuals are normally distributed. According to Montgomery et al., (2021) normally distributed data enables the researcher to make accurate and reliable conclusions. The study tested normality of the data using Shapiro-Wilk statistics. The results are shown in 4.11.

Table 4.11: Normality Test Findings

Tests of Normality			
		Shapiro-Wilk	
	df	Statistic	Sig.
Employee Safety Attitude	188	.919	.070
Level of implementation of government workplace safety regulations	188	.936	.056
Safety Emergency Management	188	.973	.066
Safety Ergonomics	188	.954	.051
Safety Training	188	.918	.057
Safety Transfers	188	.980	.143
Work Safety	188	.781	.100
Employee Productivity index	188	.760	.100
Value Added	188	.800	.300
Period in Days	188	.786	.320
Targets Met	188	.786	.210
a. Lilliefors Significance Correction			

The findings presented in Table 4.11 show the normality test results of the data collected for each key variable included in the analysis Based on the Shapiro-Wilk statistics, all the variables fell within the required threshold of >0.05respectively, hence showing a normal distribution of the data. Thus, from the Shapiro-Wilk statistics values the conclusion drawn was that the collected data for each variable is normally distributed. For sample sizes of less than five hundred, Shapiro Wilk test is recommended (Montgomery et al. 2021). The current study sample size was one hundred and ninety two respondents, therefore the study relied on Shapiro-Wilk test to test the normality of the variables.

4.6.2 Heteroscedasticity

Heteroscedasticity occurs when the variance of the error term is not constant for all independent variable values. Breusch-pagan test was used to test the null hypothesis that the variance of the residuals was homoscedastic (has a constant variance). The decision rule is that if the p value is greater than 0.05, then the null hypothesis is rejected (Wooldridge, 2015). Heteroscedasticity test results are shown in table 4.12.

Table 4.12: Heteroscedasticity Tests

Variables	chi2	Prob > chi2	Status
Fitted values of model testing effect of workplace safety on employee productivity	46.33	0.3272	No heteroskedasticity
Fitted values of moderating model	49.14	0.1000	No heteroskedasticity
Fitted value of step one model testing the intervening effect.	21.42	0.2310	No heteroskedasticity
Fitted value of step two model assessing the intervening effect.	2.72	0.0990	No heteroskedasticity
Fitted values of step three model assessing the intervening effect.	48.73	0.1210	No heteroskedasticity
Fitted values of the joint effect model	54.32	0.0670	No heteroskedasticity

The results show that probability values of the chi square statistic obtained for all models were more than 0.05 hence implying that there was no heteroscedasticity in the residuals. This signifies that the null hypothesis stated that there is a constant variance of the residuals (homoscedastic) is rejected and a conclusion is drawn that there is no constant variance of the regression residuals or there is absence of heteroscedasticity. Therefore the coefficients estimates are best linear unbiased estimators, eliminating bias when interpreting the test results.

4.6.3 Multicollinearity Test

Multicollinearity is the intercorrelation among predictive variables making it difficult to isolate the effect of each independent variable on the dependent variable. Variance inflation factor (VIF) was used to test the presence of multicollinearity in the econometric models. The values start from 1 and have no upper limit. Values of 1 indicate no correlation between the independent variable and other variables. Values between 1 and 10 suggest a moderate correlation but not severe enough to warrant corrective measures. Values greater than ten will represent critical levels of multicollinearity, indicating the coefficients could be better estimated, and the p-values will therefore be questionable (Jim, 2013). The test results were presented in the Table 4.13

Table 4.13: Variance Inflation Factor Statistics

Variables	VIF	Status
Workplace Safety Ergonomics	6.921	No severe Multicollinearity
Workplace Safety Emergency management	8.844	No severe Multicollinearity
Workplace Safety Training	8.184	No severe Multicollinearity
Workplace Safety Transfer	3.746	No severe Multicollinearity
Level of implementation of Government Workplace safety Regulations	2.100	No severe Multicollinearity
Workplace safety attitude	1.127	No severe Multicollinearity

The findings in Table 4.13 show that the VIF values for all explanatory variables were found to be less than 10.00 hence indicating a moderate correlation but not severe enough to warrant corrective action. The results of this study can therefore be relied upon.

4.6.4 Autocorrelation Test

Autocorrelation among the variables is an econometric problem that exist when there is a serial interdependence among the error terms. Autocorrelation in an econometric model leads to inconsistency and biasness of parameter estimates. Autocorrelation was tested using the Durbin Watson (DW) statistic. When the DW value is zero, it implies that there exists a strong positive autocorrelation. A DW Value of 4 implies existence of a high negative correlation level. A DW value that lies between 2 and 2.5 implies that autocorrelation is absent.

The results were presented in Table 4.14

Table 4.14 : Durbin Watson Statistics

Model	Statistic	Status
Model on the independent variables related to the dependent variable	2.307	Absence of autocorrelation
Model on the moderating effect of the level of implementation of government policy on the relationship between workplace safety and employee productivity	2.501	Absence of autocorrelation
Model on independent variable related to the potential intervenor	2.504	Absence of autocorrelation
Model of the potential intervener related to the dependent variable.	2.273	Absence of autocorrelation
Model on the dependent variable regressed on the independent variable and the potential intervener in blocks.	2.097	Absence of autocorrelation
Overall model	2.506	Absence of autocorrelation

Results from Table 4.14 indicated that the Durbin-Watson statistic for the models ranged from 2.026 to 2.506. Since these values were between 2 and 2.5, it implied the absence of autocorrelation in the models implying a lack of inconsistency and biases in parameter estimates.

4.6.5 Common Method Variance

Given that the data for this study was collected at one point, Harman's single factor test was carried out to determine the common method variance as recommended by Hayes and Rockwood (2017). Montgomery et al. (2021) describe the common method bias as a measurement error resulting from respondents who only provide positive answers due to the sociability of respondents. Common method bias may also result from measuring different constructs with the same method leading to observed covariation between them (Hayes & Montoya, 2017).

Table 4.15: Common Method Variance

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.135	23.727	23.727	2.135	23.727	23.727
2	1.457	16.194	39.921	1.457	16.194	39.921
3	1.365	15.168	55.089	1.365	15.168	55.089
4	1.012	11.240	66.329	1.012	11.240	66.329
5	.826	9.175	75.503			
6	.749	8.324	83.827			
7	.605	6.724	90.552			
8	.466	5.178	95.729			
9	.384	4.271	100.000			

Extraction Method: Principal Component Analysis.

The results in Table 4.15 show that the common method bias is absent in the study. The total variance extracted by all the factors did not exceed 50%, showing no evidence of the dataset being contaminated by common method bias. Common method bias was controlled by different methods for measuring the variables; further data was collected from one hundred and ninety-two manufacturing firms, chosen strictly by chance, therefore, reducing chances of getting only positive or negative responses. Since the data was credible, further analysis was conducted without any remedy.

4.7 Workplace Safety and Employee Productivity (Hypothesis One Testing)

The study aimed to investigate the effect of workplace safety on employee productivity in manufacturing firms in Kenya. Workplace safety was measured by workplace safety ergonomics, workplace emergency management, workplace safety transfer and workplace safety training. The dependent variable (Employee productivity) was measured by employee productive time, accomplishment of tasks and value added. An index of employee productivity measurements was computed to obtain overall employee productivity.

4.7.1 Correlation of Employee Safety Measures and Employee Productivity

The Pearson's Product Moment technique was used to carry out correlational analysis to determine the relationship between work place safety and employee productivity. It was meant to identify the direction and strength of the association between the independent variables and dependent variable. The values of correlation coefficient range from -1 and +1. A correlation coefficient of +1 indicates that the two variables are perfectly positively related in a linear sense, while -1 shows that the two variables are perfectly related but in a negative linear sense. Hair *et al*., (2006) observed that correlation coefficient (r) ranging from 0.81 to 1.0 is very strong; from 0.61 to 0.80 is strong; from 0.41 to 0.60 is moderate; from 0.21 to 0.40 is weak; and from 0.00 to 0.20 indicates no relationship.

The findings of correlations between workplace safety indicators and overall employee productivity are presented on Table 4.16 while the findings on an index of workplace safety indicators and each measure of employee productivity are presented in table 4.17.

Table 4.16 : Correlation of Employee Safety Measures and Employee Productivity

		Correlations					
		Employee Productivity	Workplace Safety Ergonomics	Emergency management	Safety Training	Safety Transfer	Workplace safety
Employee Productivity	Pearson Correlation	1	.858**	.874**	.849**	.800**	.891**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	192	192	192	192	192	192

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

The results in table 4.16 show that employee productivity and all measures of employee safety are positively and significantly correlated. Correlation of workplace safety ergonomics and employee productivity was ($r = 0.858, p = 0.00 < 0.01$), correlation of workplace emergency management and employee productivity was ($r = 0.874, p = 0.00 < 0.01$), correlation of workplace safety training and employee productivity was ($r = 0.849, p = 0.00 < 0.01$), correlation of workplace safety transfer and employee productivity was ($r = 0.800, p = 0.00 < 0.01$) while correlation of an index of all workplace safety measures and employee productivity was ($r = 0.891, p = 0.00 < 0.01$). This shows that increase (improvements) in workplace safety would lead to increase in employee productivity in manufacturing firms in Kenya. These results collaborate the results by a study by Rosemberg and Li (2018) on effort-reward imbalance and work productivity among hotel housekeeping employees that identified workplace safety as one the extrinsic employee rewards critical for work productivity. The study was based in a hotel sector in Michigan which is in a different context from manufacturing firms in Kenya. The study used presenteeism and absenteeism as measures of employee productivity while the current study used a combination of three superior employee productivity measurements (productive time, accomplishment of tasks and value added.

Second, the findings of this study can be explained from theoretical literature by the Domino theory by Heinrich (1931) which postulates that the presence of protective

factors (safety ergonomics, emergency management, safety training, and transfer) reduces the effects of exposure to diversity. The more protective factors are available, the more resilient institutions are to risk and the more the employees are likely to perform productively without worrying about safety issues. Further, workplace safety ensures that the organisation is not affected by frequent stopping of work due and the associated productivity losses due to safety incidents. This implies that workplace safety ensures that employees are protected in their workplace and this leads to positive returns on employee productivity. Therefore, holding other factors constant, employee productivity problems can be eliminated by proper workplace safety.

4.7.2 Correlation of Work place Safety and Measures of Employee Productivity

The study further aimed at assessing the correlation between workplace safety and the three measures of employee productivity. The findings are presented on Table 4.17.

Table 4.17: Correlation of Work place Safety and Measures of Employee Productivity

Correlations					
		Workplace Safety	Value Added	Productive time	Accomplishment of Tasks
Workplace Safety	Pearson Correlation	1	.866**	.912**	.769**
	Sig. (2-tailed)		.000	.000	.000
	N	192	192	192	192

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

Results in Table 4.17 indicated that the correlation between workplace safety and value added was 0.866 with a p value of 0.000. The positive sign of the correlation implied that there existed a direct positive relationship between workplace safety and value added. Since the correlation of 0.86 was more than 0.5 there existed a strong positive relationship between the two variables. The p value of 0.00 was less than 0.01 hence the effect of workplace safety on value added was significant at 1 % significance level. The implication of this results is that increase in workplace safety leads to a significant increase in value added by employees. This finding is similar to the findings of a report by the European Agency for Safety and Health at Work (EU-OSHA (2021) and a study by Wixted *et al*., (2018) that reported that eliminating

workplace hazards enables employees to stay invested in their work hence are more productive and for every investment in workplace safety there is a corresponding increase in company revenue and value added by employees. The report by European Agency for Safety and Health at Work (EU-OSHA (2021) did not collect original data on effect of workplace safety on value added, while the study by Wixted *et al*., (2018) investigated how distress and worry as a result of lack of safety ergonomics mediate on the relationship between psychosocial risks and workplace safety complaints in manufacturing firms. The current study results filled these knowledge gaps since it was based on original data from manufacturing firms in Kenya and evaluated the effect of work place safety predicted by the programmes put on place for workplace safety (Safety ergonomics, workplace emergency management, workplace safety training and workplace safety transfer) on employee productivity measured by value added by employees in this case.

The results further pointed out that workplace safety and productive time are positively and significantly correlated ($r = 0.912, p = 0.00 < 0.01$). This suggests that employee productive time in manufacturing firms in Kenya is increased by workplace safety programmes. These results collaborate the findings of a study by Rosemberg and Li (2018) that found that lack of work safety led to decreased work performance in terms of time lost from work. In addition, these results support the findings of a literature review study by Folkard and Tucker (2013) on the relationship between shift work, safety and productivity. The study reported that workplace safety increased productivity time by ensuring continuous work without work disruptions by safety incidents.

Further results indicated that correlation between workplace safety and degree of accomplishment of tasks was positive and significant($r = 0.769, p = 0.000 < 0.01$). This shows that improvements in workplace safety would lead to increase in the tasks accomplished by employees in manufacturing firms in Kenya. Therefore increase in workplace safety leads to a significant increase in the number of employees who accomplish tasks hence workplace safety boosts employee productivity in terms of number of employees who accomplish tasks. Umar and Egbu (2020) found similar results; lack of safety programmes in the construction firms exposes employees to safety incidents such as heat stress which affects their degree

of accomplishment of tasks by committing more mistakes and slacking in their job duties.

4.7.3 Regression Analysis of Work place Safety and Employee Productivity

Multiple regression analysis was carried out to test the Null Hypothesis H_{01}, which stated that workplace safety has no effect on employee productivity in manufacturing firms in Kenya. Workplace safety (independent variable) measured by safety ergonomics, emergency management, safety training, and safety transfer was regressed against the measures of employee productivity as the dependent variable. Specifically, workplace safety indicators were regressed against each measure of employee productivity (productive time, the accomplishment of tasks and value-added) separately. Further, an index of the employee productivity measures was computed as recommended by Hayes and Rockwood (2017) and Montgomery et al (2021). Workplace safety was then regressed against the index of all employee productivity measures to determine the effect of workplace safety on overall employee productivity. The results are presented in Tables 4.18 to 4.20.

Table 4.18: The Goodness of Fit of Model for Objective One

Model Summary									
				Std.		Change Statistics			
			Adjusted	Error of	R				
		R	R	the	Square	F			Sig. F
Model	R	Square	Square	Estimate	Change	Change	df1	df2	Change
I (a)	.893[a]	.798	.790	.39307	.798	175.514	4	187	.000
1(b)	.938[a]	.880	.875	.33411	.880	310.081	4	187	.000
1(c)	.259[a]	.670	.300	.39463	.067	4.255	4	187	.013
1(d)	.880[a]	.774	.765	.51929	.774	172.631	4	187	.000

a. Predictors: (Constant), Workplace safety transfer, Workplace safety training, Workplace safety ergonomics, Workplace safety emergency management.

b. Model 1(a) Dependent Variable: Index of employee productivity measures
Model 1(b) Dependent Variable: Productive time
Model 1(c) Dependent Variable: Accomplishment of tasks
Model 1(d) Dependent Variable: Value added

The results in Table 4.18 indicate a significant relationship between workplace safety and employee productivity. The probability values obtained for all measures of employee productivity were significant; precisely, the probability values obtained for an index of all employee productivity measures was 0.000<0.05, while the probability value when the productive time was applied as a measure of employee productivity was 0.000<0.05, probability value when the degree of accomplishment

of tasks was applied as a measure of employee productivity was 0.013<0.05 and finally the probability value when value added was applied as a measure of employee productivity was 0.000<0.005.

When workplace safety was regressed against an index of all employee productivity measures, the value of the adjusted R-squared obtained was 0.790 at a probability value of 0.000<0.05. This implied that holding all other factors constant, 79.0 % of the variations in the index of all employee productivity measures can be explained by the independent variable workplace safety, while 21% of variations in variations in the index of all employee productivity measures are explained by random error or other factors. Therefore increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management will lead to an increase in the index of all employee productivity measures consisting of productive time, the accomplishment of tasks, and value-added.

Second, the adjusted R squared for the effect of workplace safety on productive time was 0.875 at a probability value of 0.000<0.05. This implied that holding all other factors constant, 87.5% of the variations in productive time can be explained by the independent variable workplace safety, while 12.5% of variations in productive time are explained by random error or other factors. Therefore increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management will lead to an increase in productive time.

Third, the adjusted R squared for the effect of workplace safety on the degree of accomplishment of tasks was .300 at a probability value of .013<0.05. This implied that holding all other factors constant, 30% of the variations in the degree of accomplishment of tasks can be explained by the independent variable workplace safety, while 70% of variations in the degree of accomplishment of tasks are explained by random error or other factors. Therefore increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management will increase the degree of accomplishment of tasks.

Fourth, the adjusted R squared for the effect of workplace safety on value-added was 0.765 at a probability value of 0.000 <0.05. This implied that holding all other factors constant, 76.5 % of the variations in value added by employees can be explained by the independent variable workplace safety, while 23.5% of variations in value added are explained by random error or other factors. This implies that an increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management will increase value added.

To further investigate the effect of workplace safety on employee productivity in manufacturing firms in Kenya, Analysis of Variance (ANOVA) was carried out to ascertain the significance of the estimation model. Results presented in table 4.19

Table 4.19: The Overall Significance of the Model for Objective One

ANOVA[a]

		Sum of Squares	df	Mean Square	F	Sig.
I (a)	Regression	108.785	4	27.196	175.514	.000[b]
	Residual	28.976	187	.155		
	Total	137.762	191			
1(b)	Regression	144.333	4	36.083	310.081	.000[b]
	Residual	21.761	187	.116		
	Total	166.094	191			
1(c)	Regression	40.921	4	10.230	4.255	.013[b]
	Residual	567.694	187	5.734		
	Total	608.615	191			
1(d)	Regression	94.871	4	23.718	172.631	.000[b]
	Residual	27.776	187	.270		
	Total	122.647	191			

a. Dependent Variable: 1(a) Index of Employee Productivity measures, 1(b) Productive time, 1(c) accomplishment of tasks, 1(d) value added
b. b. Predictors: (Constant), Workplace safety ergonomics, Workplace safety emergency management, Workplace safety training, Workplace safety transfer.

The findings presented in Table 4.19 show the ANOVA results of the regression model estimating the effect of workplace safety on employee productivity. The F statistic and P values obtained for index of employee productivity measures, productive time, accomplishment of tasks and value added were F (4, 187) =175.514 and p-value=0.000<0.05, F (4, 187) =310.081and p-value=0.000<0.05, F (4, 103) =4.255 and p-value=0.003<0.05 and F (4, 187) =172.631 and p-value=0.000<0.05

respectively. This implied that all the models used were statistically significant; therefore, workplace safety was statistically applicable in predicting employee productive time, their accomplishment of tasks, and the value added. Further, this signified that the null hypothesis that workplace safety does not affect employee productivity in manufacturing firms in Kenya is rejected. A conclusion is drawn that workplace safety has a statistically significant effect on employee productivity.

Further the study multiple regression results determined the coefficient estimates that pointed out the magnitude of each work place safety measure on employee productivity. The regression coefficients for the model were presented in Table 4.20.

Table 4.20 : Coefficient Estimates of the Objective One Model

(a) Workplace Safety and Index of the Employee Productivity Measures

	B	Std. Error	t	Sig.
Constant	.068	.024	2.833	.004
X_1	.432	.147	2.939	.001
X_2	.557	.154	3.617	.003
X_3	.204	.090	2.267	.034
X_4	.365	.167	2.186	.016

(b) Workplace Safety and Productive time

	B	Std. Error	t	Sig.
Constant	.537	.159	3.378	.000
X_1	.453	.160	2.831	.000
X_2	.335	.167	2.006	.044
X_3	.426	.162	2.630	.004
X_4	.291	.112	2.598	.001

(c)Workplace Safety and Accomplishment of tasks

	B	Std. Error	t	Sig.
Constant	.405	.194	2.088	.020
X_1	.690	.240	2.875	.003
X_2	.582	.280	2.079	.043
X_3	.543	.220	2.468	.044
X_4	.538	.198	2.717	.001

(d)Workplace Safety and Value Added

	B	Std. Error	t	Sig.
Constant	.421	.117	3.598	.001
X_1	.426	.127	3.354	.000
X_2	.518	.136	3.809	.003
X_3	.355	.124	2.863	.002
X_4	.324	.121	2.678	.004

Independent variable: Workplace safety ; X_1 is Workplace safety ergonomics, X_2 is Workplace emergency management, X_3 is workplace safety training and X_4 is workplace safety transfer to insurance and consultants.

The findings presented in Table 4.20 show the coefficient estimates of the work place safety measures and their effect on employee productivity measures (an Index of employee productivity, productive time, employees' degree of accomplishment of tasks and value added.

4.7.3.1 Regression Coefficients for Workplace Safety on the Index of all Employee Productivity Measures

The results in table 4.20 (a) point out that the coefficient estimate of the constant in the model estimating the effect of workplace safety on the index employee productivity measurements (β_0) is 0.068 and p-value=0.004<0.05. This depicts that the index employee productivity measures increases by 6.8% regardless of being influenced by the work place safety. Regarding the effect of work place safety ergonomics on the index of employee productivity measurements, the results obtained a coefficient estimate (β_1) =0.432 and p-value=0.001<0.05. This depicted a significant positive relationship between workplace safety ergonomics and the index of employee productivity measurements. Therefore as the workplace safety ergonomics improves a percentage, the index of employee productivity measurements increases by 43.2 % holding all other factors constant. Concerning the effect of workplace safety emergency management on the index of employee productivity measurements, the results showed the coefficient estimate to be (β_2) =0.557 and p-value=0.003<0.05. This signified that there is a significant positive relationship between workplace safety emergency management and the index of employee productivity measurements. Moreover, this implies that as the work place safety emergency management improves by a percentage it leads to an increase in employee productivity by 55.7% holding all other factors constant.

Results on the effect of work place safety training on index of employee productivity measures, pointed out that the coefficient estimate (β_3) =0.204 and p-value=0.034<0.05. This implies that there is a significant positive relationship between work place safety training and the index of employee productivity measures. Further, this points out that as workplace safety training increases by a percent, it results to an improvement in the index of employee productivity measures by 20.4% holding every other factor constant. Regarding the effect of workplace safety transfer on the index of employee productivity measures, the results showed that the coefficient estimate (β_4) =0.365 and p-value=0.016<0.05. This signifies that there is

a positive and significant relationship between work place safety transfer and the index of employee productivity measures. This finding point out that as work place safety transfer to insurance firms, private security and consultants is improved by a percent, it results to an increase in the index of employee productivity measures by 36.5% holding all other factor constant.

4.7.3.2 Regression Coefficients for Workplace Safety on Productive Time

Second from the results in table 4.20 (b) the coefficient estimate of the constant (β_0) obtained for the model estimating the effect of workplace safety on employee productive time was 0.537 and p-value=0.000<0.05. The results point out that productive time of employees increases by 53.7 % regardless of being influenced by the work place safety. Regarding the effect of work place safety ergonomics on productive time, the results obtained a coefficient estimate (β_1) =.453 and p-value=0.000<0.05. This depicted a significant positive relationship between workplace safety ergonomics and productive time. Therefore as the workplace safety ergonomics improves by a percent, productive time of employees increases by 45.3 % holding all other factors constant. Concerning the effect of workplace safety emergency management on productive time, the results showed the coefficient estimate to be (β_2) =0.335 and p-value=0.044<0.05.This signifies that there is a significant positive relationship between workplace safety emergency management and employee productive time. Moreover, this implies that as the work place safety emergency management improves by a percent, it leads to an increase in employee productive time by 33.5% holding all other factors constant.

Results on the effect of work place safety training on employee productive time, pointed out that the coefficient estimate (β_3) =0.426 and p-value=0.004<0.05. This implies that there is a significant positive relationship between work place safety training and employee productive time. Further, this points out that as workplace safety training increases by a percent, it results to an improvement in employee productive time by 42.6% holding every other factor constant. Regarding the effect of workplace safety transfer on employee productive time, the results showed that the coefficient estimate (β_4) =0.291 and p-value=0.001<0.05. This signifies that there is a positive and significant relationship between work place safety transfer and employee productive time. These finding points out that as work place safety transfer

to insurance firms, private security and consultants is improved by a percent, it results to an increase in employee productive time by 29.1% holding all other factor constant.

4.7.3.3 Regression Coefficients for Workplace Safety on the Degree of Accomplishment of Tasks

Third the results in 4.20 (c) pointed out that the coefficient estimate of the constant in the model estimating the effect of workplace safety on the employee degree of accomplishment of tasks was (β_0) is 0.405 and p-value=0.020<0.05. This depicts that the employee degree of accomplishment of tasks increases by 40.5% regardless of being influenced by the work place safety. Regarding the effect of work place safety ergonomics on the employee degree of accomplishment of tasks, the results obtained a coefficient estimate (β_1) =0.690 and p-value=0.003<0.05. This depicted a significant positive relationship between workplace safety ergonomics and the employee degree of accomplishment of tasks. Therefore as the workplace safety ergonomics improves by a percent, the employee degree of accomplishment of tasks increases by 69.0 % holding all other factors constant. Concerning the effect of workplace safety emergency management on the degree of accomplishment of tasks, the results showed the coefficient estimate to be (β_2) =0.582 and p-value=0.043<0.05. This signifies that there is a significant positive relationship between workplace safety emergency management and employee degree of accomplishment of tasks. Moreover, this implies that as the work place safety emergency management improves by a percent, it leads to an increase in employee productivity by 58.2% holding all other factors constant.

Results on the effect of work place safety training on the employee degree of accomplishment of tasks, pointed out that the coefficient estimate (β_3) =0.543and p-value=0.044<0.05. This implies that there is a significant positive relationship between work place safety training and the employee degree of accomplishment of tasks. Further, this points out that as workplace safety training increases by a percent, it results to an improvement in the employee degree of accomplishment of tasks by 54.3 % holding every other factor constant. Regarding the effect of workplace safety transfer on the employee degree of accomplishment of tasks, the results showed that the coefficient estimate (β_4) =0.538 and p-value=0.001<0.05. This signifies that there is a positive and significant relationship between work place safety transfer and the

employee degree of accomplishment of tasks. These finding points out that as work place safety transfer to insurance firms, private security and consultants is improved by a percent, it results to an increase in the employee degree of accomplishment of tasks by 53.8% holding all other factor constant.

4.7.3.4 Regression Coefficients for Workplace Safety on the Value Added by Employees

Fourth the results in 4.20 (d) point out that the coefficient estimate of the constant in the model estimating the effect of workplace safety on value added was (β_0) is 0.421 and p-value=0.001<0.05. This depicts that the value added by employees increases by 0.421 regardless of being influenced by the work place safety. Regarding the effect of work place safety ergonomics on the value added by employees, the results obtained a coefficient estimate (β_1) =0.426 and p-value=0.000<0.05. This depicted a significant positive relationship between workplace safety ergonomics and the value added by employees. Therefore as the workplace safety ergonomics improves by a percent, the value added by employees increases by 42.6 % holding all other factors constant.

Concerning the effect of workplace safety emergency management on value added by employees, the results showed the coefficient estimate to be (β_2) =0.518 and p-value=0.003<0.05. This signifies that there is a significant positive relationship between workplace safety emergency management and value added by employee. Moreover, this implies that as the work place safety emergency management improves by a percent, it leads to an increase in employee productivity by 51.8% holding all other factors constant. Results on the effect of work place safety training on value added, pointed out that the coefficient estimate (β_3) =0.355 and p-value=0.002<0.05. This implies that there is a significant positive relationship between work place safety training and value added. Further, this points out that as workplace safety training increases by a percent, it results to an improvement in employee productivity by 35.5% holding every other factor constant.

Regarding the effect of workplace safety transfer on value added, the results showed that the coefficient estimate (β_4) =0.324 and p-value=0.004<0.05. This signifies that there is a positive and significant relationship between work place safety transfer and value added. These finding points out that as work place safety transfer to insurance

firms, private security and consultants is improved by a percent, it results to an increase in value added by employees by 32.4% holding all other factor constant. These results support the hypothesis that workplace safety affects employee productivity in manufacturing firms. The coefficients obtained on the effect of workplace safety (workplace safety ergonomics, workplace emergency management, workplace safety training and workplace safety transfer to insurance and consultants on each of the measures of employee productivity are positive and statistically significant at 5% level of significance level. The study therefore concluded that regardless of how we define employee productivity, workplace safety affects employee productivity.

These findings that workplace safety ergonomics affect employees' productivity contribute to the extant literature in three ways. First, the findings provide empirical evidence of the effect of workplace safety ergonomics on employee productive time, degree of accomplishment of tasks, and value-added. Previous studies have only linked workplace safety ergonomics to behavioral responses that may lead to employee productivity and have suffered from methodological, contextual and conceptual limitations. The explanation for these results is that proper safety ergonomics ensure that workers are fully protected; hence they can perform productively without productivity disruptions from safety incidents. Further safety ergonomics ensure that work and workplaces are comfortable enough for the employees to accomplish tasks without safety unease. Proper safety ergonomics is an effective approach to employee productivity as it gives employees the safety mindset to optimally produce results without worrying about incidents. As noted by literature by (Chintada, 2022), maintaining employees' productivity is hard when there is safety uncertainty because the unknown often consumes the thoughts of the employee. Therefore, a lack of safety ergonomics may lead to stress and anxiety, which may diminish the productivity of employees (Ravindran, 2021). The findings of the current study have empirically confirmed these observations.

Second, from the theoretical literature, the study used Heinrich's postulates of the Domino theory (1931). The theory explains that removing unsafe conditions in a workplace through safety programmes reduces the effects of exposure to adversity; hence the organisation can achieve the outcomes of a safe working environment. The

current study adds to the development of this theory in two ways; first, by showing that safety ergonomics are a critical element for workplace safety, and second, by indicating the employee productivity gains derived from implementing safety ergonomics. When organisations invest in proper workplace safety through safety ergonomics, employees will perform productively without work disruptions or worrying about safety issues. This has been empirically proved by the findings of the current study.

Lastly, the findings further bridge the gaps identified in the previous literature reviewed; Leber *et al*. (2018) study associated safety ergonomics with positive employee behaviors but was limited to safety ergonomics for persons with disability and failed to test the empirical relationship between employee safety and productivity. The current study adds above the positive employee behaviors; when organisations implement ergonomics, they benefit from positive employee productivity outcomes. The results are similar to Ravindran's (2021) study on the impact of safety ergonomics on employees' work performance in Co-operative Hospitals in India. The study was a critical literature review that found that a lack of safety ergonomics leads to increased absenteeism, errors, and sick leaves, reducing employee productivity.

This has been empirically tested by the current study's findings, which found that proper workplace safety ergonomics lead to increased employee productivity in terms of increased added value by employees, increased productive time, and increased accomplishment of tasks. Further, unlike any extant study, the current study determined a significant relationship between workplace safety ergonomics and employee productivity using a broader scope of objective measures, filling the conceptual gaps in extant studies by Pickson et al. (2017), which focused on ergonomic challenges and employee satisfaction; Olabode et al. (2017) and (Corgi, 2020) reviewed the literature on ergonomics awareness; Chintada (2022) focused on the effect of ergonomics on stress; Osoro and Kanyajua (2019) focused only on office arrangement and lighting which are partial measures. Further, the study disputed the contradictory opinion of Kimwomi (2015) and Sinno et al. (2020), which associated workplace safety ergonomics and adverse employee productivity outcomes.

Concerning the effect of workplace safety emergency management on employee productivity, the results showed a significant positive relationship between workplace safety emergency management and employee productivity measures. The result departs from extant literature in four ways. First, the study has provided empirical evidence that workplace emergency management programmes, including rescue response and evacuation plans, emergency equipment and medical care, emergency contacts, safe assembly, exit points, first aid facilities, emergency logs, and documentation, affect employee productivity. Second, the empirical results of the current study have shown that workplace emergency management does influence employee productive time, degree of accomplishment of tasks, and value-added. Extant literature is deficient in explaining these relationships. The explanation for these results is that workplace emergency management reduces safety distress by employees; therefore, they concentrate better on their work. Further safety emergency management enables organisations to react faster to safety incidents and therefore reduce the extent of productivity disruptions. Further, responding swiftly to incidents prevents organisations from losing an employee's productivity fulfilling a crucial role. Further, it enables organisations to recover quickly from safety incidents, saving productivity time. Third, the results add to the development of existing theoretical literature, specifically the Domino theory by Heinrich (1931). It adds that workplace safety emergency management is a critical element for workplace safety; it adds that organisations with proper emergency management will have their employees accomplish their work tasks better, increase productive time, and add more value.

Lastly, the findings bridge the gaps identified in the previous literature reviewed; the study by Alariki and Al-Abed (2021) had similar findings to the current study but used one measure of emergency management and subjective measures of employee performance. The current study used employee productivity data from manufacturing firms in Kenya. Further, the results align with the recommendations of a study by Obrenovic *et al.* (2020) on sustaining enterprise operations and productivity during the COVID-19 pandemic. The study recommended safety emergency management as an innovative approach to enhancing employee productivity during the COVID-19 pandemic. The findings of the current study have empirically proved this. Moreover, the current study finding brings new knowledge in using workplace safety

emergency management to enhance employee productivity in terms of the value-added, degree of accomplishment of tasks, and productive time. Further, unlike other related previous studies, the current study used the existing safety emergency programmes such as rescue response and evacuation plans, safe assembly and exit points, emergency equipment, and first aid facilities in place in manufacturing firms in Kenya.

Results on the effect of work place safety training on employee productivity, pointed out that there is a significant positive relationship between work place safety training and employee productivity. The results contribute to the extant literature in four ways. First, the study determined the effect of safety training programmes on employee productive time, value-added, and degree of accomplishment of tasks. Extant empirical studies (Aluoch, 2015; Bayram (2022); Obong et al. (2021); Mazorodze & Buckley, 2019) have measured workplace safety training in terms of ex-ante perspective (employees' subjective awareness) instead of safety training interventions. These measures could have led to mistaken inferences. Second, the current study provides a fresh perspective on various measures of employee productivity. Conversely, the current study has addressed the conceptual and methodological limitations identified in previous literature by a study by Adim & Mezeh (2020). Adim & Mezeh (2020) study found a significant relationship between safety and health training and employee productivity but used one subjective measure (awareness) of employee productivity.

Third, the study clarifies the contradicting findings of a study by (Shockley, 2022), who opined that safety training does not influence productivity as employees often forget what they learned quickly, and the hours spent in training reduce employee productivity time. The current study clarifies that workplace safety training influences employee productivity; however, organisations should supplement instructional safety training with safety rules, manuals, safety drills, and regular briefs since the current study found that these programmes significantly influence employee productivity. Fourth, the study findings add to the development of the existing theoretical literature by determining the employee productivity gains derived from implementing workplace safety training programmes. The explanation for this finding is that safety training ensures safety-mindedness by employees; therefore, it

reduces chances of work disruptions from incidents; it also enables informed and adaptive responses to incidents enabling continuity of work operations; it clarifies their precise role in safety and productivity further enables the exchange of perspectives leading to increased productive time, an enhanced accomplishment of tasks and value added by employees.

Regarding the effect of workplace safety transfer on employee productivity, the results showed that there is a positive and significant relationship between work place safety transfer and all employee productivity measures. Extant literature has provided possible explanation for the relationship as determined by the results of the current study. For instance, studies by Berry et al. (2020) and Ruvalcaba et al. (2022) have identified safety transfer through insurance as a crucial wellness programme. The studies have argued that safety transfer to health insurance ensures better healthcare for employees and assures them of protection in case of work injuries hence boosting their productivity, as the current study has determined. Therefore insurance ensures healthy and safety-assured employees who accomplish tasks better, add more value and give better productive time. Further in support of the current finding, literature by Knetsch and Watts (2023) argues that safety transfer to insurance programmes such as group life insurance, group health insurance, and personal accident insurance enhances the morale, motivation, and capability of employees. These outcomes are associated with employee productivity, and the current study findings have demonstrated that workplace safety transfer leads to better employee productivity. Further safety transfer to independent consultants and private security guarantees the employees and organisations their safety through proper design of safety programmes, compliance checks, reviews, and suggestions for corrective actions. This enhances employees' productivity, as the current study's findings determined.

These findings add to the extant literature in three ways; first, it has provided empirical evidence that workplace safety transfer to insurance and safety consultants influences employee accomplishment of tasks, their productive time, and value added. Second, the study adds to the development of existing theoretical frameworks by demonstrating that workplace safety transfer is a crucial workplace safety component and influences the most critical organizational outcome, employee

productivity. Third, the current study fills the knowledge gaps left by previous studies; first, it determines the combined effect of all workplace safety transfer constructs on employee productivity, whereas past studies conceptually focused on single constructs (Owolabi et al., 2016), Peshawar 2014; Otiso & Mutugi, 2018). These studies suggested that workplace safety transfer may affect employee productivity; nonetheless, unlike the current study, they barely pursued its effect on employee productive time, degree of accomplishment of tasks, and value-added. Further, the study clarifies the contradictory literature by Perrow (2014), which suggested that safety transfer programmes are costly to purchase and hence may diminish employee value added and that safety transfer to consultants and robotics are expensive and may make employees more stressed about their job tenure thus reduce employee productivity. Conversely, the current study has empirically determined that safety transfer significantly influences employee productivity in all aspects of productive time, value-added, and degree of accomplishment of tasks.

The multiple regression model for the effect of workplace safety on employee productivity in manufacturing firms in Kenya was presented using the index of all employee productivity measures as recommended by Tjostheim et al., (2021). Tjostheim et al., (2021) posits that the model should be presented using the model index as this depicts all parameters simultaneously estimated and included in one model, so there is no contradiction. This is presented by the equation 4.10.

$$Employee\ Productivity(Y) = 0.068 + 0.432x_1 + 0.557x_2 + 0.204x_3 + 0.365x_4 + \varepsilon \quad \ldots\ldots 4.10$$

Where x_1 is safety ergonomics, x_2 is emergency management, $x_3$is safety training, x_4 is safety transfer and e is error term.

The t-statistics obtained for this model as shown in Table 4.20 was 2.939 for workplace safety ergonomics, 3.617 for workplace safety emergency management, 2.267 for workplace safety training and 2.186 for workplace safety transfer at P-values of .001, 0.03, 0.034 and .016 for workplace safety ergonomics, workplace safety emergency management, workplace safety training and workplace safety transfer respectively which were less than the significance value of 0.05. The interpretation was therefore that workplace safety has a statistically significant

influence on the productivity of employees in manufacturing firms in Kenya. This study therefore rejects the null hypothesis H_{01}: Workplace safety has no effect on employee productivity in manufacturing firms in Kenya. The P values obtained do not support the hypothesis that workplace safety has no effect on employee productivity in manufacturing firms in Kenya. Therefore the hypothesis was rejected implying that workplace safety is a good predictor of employee productivity in manufacturing firms in Kenya.

The findings of this study bring out the importance workplace safety on employee productivity in terms of productive time, value added and degree of accomplishment of tasks. From the theoretical literature, study used the postulates of the Domino theory by Heinrich (1931). The theory explained that removing unsafe conditions in a workplace through various programmes like the ones identified by the current study (ergonomics, emergency, transfer and safety training), reduces the effects of exposure to a diversity hence employees are able to perform productively without work disruptions or worrying about safety issues. The postulates of the domino theory have therefore been confirmed by the findings of the current study that greater safety leads to more productivity by employees. Second, the results show the importance of manufacturing firms installing safety programmes as per the recommendations and guidelines by the International Loss Control Institute (ILCI), (2015) and the National Occupational Safety Association (NOSA) 5- star rating system (2016) that recommend workplace safety programmes should address areas of safety ergonomics, emergency management, transfer and safety training. When these programmes are well implemented, manufacturing workplace safety is enhanced hence leading to increased employee productivity.

From the descriptive results of this study, workplace safety ergonomics had an aggregate score of (Mean =3.5683, SD= 1.18513), workplace safety emergency management programmes had an aggregate score of (Mean =3.8025, SD= 1.13598), workplace safety training programmes had an aggregate score of (Mean =3.4578, SD= 1.061) while workplace safety transfer programmes in the manufacturing sector in Kenya had an aggregate score of (Mean =3.2389, SD= 1.2604). These descriptive results showed that manufacturing firms in Kenya had slightly more than average adopted workplace safety programmes, therefore the employee productivity losses in

manufacturing firms in Kenya as established Bureau of Labour Statistics report (2019) could be attributed to lack of proper workplace safety in the manufacturing sector in Kenya. This finding confirms the OSHA Africa report (2019) that opined that low worker productivity in manufacturing firms can be attributed to a defective workplace safety system. Further from the descriptive statistics, workplace safety transfer was the least adopted out of all the workplace safety programmes and this low adoption explained the reason β_4 had the least statistical significance.

Further the results are consistent with the tip of the iceberg theory of Kahneman McCllelland (2000) which posits that lack of workplace safety is expensive because of productivity costs; time lost in investigating incidences, replacing skilled workers, lower morale, medical and indemnity payments, lost time to implement corrective action, increased absenteeism, and poor customer relations. These results therefore enrich the existing theoretical literature involving workplace safety and employee productivity. Workplace safety through safety ergonomics, safety emergency management, workplace safety training and workplace safety transfer enhances productivity of employee through increasing productive time, level of accomplishment of tasks and value added. These findings therefore show that firms could attain better employee productivity if they adopted better COVID 19 workplace safety programmes. The safety programmes studied by the current study are effective in combating COVID 19 which is one of the greatest workplace safety issues facing all firms and industries. Further the findings of this study are consistent with the postulates of (Michael & Merson, (2016) and Aswathappa (2015) that workplace safety leads to a productivity culture by the employees hence leads to more productivity gains by the employees in terms of reduced workplace safety incidents, added value by employees, productive time and degree of accomplishment of tasks.

Lastly, the findings bridge the gaps identified in the previous literature reviewed; Pickson, Bannerman and Ahwireng (2017) studied workplace safety in one firm while the current findings originate from original data from 192 manufacturing firms in Kenya. Olabode, Adesanya and Bakare (2017) study was based in a Nigeria which has different contextual setup from the manufacturing firms in Kenya and did not collect original findings on the topic. The current study used original findings and

measured employee productivity through a combination of three measures value added, productive time and degree of accomplishment of tasks. Bieder *et al*., (2018) critical literature review study which failed to generate original findings on the area but found that safety training may boost employee productivity by addressing attitude to risk (chronic unease) therefore improving employee productivity. This has been empirically tested by the current study using original data from manufacturing firms.

4.7.4 Sectoral Regression Statistics on Workplace Safety and Employee Productivity

To determine differences on the relationship between workplace safety and employee productivity in different sectors of manufacturing firms dummy variables were computed. This was done to evaluate the effect of workplace safety on employee productivity in different operational context of sectors of manufacturing firms. The study introduced dummy variables taking the value of one for one sector and if otherwise zero, simultaneously one sector after the other until the 14^{th} sector.

The results are presented in table 4.21 to 4.23.

Table 4.21 : Goodness of Fit of Model for Workplace Safety, Manufacturing Sector Dummy Variables and Employee Productivity

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Observation
1	.910	.827	.799	.38399	Explanatory power of model improved

Dependent Variable: Productivity

a. Predictors: (Constant), Timber, wood and furniture, Pharmaceutical and Medical, Leather and Footwear, Fresh Produce, Paper and Board, Building Mining and construction, Motor Vehicle and Accessories, Energy electrical and electronics, Services sector, Textiles and Apparels, Chemical and Allied Sector, Metal and Allied Sector, Plastic and Rubber, Workplace safety

The findings shown in Table 4.21 indicate the study obtained an adjusted R-squared of 0.799 which implies that 79.9% of the variations in the employee productivity is explained by the work place safety and the differences across different sub sectors holding all other factors constant. The findings also indicate that the explanatory power of model improved from 0.790 to 0.799 in comparison to the original model

testing effect of workplace safety on employee productivity. This means that there is an effect of each explanatory variable when the other explanatory variable is held constant.

To examine the model fitness, ANOVA test was conducted. This was to ascertain the significance of the estimation model testing the relationship between workplace safety and employee productivity in different sectors of manufacturing firms. Results presented in table 4.22

Table 4.22: Manufacturing Firms Dummy Variables ANOVA Findings

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	65.029	15	4.335	29.403	.000
Residual	13.565	176	.147		
Total	78.595	191			

a. Dependent Variable: Productivity
b. Predictors: (Constant), d1, d2, d3, d4, d5, d6, d7, d8, d9, d10, d11, d12, d13, d14, Work safety

The findings presented in Table 4.22 show the ANOVA results of the regression model estimating the differences on the relationship between workplace safety and employee productivity in different sectors of manufacturing firms. The results show that F (15, 176) =29.403 and p-value=0.000<0.05, implying that the model used is statistically significant. Also this signifies that the null hypothesis stated that there are no statistically significant differences on the relationship between workplace safety and employee productivity in different sectors of manufacturing firms is rejected and conclusion is drawn that there are significant differences on the relationship between workplace safety and employee productivity in different sectors of manufacturing firms. The probability value remained the same in comparison to the probability value of the original model testing effect of workplace safety on employee productivity hence implying that the change was not significant.

The regression analysis also consisted of the coefficient estimates that point out the magnitude of the differences in the relationship between workplace safety and employee productivity in different sectors of manufacturing firms. The analysis showed individual significance of the model regression coefficients for the model on workplace safety, dummy variables of different manufacturing sectors and employee productivity.

This is indicated in Table 4.23 below.

Table 4.23 The Individual Significance of the Model on Dummy Variables representing Manufacturing Firms, Workplace Safety and Employee Productivity

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	.621	.279	2.225	.020
Work safety	.440	.139	3.165	.000
d1	.499	.182	2.742	.002
d2	.401	.204	1.966	.022
d3	.396	.196	2.020	.041
d4	.383	.125	3.064	.001
d5	.397	.134	2.963	.003
d6	.342	.162	2.111	.043
d7	.353	.173	2.040	.022
d8	.386	.195	1.979	.024
d9	.415	.142	2.922	.003
d10	.411	.176	2.335	.034
d11	.337	.153	2.203	.028
d12	.578	.247	2.340	.019
d13	.541	.265	2.042	.027
d14	.511	.255	2.004	.031

a. Dependent Variable: Employee Productivity

Where d_1,d_2, d_3, d_4... d_{14} are dummy variables representing different sectors of the manufacturing sector; where d_1 = services and consultancy, d_2 = building, mining and construction, d_3= chemical and allied sector, d_4=energy electrical and electronics, d_5 = foods and beverage, d_6= leather and footwear, d_7= metal and allied sector, d_8= motor vehicle and accessories, d_9= Paper and Board, d_{10}= Pharmaceutical and Medical, d_{11}= Plastic and Rubber, d_{12}= Fresh Produce, d_{13}= Textiles and Apparels and d_{14}=Timber, wood and furniture.

The study unstandardized beta coefficients of all the sectors had a positive sign therefore implying that increase in workplace safety across all manufacturing sectors would lead to an increase in the dependent variable (employee productivity). The coefficient estimates for all sectors were found to be significant with p-values<0.05. However, statistical significance of the relationship between workplace safety and employee productivity in some sectors was statistically higher than in other sectors. Sectors with the highest contribution to the model included d_{12}= Fresh Produce, with beta .578 and probability value of 0.019<0.05, d_{13}= textiles and apparels motor vehicle and accessories with beta .541 and probability value of 0.027<0.05, d_2=

building, mining and construction, with beta .401 and probability value of 0.022<0.05, d_3= chemical and allied sector, with beta .396 and probability value of 0.041<0.05,d_8= motor vehicle and accessories with beta .386 and probability value of 0.024<0.05, d_{10}= pharmaceutical and medical with beta .411 and probability value of 0.034<0.05. Sectors with the lowest contribution to the model included d_{11}= Plastic and Rubber with beta .337 and probability value of 0.028<0.05. d_6= leather and footwear with beta .342 and probability value of 0.043<0.05, d_7= metal and allied sector with beta .353 and probability value of 0.022<0.05. Other sectors such d_5= foods and beverage with beta .397 and probability value of 0.003<0.05, d_9= paper and board with beta .415 and probability value of 0.003<0.05, d_8= motor vehicle and accessories with beta .386 and probability value of 0.024<0.05 and d_4= energy electrical and electronics with beta .383 and probability value of 0.001<0.05.

The differences between the different sectors in the manufacturing industry can be explained by the nature of the work done in the sectors. Sectors such as services and consultancy sector, pharmaceutical and medical, textiles and apparels are expected to have less safety risks hence the nature of safety programmes in the sector is different from the highly mechanized and labour intensive sectors such as building, mining and construction, chemical and allied sector and energy electrical and electronics. These results and interpretations are consistent with the findings of Hong *et al*., (2018) that the nature of work in manufacturing sector or department influences the safety programmes in place and employee productivity levels. The study was based in the Malaysian manufacturing sector compared two sectors and found that nature of adoption of safety programmes in the services and consultancy sector was less in comparison to the building and construction sector which was highly mechanized and labor intensive.

The current study addresses a crucial gap of knowledge because previous studies such as Goetzel (2018) and OSHAfricans report (2018) did not bring out discussions of dummy variables comparing workplace safety and employee productivity in different sectors. This study also enriches the literature on regressions involving categorical variables. The study also helps build up to the existing theoretical literature such as Domino theory developed Heinrich (1931) that posited that incidents directly relate to lack of safety programmes such as ergonomics,

emergency, transfer and safety training. The study adds that employee productivity problems originate from lack of safety programmes hence productivity problems can be eliminated by adoption of appropriate safety programmes regardless of the sector or industry they belong. When organisations adopt safety programmes, employees are likely to better produce regardless of the organisation or nature of work they perform (Michael & Merson, 2016).

The dummy variable multiple regression model for the effect of workplace safety on employee productivity in different sector of manufacturing firms in Kenya can therefore be presented by the equation below.

$$Employee\ Productivity(Y) = 0.621 + 0.440 Work\ Safety + 0.499d1 + 0.401d2 + 0.396d3 + 0.383d4 + 0.397d5 + 0.342d6 + 0.353d7 + 0.386d8 + 0.415d9 + 0.411d10 + 0.337d11 + 0.578d12 + 0.531d13 + 0.511d14 + +\varepsilon \ldots\ldots\ldots\ldots\ldots 4.11$$

Where *d1*-services and consultancy, *d2*-building, mining and construction, *d3*-chemical and allied sector, *d4*-energy electrical and electronics, *d5*-foods and beverage, *d6*-leather and footwear, *d7*-metal and allied sector, *d8*-motor vehicle and accessories, *d9*-paper and board, *d10*-pharmaceutical and medical, *d11*-plastic and rubber, *d12*-fresh produce, *d13*-textiles and apparels, *d14*-timber, wood and furniture.

4.8 Moderating Effect of Level of Implementation of Government Regulations on Relationship between Workplace Safety and Employee Productivity of Manufacturing Firms in Kenya

The study's second objective was to determine the moderating effect of level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The direction and strength of the relationship between the independent, moderating and dependent variables was examined by the Pearson's Product Moment approach. Multiple linear regression analyses were used to test the hypotheses. The results consisting of correlation and regression analysis are presented under the following sub-sections.

4.8.1 Correlation of Level of Implementation of Government Workplace Safety Regulations, Employee Safety and Employee Productivity

The Pearson's Product Moment correlation technique was used to determine the relationship between level of implementation of government workplace safety regulations, work place safety and employee productivity. This was meant to identify the direction and strength of the association between the independent variables, moderating and dependent variable. The findings are presented on Table 4.24.

Table 4.24: Correlation between Workplace Safety, Level of Implementation of Government Workplace Safety Regulations and Employee Productivity

Correlations

		Employee Productivity	Workplace safety	Level of implementation of government workplace safety regulations
Employees Productivity	Pearson Correlation	1	.891**	.617**
	Sig. (2-tailed)		.000	.000
	N	192	192	192
Workplace safety	Pearson Correlation	.891**	1	.682**
	Sig. (2-tailed)	.000		.000
	N	192	192	192
Level of implementation of government workplace safety regulations	Pearson Correlation	.617**	.682**	1
	Sig. (2-tailed)	.000	.000	
	N	192	192	192
Workplace Safety Ergonomics	Pearson Correlation	.858**	.969**	.668**
	Sig. (2-tailed)	.000	.000	.000
	N	192	192	192
Workplace Safety Emergency management	Pearson Correlation	.874**	.959**	.613**
	Sig. (2-tailed)	.000	.000	.000
	N	192	192	192
Workplace Safety Training	Pearson Correlation	.849**	.966**	.703**
	Sig. (2-tailed)	.000	.000	.000
	N	192	192	192
Safety Transfer	Pearson Correlation	.800**	.892**	.596**
	Sig. (2-tailed)	.000	.000	.000
	N	192	192	192

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

The correlation results in table 4.24 show that the level of implementation of government workplace safety regulations, workplace safety and employee productivity are positively and significantly correlated. Correlation of level of implementation of government workplace safety regulations and workplace safety and was ($r = 0.682, p = 0.00 < 0.01$). Since the correlation of 0.682 was more than 0.5 there existed a strong positive relationship between the two variables. The p value of 0.00 was less than 0.01 hence the effect of the level of implementation of government workplace safety regulations was significant at 1% significance level. The implication of these results is that increase in the level of implementation of government workplace safety regulations leads to a significant increase in workplace safety. The results further reveal positive and significant correlation between level of implementation of government workplace safety regulations and workplace safety ergonomics($r = 0.668, p = 0.00 < 0.01$), workplace safety emergency management ($r = 0.613, p = 0.00 < 0.01$), workplace safety training ($r = 0.703, p = 0.00 < 0.01$) and workplace safety transfer($r = 0.596, p = 0.00 < 0.01$).

These results contradict the results by a study done by Shi (2019) which assessed whether government regulations improved workplace safety China's coal industry from 2015 to 2017. These were the years before and after introduction of safety regulations for coal industry in China. The study measured workplace safety through the number of fatalities per 1,000 employees while the current study assessed safety through the programmes put in place for workplace safety. The study found a negative relationship between government workplace regulations and the annual number of disastrous accidents. These results fail to collaborate with the results of the current study because Shi (2019) study measured level of implementation of workplace safety regulations by the number of government inspections on China's coal industry. Secondly, Shi (2019) assessed safety regulations before they were fully implemented by government and coal industry. Gao *et al*., (2019) and Gupta (2016) posit that the nature of OSHA and WIBA regulations worldwide is that they take at least four years after their initial implementation to attain full impact. This time lag could be due to the investment and the length of time it takes for equipment and technology to be put in place to implement these regulations.

The current study was conducted at a time when work place safety regulations such as the work injury benefits act (2007) and the amendments of (2010), occupational health and safety Act (2013) and the mandatory safety requirements for the manufacturing sector (2016) are expected to have operationalized in the manufacturing firms in Kenya. This is evident from the descriptive statistics of the current study that revealed that manufacturing firms in Kenya had complied with government workplace regulations with variations. The current study results support the findings of Ndegwa *et al*., (2022) that found a positive correlation between implementation of OSH (Occupational safety and health) programmes with legal framework. Similarly to the findings of the current study, Ndegwa *et al*., (2022) results implied that increased government rules and regulations led to improved implementation of OSH programmes.

Further the results revealed that the correlation of level of implementation of government workplace safety regulations and employee productivity and was ($r = 0.617, p = 0.00 < 0.01$). Since the correlation of 0.617 was more than 0.5 there existed a strong positive relationship between the two variables. The p value of 0.00 was less than 0.01 therefore the relationship between the level of implementation of government workplace regulations and employee productivity was significant at 1 % significance level. The implication of these results is that increase in the level of implementation of government workplace safety regulations leads to a significant increase in employee productivity in terms of productive time, accomplishment of tasks and value added. These findings collaborate the results by a study by Rosemberg and Li (2018) on effort-reward imbalance and work productivity among hotel housekeeping employees that found a positive significant correlation between implementation of government policy in the hotel industry and number of absenteeism cases. The results are also similar to the findings of Chepkorir (2018) study on the role of occupational safety and health policy on employee productivity in the public service: a case of registry officers in selected government ministries in Kenya. The study found that government safety regulations are important for business economic reasons. The study found a positive relationship between improved legal framework in form of legal issues such as OSH Act, government inspections and audits, government support and increased employee productivity in terms of reduction of errors, injuries and sicknesses.

4.8.2 Regression Analysis of Level of Implementation of Government Workplace Regulations, Workplace Safety and Employee Productivity

To test the Null Hypothesis H_{02} which stated that level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya, multiple regression analysis was carried out using guidelines set out by Hayes and Rockwood (2017). Moderation was tested by checking the behaviour of the adj. R^2 and the coefficient of regression of the independent variable were monitored for any change. A change in the coefficient of regression and adj. R^2 would suggest a significant change or a moderating effect of level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. Further, this was the criteria for the decision on whether the hypothesis was supported or not.

Multiple linear regression analyses were conducted to test the hypothesis. The results are presented in Table 4.25 to 4.27.

Table 4.25: The Goodness of Fit of Model for Objective Two

Model	R	R^2	adj. R^2	Std. Error of the Estimate	Model 1 (adj. R^2)	Observation
2(a)	.909 [a]	.826	0.810	.37380	0.790	The explanatory power of the model adj. R^2 improved by 0.002
2(b)	.947[a]	.897	0.897	.3368	0.875	The explanatory power of the model adj. R^2 improved by 0.013
2(c)	.450[a]	.202	0.302	.9395	0.300	The explanatory power of the model adj. R^2 improved by 0.01
2(d)	.747[a]	.558	0.558	1.5445	0.765	The explanatory power of the model adj. R^2 reduced by 0. 247

Predictors: (Constant), level of implementation of government workplace safety regulations, (x_5) , workplace safety transfer(x_4), workplace safety training(x_3), workplace safety ergonomics(x_1), workplace safety emergency management(x_2), x_1x_5 , x_2x_5, x_3x_5, x_4x_5

a. Model 2(a) Dependent Variable: Index of employee productivity measures
b. Model 2(b) Dependent Variable: Productive time
c. Model 2(c) Dependent Variable: Accomplishment of tasks
d. Model 2(d) Dependent Variable: Value added

The findings in Table 4.25 showed that the level of implementation of government workplace safety regulations moderated the relationship between workplace safety and employee productivity. The values of adjusted R-squared obtained for the subsequent models testing the moderating effect changed, and this depicted that the

level of implementation of government workplace safety regulations moderated the relationship between workplace safety and employee productivity. Specifically, the values of the adjusted R-squared obtained (0.810, 0.897, 0.302 and 0.558) depicted that holding all other factors constant, 81%, 89.7%, 30.2% and 55.8% of the variations in employee productivity measures (Index of employee productivity measures, productive time, the accomplishment of tasks and value-added respectively) can be explained by the independent variable workplace safety, and moderating variable; level of implementation of government workplace safety regulations while 19%, 11.2%, 69.8%, 44.2% of variations in the index of employee productivity measures, productive time, the accomplishment of tasks and value-added respectively are explained by random error or other factors. Further, as indicated by the adjusted R-squared, the models' explanatory powers for the index of employee productivity measures, productive time, and accomplishment of tasks improved by 0.002, 0.013, and 0.01, respectively, while the explanatory power of the model adj. R^2 for value-added reduced by 0.247 compared to the fitted model for objective one without the moderating variable.

This implies that enhancing the moderator (level of implementation of government workplace safety regulations) would increase the effect of the predictor (workplace safety) on three employee productivity measures (index of employee productivity measures, productive time and accomplishment of tasks improved while enhancing the moderator (level of implementation of government workplace safety regulations) would reduce the effect of the predictor (workplace safety) on value-added as a measure of employee productivity. Unlike the case of productive time and accomplishment of tasks, the inclusion of the moderator reduced the impact of workplace safety on the value added by employees. This result contrasts the interpretation of Signé (2020) that better government policy implementation means better safety and revenue output by human capital. This was explained by the fact that workplace safety programmes such as transfer to insurance, consultants and safety ergonomics among others are expensive. A firm with a better implementation of government workplace safety regulations is expected to have spent more, reducing revenue per employee. This result may be illustrated using a study by Yadav et al. (2019), which found that firms that heavily invest in programmes that boost the quality of work-life may diminish the revenue per employee.

The study further carried out Analysis of Variance (ANOVA) test was to ascertain the significance of the estimation model. Results presented in table 4.26.

Table 4.26: ANOVA Results Showing Overall Significance of the Model for Objective Two

2(a)	Model	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	64.902	9	7.211	51.611	.000[b]
	Residual	13.693	182	.140		
	Total	78.595	191			
2(b)	Regression	98.856	9	10.984	96.803	.000[b]
	Residual	11.347	182	.113		
	Total	110.202	191			
2(c)	Regression	393.123	9	43.680	2.814	.004[b]
	Residual	1551.994	182	15.520		
	Total	1945.117	191			
2(d)	Regression	300.962	9	33.440	14.018	.000[b]
	Residual	238.552	182	2.386		
	Total	539.514	191			

a. Dependent Variable: 2(a) Index of Employee Productivity measures, 2(b) Productive time, 2(c) accomplishment of tasks, 2(d) value added

b. Predictors: (Constant), government regulation($x_{5)}$, workplace safety transfer($x_{4)}$, workplace safety training($x_{3)}$, workplace safety emergency management(x_2), workplace safety ergonomics($x_{1)}$, x_1x_5 , x_2x_5, x_3x_5, x_4x_5

The findings presented in Table 4.26 show the ANOVA results of the regression model estimating the moderating effect of the level of implementation of government regulation on the relationship between workplace safety and employee productivity. The results show that F statistics were 51.611, 96.803, 2.814, 14.018 and p-values 0.000, 0.000, 0.004, 0.000<0.05 for the index of employee productivity measures, productive time, the accomplishment of tasks and value-added respectively. This implied that the model used is statistically significant. Further, these results show that the fitted regression model linking the relationship between the moderator, the predictor and the outcome is statistically significant (F = (51.611, 96.803, 2.814, 14.018); $p < 0.05$) at a 5% level of significance. Also, this signifies that the null hypothesis stated that there is no statistically significant moderating effect of the level of implementation of government regulation on the relationship between workplace safety measures and employee productivity is rejected. A conclusion is drawn that the level of implementation of government workplace safety regulations has a significant moderating effect on the relationship between workplace safety measures and employee productivity.

Further the study results determined the coefficient estimates that pointed out the magnitude that the level of implementation of government safety regulation affected the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The regression coefficients for the model are presented in Table 4.27.

Table 4.27: Coefficient Estimates of the Objective Two Model

(a) Workplace Safety, Level of Implementation of Government Safety Regulation and Index of the Employee Productivity measures

	B	Std. Error	t	Sig.
Constant	.240	.090	2.667	.000
x_1	.496	.245	2.024	.028
x_2	.436	.219	1.991	.040
x_3	.493	.232	2.125	.016
x_4	.396	.201	1.970	.040
x_5	.382	.192	1.990	.022
x_1x_5	.500	.191	2.618	.004
x_2x_5	.485	.222	2.185	.035
x_3x_5	.497	.211	2.355	.043
x_4x_5	.428	.197	2.173	.042

(b) Workplace Safety, Level of Implementation of Government Safety Regulation and Productive Time

	B	Std. Error	t	Sig.
Constant	.165	.070	2.357	.017
x_1	.367	.183	2.005	.021
x_2	.351	.171	2.053	.033
x_3	.388	.185	2.097	.026
x_4	.371	.188	1.973	.044
x_5	.331	.167	1.982	.035
x_1x_5	.392	.177	2.215	.022
x_2x_5	.384	.186	2.065	.019
x_3x_5	.392	.169	2.320	.025
x_4x_5	.391	.193	2.026	.024

(c) Workplace Safety, Level of Implementation of Government Safety Regulation and Accomplishment of Tasks

B	B	Std. Error	t	Sig.
Constant	.290	.121	2.397	.022
x_1	.426	.216	1.972	.017
x_2	.473	.228	2.075	.016
x_3	.456	.221	2.063	.036
x_4	.430	.209	2.057	.037
x_5	.421	.212	1.986	.024
x_1x_5	.437	.199	2.196	.026
x_2x_5	.479	.219	2.187	.033
x_3x_5	.451	.222	2.032	.027
x_4x_5	.486	.231	2.104	.015

(d) Workplace Safety, Level of Implementation of Government Safety Regulation and Value Added

B	B	Std. Error	t	Sig.
Constant	.223	.110	2.027	.042
x1	.381	.189	2.016	.033
x2	.348	.176	1.977	.044
x3	.352	.166	2.120	.021
x4	.331	.159	2.082	.034
x5	.363	.182	1.995	.027
x1x5	.423	.204	2.074	.041
x2x5	.413	.203	2.034	.019
x3x5	.392	.192	2.042	.015
x4x5	.403	.198	2.035	.046

a. Dependent Variable: Employee Productivity measured (a) index of Employee Productivity measures (b) Productive time (c) employees' degree of accomplishment of tasks and (d) value added

Independent variable: Workplace safety ; x_1 is workplace safety ergonomics, x_2 is workplace emergency management, x_3 is workplace safety training , x_4 is workplace safety transfer to insurance and consultants and x_5 is the level of implementation of government workplace safety regulations.

Results in table 4.27 showed that when workplace safety interacted with the level of implementation of government policy, the resultant coefficients were positive and significant therefore implying that enhancing workplace safety programmes and the level of implementation of government policy would improve employee productivity through better value-added by employees, better productive time and better degree of accomplishment of tasks. For instance, the coefficient estimate for the effect of workplace safety ergonomics on the index of the employee productivity measures ($\beta_1 x_1$) was 0.496 and p-value =0.028<0.05, but when interacted with the moderator ($\beta_6 x_1 x_5$), it became 0.500 and p-value=0.004<0.05. The coefficient estimate for the effect of workplace safety emergency management on the index of the employee productivity measures ($\beta_2 x_2$) was 0.436 and p-value =0.040<0.05, but when interacted with the moderator ($\beta_7 x_2 x_5$), it became 0.485 and p-value=0.035. This implied that employee productivity is enhanced positively when workplace safety and the level of implementation of government workplace safety regulations interact, and this relationship is statistically significant. The coefficient estimates for other variables exhibited a similar behavior meaning that when the level of implementation of government workplace safety regulations interacted with workplace safety training, and workplace safety transfer to insurance and consultants, it resulted in a

significant positive change in all employee productivity measures; productive time, accomplishment of tasks and value-added.

Therefore, when workplace safety and the level of implementation of government workplace safety regulations interact, their effect on the outcome variable is enhanced positively, and this relationship is statistically significant. Thus the null hypothesis that the level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya was rejected. Therefore, the study concludes that the level of implementation of government workplace safety regulations moderates the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.

The conclusion arrived at in this hypothesis can be explained on several grounds. First, in terms of the concern for this study, the findings bring out the role of the level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. These findings are supported by the descriptive analysis where the majority with an aggregate score of (Mean =3.4850, SD= 1.1670) indicated that manufacturing companies had complied with government workplace regulations with variations. Further emphasizing the implications of these findings, a study by Mohamed (2021) notes that firms that have fully implemented government regulations have superior workplace safety programmes. Consequently, their employees perform duties confidently and hence better accomplishment of tasks. Literature by Baicker (2018) and Sinno et al., (2020) also opined that implementing government workplace safety regulations is the cornerstone to preventing employee safety and productivity problems. This study has empirically proved these assertions.

Second, from the theoretical literature, the study used the postulates of the domino theory developed by Heinrich (1931), which identified that protective factors eliminate incidents brought about by the person's fault and work-related factors. Therefore, implementing government workplace safety regulations ensures that manufacturing firms have workplace safety programmes. When these programmes are in place, the employees are likely to better produces in terms of improved

productive time, better accomplishment of tasks and value added by employees. For instance, when the firms have a well-implemented Work Injury Benefits Act (WIBA) plan, which guarantees financial compensation in case of workplace accidents, they are likely to produce better without constant worries of accidents. Domino theory posits that when employee safety is guaranteed through policy, and in this case, implementation of government safety regulations, employee factors leading to unsafe acts and unproductive behaviour such as recklessness, violent temper, nervousness, excitability, inconsiderateness and ignorance are eliminated, leading to better workplace safety and employee productivity. Further, implementing government safety regulations such as the occupational health and safety Act (2013) and the mandatory safety requirements for the manufacturing sector (2016) ensure that employees are protected from accidents that could adversely affect their productivity. When employees are safe, and their safety is guaranteed through government policy implementation, they are likely to better produce results (Michael & Merson, 2016). The results of the current study have empirically tested this.

Further, these findings can be explained by the postulates of the risk homeostasis theory developed by Wilde (1998). This theory maintains that employees adjust their work and risk-taking behaviour based on their perceived exposure to risk. If they perceive that the level of subjectively experienced risk is higher, people adjust their work behaviour, which may lower their productivity. Therefore low government safety regulation implementation interferes with employees' productivity. The findings have empirically proved this. Increased workplace safety and the level of implementation of government safety mandates lead to better employee productivity.

The findings add to the development of Rasmussen's Risk Management theory (Rasmussen, 1997). The theory stipulates that compliance with regulations is required for the organization's safety systems to function and provide value to the organization. The current study findings add that implementation of government policy moderates the relationship between workplace safety and employee productivity. Therefore a firm that fully implements government workplace safety regulations is expected to have better workplace safety and employees to accomplish tasks better, adding value to the firm's revenues and enhancing their productive time. Therefore, the postulate of the theory that compliance with the regulations protects

the value stream from threats that hinder the creation of value has been empirically proved by the current study's findings.

Third, the findings of this study are consistent with study findings of Dwomoh et al. (2016), which was a critical literature review study on the impact of occupational health and safety policies on employees' performance in Ghana's timber industry that suggested that the government workplace safety policies have a significant impact on the level of adoption of safety programmes and employee performance. The current study finding brings on new knowledge by testing the moderating effect of the level of implementation of government safety regulation on the relationship between workplace safety and employee productivity using original findings. These results are also similar to the findings of Katsuro et al. (2018) on the impact of occupational health and safety on worker productivity in the food industry in Zimbabwe, which found that food firms that had upgraded their safety programmes as per government requirements recorded better worker productivity. The study was, however, based in a different sector and country from the contextual background of the current study and failed to investigate the moderating effect of the level of implementation of government safety regulations on the relationship between workplace safety and employee productivity. Additionally, the current study used a combination of employee productivity measures: level of accomplishment of tasks, value-added and productive time. Therefore, the observations drawn above show that the current study findings contribute to bridging the knowledge gaps identified in the literature review.

Lastly, from the findings shown in Table 4.27, the coefficient estimates of the moderating effect of the level of implementation of government safety regulation on the relationship between work place safety and index of all employee productivity measures can be presented in the regression equation below:

$$Index\ of\ Employee\ Productivity\ Measures(Y) = .0240 + 0.496x_1 + 0.436x_2 + 0.493x_3 + 0.396x_4 + 0.382x_5 + 0.500x_{1*}x_5 + 0.485x_{2*}x_5 + 0.497x_{3*}x_5 + 0.428x_{4*}x_5 + \varepsilon \quad \ldots\ldots 4.12$$

Where x_1 is safety ergonomics, x_2 is emergency management, x_3 is safety training, x_4 is safety transfer, x_5 is the level of implementation of workplace safety policy and e i**s** error term.

4.9 Intervening Effect of Employee Safety Attitude on Relationship between Workplace Safety on Employee Productivity of Manufacturing Firms

The study's third objective was to evaluate the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. To achieve this objective, the study used Pearson's Product Moment approach to assess the direction and strength of the relationship between employee safety attitudes, workplace safety and employee productivity in manufacturing firms in Kenya. Further, linear regression analyses were used to test the hypotheses. The results consisting of correlation and regression analysis are presented under the following sub-sections.

4.9.1 Correlation of Employee Safety Attitude, Workplace Safety and Employee Productivity of Manufacturing Firms in Kenya

The Pearson's Product Moment correlation technique was used to determine the direction and strength of the association between the independent variable, intervening and dependent variable. The findings are presented on Table 4.28.

Table 4.28: Correlation of Employee Safety Attitude, Workplace Safety and Employee Productivity of Manufacturing Firms in Kenya

Correlations

		Employee Productivity	Workplace safety	Employee safety attitude
Employee Productivity	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	192		
Workplace safety	Pearson Correlation	.891**	1	
	Sig. (2-tailed)	.000		
	N	192	192	192
Employee safety Attitude	Pearson Correlation	.192*	.180*	1
	Sig. (2-tailed)	.036	.003	
	N	192	192	192

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The correlation results in table 4.28 show that employee safety attitude, workplace safety and employee productivity are positively and significantly correlated with each other. Correlation of employee safety attitude and workplace safety was ($r = 0.180, p = 0.03 < 0.05$). Since the correlation of 0.180 was more than 0.5 there existed a strong positive relationship between the two variables. The p value of 0.03

was less than 0.05 hence the correlation of workplace safety attitude was significant at 5% significance level. The implication of this finding is that positive increase in the level of employee safety attitude leads to a significant increase in workplace safety. Therefore firms that have employees with better safety attitudes are expected to have better workplace safety.

Further the results revealed that the correlation of employee safety attitude and employee productivity and was ($r = 0.192, p = 0.036 < 0.05$). Since the correlation of 0.192 was more than 0.5, there existed a strong positive relationship between the two variables. The p value of 0.036 was less than 0.05 therefore the relationship between the employee safety attitude and employee productivity was significant at 5% significance level. The implication of these results is that positive increase in workplace safety attitude leads to a significant increase in employee productivity in terms of productive time, accomplishment of tasks and value added.

4.9.2 Regression Analysis Evaluating the Intervening Effect of Employee Safety Attitude on the Relationship between Workplace Safety and Employee Productivity

To determine the intervening effect of the employee safety attitude on the relationship between work place safety and employee productivity, a linear regression analysis was carried out in four steps. In the first step, employee productivity was regressed against workplace safety so as to show there is a relationship between the independent variable and dependent variable which may be intervened. In the second step, employee safety attitude was regressed against the workplace safety to show that the independent variable is related to the potential intervenor. In the third step employee productivity was regressed against the intervening variable (employee work safety attitude) to show that the potential intervener is related to the dependent variable. In the fourth model the dependent variable was regressed on the independent variable and the potential intervener in blocks.

The findings are presented in the following sub-sectional tables of summary statistics, ANOVA, and coefficient estimates combining results of the three models in one table.

Table 4.29 : Summary of the Objective Three Models

Model	Indicator and interaction terms	R	R Square	Adjusted R Square	Std. Error of the Estimate
Model 1	$Y = \alpha_0 + \beta_1 X_1 + \varepsilon_0$	.891[a]	.794	.792	.39117
Model 2	$M = \alpha_1 + \beta_2 X_1 + \varepsilon_1$	.180[a]	.032	.023	.30456
Model 3	$Y = \alpha_2 + \beta_3 M + \varepsilon_2 x$	.192[a]	.037	.028	.84499
Model 4	$Y = \alpha_3 + \beta_4 X_1 + \beta_5 M + \varepsilon_3$	.873[a]	.762	.758	.42195

a. Predictors: (Constant), Work safety
a. Predictors: (Constant), Work safety
a. Predictors: (Constant), Work safety employee Attitude
a. Predictors: (Constant), safety employee attitude, Work safety

Where; Where Y is the dependent variable (employee productivity), $\alpha_0 =$ to α_3 is the y intercepts, $\beta_1$to β_5 is the regression (beta) coefficients, $X_1$is the independent variable (workplace safety), M is the intervening variable (employee safety attitudes) and ε_0 to ε_3 are the regression error terms.

Based on the findings presented in Table 4.29 above, the adjusted R-square for model l (regression of employee productivity and work safety) was found to be 0.794. This signified that 79.4% of the variation in employee productivity is explained by work safety. Regarding the model 2 (regression of employee safety attitude against work safety), the R-square=0.032, signified that 3.2% of the variation in work safety is explained by the employee safety attitude. Concerning model 3 (regression of employee productivity against employee safety attitude), the R-square=0.037, implying that 3.7% of the variation of the employee productivity is explained by employee safety attitude. Lastly, regarding model 4 (regression of employee productivity against work safety and employee safety attitude), the R-square=0.762, signifying that 76.2% of the variation in employee productivity is explained by work safety and employee safety attitude holding other factors constant.

To further investigate the intervening effect of the employee safety attitude on the relationship between the work place safety and employee productivity in manufacturing firms in Kenya, Analysis of Variance (ANOVA) was carried out to ascertain the significance of the estimation model. Results presented in table 4.30

Table 4.30: ANOVA Findings for Objective Three Models

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	62.375	1	62.375	407.638	.000
	Residual	16.220	190	.153		
	Total	78.595	191			
2	Regression	.328	1	.328	3.537	.016
	Residual	9.832	190	.093		
	Total	10.160	191			
3	Regression	2.909	1	2.909	4.074	.046
	Residual	75.686	190	.714		
	Total	78.595	191			
4	Regression	59.900	2	29.950	168.223	.000
	Residual	18.694	189	.178		
	Total	78.595	191			

1. a. Dependent Variable: Employee Productivity
   b. Predictors: (Constant), Work safety
2. a. Dependent Variable: Employee Safety Attitude
   b. Predictors: (Constant), Work safety
3. a. Dependent Variable: Employee Productivity
   b. Predictors: (Constant), Employee Safety Attitude
4. a. Dependent Variable: Employee Productivity
   b. Predictors: (Constant), Employee Safety Attitude, Work safety

The findings presented in Table 4.30 show the ANOVA results of the four regression models estimating the intervening effect of the employee safety attitude on the relationship between the work place safety and employee productivity in manufacturing firms in Kenya. In model 1, the study obtained F (1, 190) = 407.638 and p-value=0.000<0.05 implying that the model used to link the predictor and the outcome is statistically significant ($F = 407.638$, $p < 0.05$) at a 5% significance level. Also this signifies that the null hypothesis stated work safety has no statistically significant effect on employee productivity is rejected and conclusion drawn that work safety significantly affects employee productivity.

Regarding the results for model 2, the study obtained F (1,190) = 3.537, p-value=0.016<0.05 implying that the model used to link the independent variable and the potential intervenor is statistically significant. Thus, the null hypothesis stated

that work safety has no statistically significant effect on employee safety attitude is rejected and conclusion is drawn that work safety affects employee safety attitude significantly.

The results for model 3, obtained F (1, 190) = 4.074, p-value=0.046<0.05 implying that the model used to link the dependent variable and the potential intervenor is statistically significant. This signifies that the null hypothesis stated that employee safety attitude has no statistically significant effect on employee productivity is rejected and conclusion drawn that employee safety attitude affects employee productivity significantly.

Lastly the results for model 4, obtained F (2,189) = 168.223, p-value=0.000<0.05 , implying that the model used to link the dependent variable, independent and the potential intervenor is statistically significant thus the null hypothesis stated that work safety and employee safety attitude have no statistically significant effect in employee productivity is rejected and conclusion drawn that work safety and employee safety attitude affect employee productivity significantly.

Further the results determined the coefficient estimates that pointed out the magnitude of each interaction terms on each other. The regression coefficients for each of the model were presented in Table 4.31.

Table 4.31 : Coefficient Estimates for the Objective Three Models

Model	Variable List	Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	.418	.200	2.090	.040
	Work safety	.439	.201	2.184	.031
2	(Constant)	.415	.210	1.976	.020
	Work safety	.351	.164	2.140	.016
3	(Constant)	.442	.220	2.009	.041
	Employee Attitude	.435	.212	2.052	.042
4	(Constant)	.437	.219	1.995	.033
	Work safety	.392	.192	2.042	.022
	Employee Attitude	.463	.225	2.058	.019

1. Dependent Variable: Employee Productivity
2. Dependent Variable: Employee Safety Attitude
3. Dependent Variable: Employee Productivity
4. Dependent Variable: Employee Productivity

The findings presented in Table 4.31 shows the coefficient estimates of the models 1, 2, 3 and 4 applied in estimating the intervening effect of employee safety attitude on the relationship between work safety and employee productivity. Model 1 tested the relationship between the independent variable (workplace safety) and dependent variable (employee productivity) which may be intervened. The results for model one obtained a coefficient estimate of β_1=0.439 and p-value=0.032<0.05, signifying that an increase in work safety by 1 unit results in an increase in employee productivity by 0.439 units holding all other factors constant.

Therefore, from the findings, the coefficient estimates for model 1 in step 1 for estimating the intervening effect employee safety attitude on the relationship between workplace safety and employee productivity can be presented in the regression equation :$Y = \alpha_0+0.439\ x_1 + \varepsilon_0$.

Where Y is the dependent variable (employee productivity), α_0 is the y intercept, β_1 is the regression coefficient, x_1 is the independent variable (workplace safety) and ε_0 is the regression error term.
The interpretation drawn from these results therefore is that workplace safety predicts employee productivity in manufacturing firms since β_1 is statistically significant.

The second step for testing intervening effect of employee safety attitudes on the relationship between employee safety and employee productivity involved regressing employee safety attitude against the workplace safety to show that the independent variable is related to the potential intervenor. The results for model 2 obtained a coefficient estimate of β_2=0.351, p-value=0.016<0.05, which implied that an increase in work safety by 1 unit, leads to an increase in employee safety attitude by 0.351 units holding all other factors constant. Therefore, from the findings, the coefficient estimates for model 2 in step 2 for estimating the intervening effect employee safety attitude on the relationship between workplace safety and employee productivity can be presented in the regression equation : $M= \alpha_1+ . 0.351s\ x_1+ \varepsilon_1$.
Where M is the intervening variable (employee safety attitudes), α_1 is the y intercept, β_2 is the regression coefficient, x_1 is the independent variable (workplace safety) and ε_1 is the regression error term.

The interpretation drawn from these results is that workplace safety predicts employee safety attitude in manufacturing firms since β_2 is statistically significant. Therefore as the firm invests more on workplace safety, employees' safety attitudes improve positively. This finding collaborates the postulates of Schultz (2017) that workplace safety programmes such as safety training, workplace safety analysis, safety transfer to insurance companies and consultants affects the behavior of the employees by influencing their response to safety programmes positively. Similarly, Cox and Cox (2018) studied the structure of employee attitudes to safety in selected firms in Europe and found that safety programmes demonstrate organizational commitment to safety and therefore lead to safeness of the work environment which enhances positive safety culture and attitudes among employees. Second, these results confirm the postulates of the domino theory developed Heinrich (1931) that safety incidents relate to lack of safety programmes such as ergonomics, emergency, transfer and safety training. The theory posits that faults brought about by employee safety attitudes (personal and ancestry; such as recklessness, violent temper, nervousness, excitability, inconsiderateness, ignorance of safe practices) can be eliminated by a proper workplace safety programme.

The third step for testing the intervening effect of employee safety attitudes on the relationship between employee safety and employee productivity involved regressing potential intervener against the dependent variable. The results for model 3 obtained a coefficient estimate of $\beta 1=0.435$, p-value=0.046<0.05, signifying that an increase in employee safety attitude by 1 unit leads to an increase of employee productivity by 0.435 units holding all other factors constant. Therefore, from these findings, the coefficient estimates for model 3 in step 3 for estimating the intervening effect employee safety attitude on the relationship between workplace safety and employee productivity can be presented in the regression equation: $Y= \alpha_2+ 0.435M + \varepsilon_2$
Where: Y is the dependent variable, α_2 is the y intercept, β_3 is the regression (beta) coefficient, M is the intervening variable and ε_2 is the regression error term.

The interpretation drawn from these results is that employee safety attitude predicts employee productivity in manufacturing firms since β_3 is statistically significant. Therefore as the employees safety attitudes improve, employee productivity improves holding other factors constant.

These results are similar to the findings by Rahiman and Kodikal (2017) that studied the relationship between employee work related attitudes (safety attitudes, work commitment and job involvement) and job performance. The study found that the level of productivity in industries that posted better work related attitudes was better than those industries where employees had poor employee attitudes. These findings also support the findings of Jahangiri (2017) who did a critical literature review on attitudes that affect employee productivity of construction workers and identified safety perception and attitudes of employees as a major factors influencing employee productivity. These results can also be explained by the postulates of the tip of the iceberg theory developed by McCllelland (2000) that some factors which allowed employees to excel in their work were not appearing on the surface and lead to huge employee productivity losses in terms of error rates, worktime and unaccomplished tasks . This has been confirmed by the findings of the current study that workplace safety attitudes influences employee productivity in terms of productive time, accomplishment of tasks and value added.

The fourth step involved regressing employee productivity on workplace safety and employee safety attitudes in blocks to check whether workplace safety still predicts employee productivity in manufacturing firms when employee safety attitude is in the model. The results for model 4, obtained a coefficient estimate of work safety, β_4=0.392, p-value=0.022<0.05, imply that an increase in work safety by 1 unit leads to an increase in employee productivity by 0.392 units holding employee safety attitude and other factors constant in model 4. Further, the coefficient estimate of employee safety attitude, β_5=0.463, p-value=0.019<0.05 implying that an increase in employee safety attitude by 1 unit, leads to an increase in employee productivity by 0.463 units holding work safety and other factors constant in model 4.

Therefore, from these findings, the coefficient estimates for model 4 in step 4 can be presented in the regression equation: $Y= \alpha_3+ 0.392x_1 + 0.463M + \varepsilon_3$

Where: Y is the dependent variable (Employee productivity), α_3 is the y intercept, β_4 and β_5 are regression (beta) coefficients, x_1 is the independent variable (workplace safety), M is the intervening variable (employee safety attitudes) and ε_3 is the regression error term.

The interpretation drawn from these results is that workplace safety predicts employee productivity in manufacturing firms when employee safety attitude is in the model since β_4 is statistically significant. The results further indicate that the coefficient of workplace safety on employee productivity reduces from 0.439 in model one without employee safety attitudes to 0.392 in model four when employee safety attitudes are included in the model. Therefore inclusion of employee safety attitudes reduces the effect of workplace safety on employee productivity. Further the results indicate that the coefficient of employee safety attitude when regressed against employee productivity was (0.435) but when workplace safety is included in the model employee safety attitude coefficient increases to (0.463). These results therefore reveal that employee safety attitude significantly intervenes on the relationship between workplace safety and employee productivity. Therefore the null hypothesis

H_{03} that employee safety attitude has no intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya is not supported and therefore is rejected. This means that employee safety attitude has an intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya

The interpretations drawn can be explained on several grounds. First, from the descriptive statistics of the current study workplace safety attitudes obtained an aggregate score of (Mean =2.2904, SD= 1.18454). These results implied that employees in manufacturing companies in Kenya had bad safety attitudes towards safety in the manufacturing firms. The standard deviation obtained (1.18454) showed that respondents varied on their views. This shows that despite the importance of workplace safety attitudes on workplace safety and employee productivity as demonstrated by the findings of the current study, manufacturing firms still needed to launch programmes to improve workplace safety attitudes of their employees. This will boost workplace safety and employee productivity as demonstrated by the findings of this study.

Secondly, previous literature by behavioral human resource experts suggest that workplace safety attitudes is essential for influencing work behavior; Lencioni, (2019) suggested that employee safety attitudes such as overconfidence or phobias

affects their judgement and reaction towards safety programmes which may lead to more or less safety incidents and which may affect their work productivity. This has been empirically proven by the findings of the current study. Aswathappa (2015) opined that bad work habits, attitudes and poor working conditions that lead to carelessness and mistakes lead to employee productivity and safety problems while Dessler (2015) asserts that regardless of the type of the organisation, workplace attitudes can have a significant influence on the employee's productivity and safety on the job. The findings of the current study contribute to extant behavioral human resource literature by empirically pointing out that workplace safety attitudes have a significant intervening effect on the relationship between workplace safety and employee productivity.

Thirdly, these findings are similar to the results by a study by Saleh (2015) which found a significant relationship between employee safety attitudes, employee performance and employee safety. The study investigated the influence employee attitudes on safety management in the manufacturing sector in Malaysia. The study however, was based in a different country and conceptualized employee safety attitudes in terms of personal involvement, communication and physical work environment while the current study used conceptualized employee safety attitudes in terms of; response to safety practices and employee perception of safety risk programmes as posited by (Fine, 2017), Gao *et al*., (2019) and NOSA safety management system (2017). Further, the current study finding clarifies the contradictory results of Kao (2019) and Laura (2019) on the role of workplace safety attitude on the relationship between workplace safety and employee productivity. Roy & Gupta (2020) studied safety investment optimization in process industry and found that investments in workplace safety improved risk heuristics in employees and this in turn boosted employee productivity. The study did not test for the empirical relationships between the variables. These research gaps have been addressed by the findings of the current study.

Lastly, from the theoretical literature, the study used the postulates of the domino theory developed Heinrich (1931) which posited that combining factors that lead to unsafe workplaces; faults of the person (personal and ancestry) and the environment or work related factors. The theory identified that these causes of accidents can be

eliminated using a safety management system. The current study results add that employee safety attitudes do not just affect workplace safety but also the productivity of employees. To address employee productivity problems therefore, the organization should have a safety management system that also addresses the safety attitudes of employees. Further the current study used the postulates of the the risk homeostasis theory developed by Wilde (1998) which posited that employees adjust their work risk behaviour based on four factors: firstly the expected benefits of risky behaviour for example gaining work time by speeding, secondly the expected costs of risky behaviour for example insurance surcharges, thirdly expected benefits of safe behaviour for example insurance discounts and fourthly the expected costs of safe behaviour for example for example time loss. All these factors (work behaviours) have been empirically tested by the current study and found to influence safety and productivity issues in the manufacturing sector.

The implication of these findings is that workplace safety and employee productivity problems persisted because of the consequences of unsafe practices and attitudes such as taking unsafe risky shortcuts to time save or because it was more convenient for the employees. The Managerial implication of these results is that for managers to achieve safety and productivity in their institution have to overcome bad employee safety attitudes. This can be done through launching programmes to improve employee safety behavior through maintaining a worker's perception of their skill and ability to avoid workplace injury. Therefore an organization seeking to reduce its workplace safety and employee productivity problems should focus on reinforcing safe behaviors brought about by employee safety attitude.

4.10 : The Joint Effect of Work Place Safety, Level of Implementation of Government Work Place Safety Regulations and Employee Safety Attitude on Employee Productivity in Kenya

The fourth objective of the study was to assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. To achieve this objective; hypothesis H_{04} was formulated as follows: Workplace safety, level of implementation of government workplace safety regulations and employee safety attitudes have no significant joint effect on employee productivity in manufacturing firms in Kenya. The direction and strength of the relationship between

the variables was examined using the Pearson's Product Moment approach. Multiple linear regression analyses were used to test the hypotheses. The results consisting of correlation and regression analysis are presented under the following sub-sections.

4.10.1 Correlation of Work Place Safety, Level of Implementation of Government Work Place Safety Regulations, Employee Safety Attitude and Employee Productivity

The Pearson's Product Moment correlation results showing the direction and strength of the association between the independent variables, moderating, intervening and dependent variable are presented on Table 4.32.

Table 4.32 Correlation between Work Place Safety, Level of Implementation of Government Work Place Safety Regulations, employee Safety Attitude and Employee Productivity

Correlations								
		Y	x_6	x_1	x_2	x_3	x_4	x_5
Y	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	192						
x_6	Pearson Correlation	.192*	1					
	Sig. (2-tailed)	.036						
	N	192	192					
x_1	Pearson Correlation	.858**	.189	1				
	Sig. (2-tailed)	.000	.050					
	N	192	192	192				
x_2	Pearson Correlation	.874**	.146	.910**	1			
	Sig. (2-tailed)	.000	.033	.000				
	N	192	192	192	192			
x_3	Pearson Correlation	.849**	.177	.897**	.921**	1		
	Sig. (2-tailed)	.000	.004	.000	.000			
	N	192	192	192	192	192		
x_4	Pearson Correlation	.800**	.223*	.820**	.830**	.838**	1	
	Sig. (2-tailed)	.000	.021	.000	.000	.000		
	N	192	192	192	192	192	192	
x_5	Pearson Correlation	.617**	.299**	.668**	.613**	.703**	.596**	1
	Sig. (2-tailed)	.000	.002	.000	.000	.000	.000	
	N	192	192	192	192	192	192	192

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

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

Where; Y is employee productivity, x_1 is safety ergonomics, x_2 is emergency management, x_3 is safety training, x_4 is safety transfer, x_5 is the level of implementation of workplace safety policy, x_6 is employee safety attitude and e_4 is error term.

The correlation results in table 4.32 show that all variables (employee safety attitude, level of implementation of government safety regulations, workplace safety and

employee productivity are positively and significantly correlated with all p values< 0.05. Out of the indicators of workplace safety; safety transfer had the highest correlation with workplace safety attitude with $(r = 0.223, p = 0.21 < 0.05)$, followed by workplace safety ergonomics $(r = 0.189, p = 0.50 < 0.05)$ and correlation of workplace safety training and employee safety attitudes was$(r = 0.177, p = 0.004 < 0.05)$. Therefore these results show that enhancing workplace safety transfer through insurance companies, safety consultants and private security enhanced positive safety attitudes among employees in manufacturing firms in Kenya. Workplace safety ergonomics, workplace safety training, and workplace safety emergency management also positively enhance employee safety attitudes. Correlation of the level of implementation of government workplace safety regulations and employee safety attitudes was$(r = 0.299, p = 0.002 < 0.05)$ implying a positive and significant correlation between the two variables.

Generally the results implied that for a firm to attain maximum employee productivity in terms of degree of accomplishment of tasks, productive time and value added, it has to address areas of workplace safety through enhancing its safety control programmes such as safety ergonomics, emergency management, safety training and safety transfer. Further the organization must ensure implementation of government workplace safety regulations. Implementation of these programmes would enhance positive employee safety attitudes. Further, workplace safety, workplace safety attitudes and degree of implementation of government workplace safety regulations s predicted employee productivity in manufacturing firms in Kenya.

4.10.2 Regression Analysis Assessing the Joint Effect of Workplace Safety, Level of Implementation of Government Workplace Safety Regulations and Employee Safety Attitude on Employee Productivity in Manufacturing Firms in Kenya

To assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya, a linear regression analysis was carried out. The regression analysis findings are presented under the following sub-sectional tables of summary statistics, ANOVA, and coefficient estimates:

Table 4.33: Model Summary the Goodness of Fit of Model for Objective Four

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.894	.799	.787	.3950

a. Predictors: (Constant), Safety Ergonomics, safety emergency management, safety training, Safety transfer, level of implementation of government workplace safety regulations Employee safety attitude.

The results in Table 4.33 showed that the value of adjusted R-squared obtained for the joint effect workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya, was 0.787 at a probability value 0.000, which is less than significance value of 0.05. Therefore the R-squared 0.787 obtained implies that holding all other factors constant, 78.7 % of the variations in employee productivity can be explained by workplace safety, level of implementation of government workplace safety regulations and employee safety attitude while 21.3% of variations in employee productivity are explained by random error or other factors not included in the current study. The results further show that the explanatory power of the model (adj. r^2) reduced from 0.91 to 0.787 when employee safety attitude was included in the model. This is a slight reduction (0.123) which can be explained by the descriptive statistics of employee safety attitudes which showed that employee safety attitudes in manufacturing firms in Kenya were slightly below average (2.347) in comparison to the descriptive statistics of workplace safety (3.517) and descriptive statistics of level of implementation of government workplace safety regulations (3.485).

These results therefore imply that when organisations address these three areas; workplace safety, implementation of government workplace safety regulations and foster positive employee safety attitudes, then employee productivity in manufacturing firms is to be accomplished. This finding is in line with the recommendations of national occupational safety association (NOSA) safety management system (2017), international loss control institute (ILCI) guidelines (2015) and the three Es of safety (engineering, education, enforcement) advocated by Heinrich (2017) that when organisations address areas of ergonomics, emergency planning, safety training, safety transfer, enforcement through safety policy and progammes to create positive safety attitudes then a safe workplace is to be accomplished and consequently better employee productivity.

To further investigate the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya, Analysis of Variance (ANOVA) was carried out to ascertain the significance of the estimation model. The results presented in table 4.34

Table 4.34 : ANOVA Results Showing Overall Significance of the Model for Objective Four

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	62.704	6	10.451	66.974	.000
Residual	15.760	185	.156		
Total	78.464	191			

a. Dependent Variable: Employee Productivity
b. Predictors: (Constant), Attitude, Safety Management, Government Regulation, Safety Transfer, Safety ergonomics, Safety Training.

The findings presented in Table 4.34 show the ANOVA results of the regression model estimating the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. The results show that F (6, 185) =66.974 and p-value=0.000<0.05, implying that the model used is statistically significant. Also this signifies that the null hypothesis stated that there is no statistically significant joint effect of workplace safety, level of implementation of

government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya is rejected and a conclusion is drawn that the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya is significant.

The regression analysis also consisted of the coefficient estimates that pointed out the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. The analysis showed various sizes of coefficient estimates and indicated in Table 4.35 below.

Table 4.35: Coefficient Estimates of the Objective Four Model

	Coefficients		t	Sig.
	B	Std. Error		
(Constant)	.480	.315	3.556	.000
Safety Ergonomics	.537	.154	3.487	.003
Safety emergency management	.615	.162	3.796	.002
Safety training	.541	.165	3.279	.004
Safety transfer	.593	.179	3.313	.001
Level of implementation of government workplace safety regulations	.608	.186	3.269	.004
Employee safety attitude	.468	.132	3.545	.006

Dependent Variable: Employee Productivity

The findings shown in Table 4.35 indicate the coefficient estimates of the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. The results point out that the coefficient estimate of the constant (β_0) is 0.480 and p-value=0.000<0.05. This implies that employee productivity improves by 0.480 units regardless of being influenced by workplace safety, level of implementation of government workplace safety regulations and employee safety attitudes.

Concerning the effect of work place safety ergonomics on employee productivity, the results showed the coefficient estimate (β_1) =0.537 and p-value=0.003<0.05. This depicted that there is a significant positive relationship between work place safety ergonomics and employee productivity. Thus, as the work place safety ergonomics

improves by a percentage, it results in an increase in employee productivity by 53.7% holding all other factors constant. The regression coefficient for workplace safety ergonomics increased from 0.432 when testing the direct effect (predictor regressed without the moderator and intervenor) to 0.496 when the moderator and interaction terms were included in the model . It also increased to 0.537 when the intervening variable was included in the model. This finding shows that the three variables influence one another. The moderating variable and the intervening variable jointly increase the effect of workplace safety ergonomics on employee productivity by a factor of 0.537 holding other factors constant.

Concerning the effect of work place safety emergency management on employee productivity when the joint variables are included in the model, the results obtained a coefficient estimate (β_2) =0. 615 and p-value=0.002<0.05. This signifies that there is a significant positive relationship between work place safety emergency management and employee productivity when the moderator and intervening variables are included in the model. Moreover, this implies that as the work place safety emergency management improves by a percentage, it leads to an increase in employee productivity by 61.5% holding all other factors constant. Further the results show that the coefficient estimate for workplace safety emergency management when testing the direct effect in model one was 0.557, when the moderator and interaction terms were included in the model, the coefficient estimate became 0.436, whereas when testing the joint effect with the intervener now included, the coefficient estimate of workplace safety emergency management increased to 0.615. This show the variables jointly influence on another towards their effect employee productivity.

Concerning the effect of work place safety training on employee productivity, the findings pointed out that the coefficient estimate (β_3) =0.541 and p-value=0.004<0.05. This implies that there is a significant positive relationship between work place safety emergency management and employee productivity. Further, this points out that as work place safety training increases by a percentage, it results to an improvement in employee productivity by 54.1% holding every other factor constant. Moreover, the results show that the coefficient of workplace safety training was 0.204 when testing the direct effect. The coefficient increased to 0.493

when the moderator and interaction terms were included in the model then increased to 0.541 when testing the joint effect with the intervener included. This show the variables jointly influence one another on their effect towards employee productivity.

Regarding the effect of work place safety transfer on employee productivity in the joint model, the results showed that the coefficient estimate (β_4) =0.593 and p-value=0.001<0.05. This signifies that there is a positive and significant relationship between work place safety transfer and employee productivity. This point out that as the work place safety transfer is improved by a percentage, it results to an increase in employee productivity by 59.3% holding all other factor constant. Moreover the results reveal that the coefficient of workplace safety transfer in the direct model was .365, when the moderator was included in the model it increased to .382 then increased to 0.593 in the joint regression model when workplace safety attitudes(intervening variable) was included in the joint model. This show the variables jointly influence on their effect on employee productivity.

Regarding the effect of the level of implementation of government safety regulation on the employee productivity in the joint model, the results showed that the coefficient estimate (β_4) =0.608 and p-value=0.004<0.05. This signifies that there is a positive and significant effect of level of implementation of government safety regulation on the employee productivity, and this points out that as the level of implementation of government regulation improves by a percentage, the employee productivity improves by 60.8% holding all other factor constant. Moreover the results reveal that the coefficient of the level of implementation of government safety regulation in the moderating model was .382, when the joint variables were included in the model it increased to .608. This show the variables jointly influence on their effect on employee productivity. In addition the results imply that improving workplace safety and employee safety attitudes results to increased level of implementation of government safety regulation.

Regarding the effect of the work place safety attitude on the employee productivity, the results showed that the coefficient estimate (β_4) =0.468 and p-value=0.06<0.05. This signifies that there is a positive and significant effect of work place safety attitude on the employee productivity. This points out that as the work safety attitude

improves by a percent, the employee productivity improves by 46.8% holding all other factor constant. The results of the coefficients obtained for employee safety attitude in the joint model were 0.468 in comparison to the coefficient (0.435) obtained when employee safety attitudes was regressed against employee productivity directly. This shows that the inclusion of other variables in the model reduced the effect of employee safety attitudes on employee productivity. This result can be explained from the descriptive statistics obtained for employee safety attitudes which were below average in comparison to other variables in the study therefore coefficients for employee safety attitudes were less than other variables and reduced because it had the lowest contribution to the model predicting the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya.

Lastly, from the findings shown in Table 4.35, the coefficient estimates of the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya can be presented in the regression equation below:

$$Employee\ Productivity(Y) = 0.48 + 0.537x_1 + 0.615x_2 + 0.541x_3 + 0.593x_4 + 0.608x_5 + 0.468x_6 + \varepsilon \quad \ldots\ldots 4.13$$

Where x_1 is safety ergonomics, x_2 is emergency management, x_3 is safety training, x_4 is safety transfer, x_5 is the level of implementation of workplace safety policy, x_6 is employee safety attitude and e **is** error term.

The interpretation drawn from these results is that workplace safety, level of implementation of government workplace safety regulations and employee safety attitude have a significant joint effect on employee productivity in manufacturing firms in Kenya. Therefore, a relationship exists between these variables and employee productivity since coefficients $\beta_{1\ldots}\beta_6$ are statistically significant. Therefore the null hypothesis H_{04} that stated that workplace safety, level of implementation of government workplace safety regulations and employee safety attitude have no significant joint effect on employee productivity in manufacturing firms in Kenya is not supported and therefore is rejected.

There are various reasons for the results reached in this hypothesis. First and foremost, the outcomes of this study highlight the significance of installing workplace safety programmes, implementing, government workplace safety regulations and launching programmes that instill positive employee safety attitudes by organisations. The outcomes of this study also emphasize the importance of doing all these jointly to enhance employee productivity. The results revealed that these variables influence each other therefore an organization that installs one aspect of safety but leaves another will suffer from employee productivity problems.

Secondly, the findings of this study can be explained by theoretical literature using the the tip of the iceberg theory developed by McCllelland (2000). It is also referred to as the theory of omission. The theory ties workplace and employee productivity together. The firm posits that when firms allow their safety systems to degrade, their risk exposure increases and employees become less productive. The theory posits that management strategies should be channeled toward installing and maintaining safety programmes, effective implementation of safety regulations and addressing sources of entropic risk such as factors which reduce worker alertness and competence towards handling risk. Adopting such programmes contribute to improved safety, production output and system factor quality while failure to adopt such programmes(omissions) allows firms safety systems to degrade, their risk exposure increases and employees become less productive. These postulates have been proven by the findings of the current study that to ensure employees are productive in terms of accomplishment of tasks, value added and productive time, organisations have to address workplace safety in terms of ensuring programmes are in place to protect employees, further organisations must ensure they fully implement workplace safety regulations and foster positive workplace safety attitudes among the employees. These must be done jointly to ensure better employee productivity.

The findings can also be explained by the Heinrich's domino theory (1931) which posited that protective factors around the organization makes the organisations more resilient to risk and hence the more the employees are likely to perform productively without worrying about safety issues. Decreases in workplace incidents often leads to a transformed culture that leads to higher productivity. The more protective factors (ergonomics, emergency management, safety training, safety transfer and

implementation of government regulations) are available, the more resilient institutions are to risk and the more the employees are likely to perform productively without worrying about safety issues.

Third, the outcomes of this study were compatible with those of Beus et al., (2016) who discovered that unsafe work environments have clear employee productivity consequences. The study concluded that to achieve employee productivity organisations have to create an integrated safety system consisting of engineering approach (ergonomics and emergency management that focus on mechanical removal of hazards), human behavior approach that focuses on unsafe acts of the person and enforcement of government safety policies. The study compared extant empirical findings on safety and productivity therefore did not generate original empirical findings, this research gap has been subsequently addressed by the findings of the current study.

Similarly, Lei *et al*., (2018) found that highly developed occupational safety management system increases the employee productivity in terms of reduction in absenteeism, product improvement and service quality. The study used only descriptive statistics to analyse data therefore did not test for relationships between the variables. This gap has been subsequently addressed by the findings of the current study using superior employee productivity measures. Further the findings of the current study are in line with the recommendations of national occupational safety association (NOSA) safety management system (2017), international loss control institute (ILCI) guidelines (2015) and the three Es of safety (engineering, education, enforcement) advocated by Heinrich (2017) that organisations should address areas of ergonomics, emergency planning, safety training, safety transfer, enforcement through safety policy and progammes to create positive safety attitudes and then better employee productivity will be recorded.

4.11 Summary of Hypothesis Testing

The results of the test of hypotheses are summarized as presented in Table 4.36.

Table 4.36: Summary of the Test of Hypotheses

Hypothesis	Findings	Observations	Conclusion
H_{01}: Workplace safety has no effect on employee productivity in manufacturing firms in Kenya.	β_1 to β_4 are statistically significant. P <0.05) at a 5% level of significance	Workplace safety has a significant effect on employee productivity	$H_{01:}$ Not Supported, reject the hypothesis
H_{02}: Level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	The interaction terms are statistically significant.	Level of implementation of government workplace safety regulations showed evidence of the moderation effect on workplace safety and employee productivity.	H_{02}: Not Supported, reject the hypothesis
H_{03}: Employee safety attitude has no intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	(β_1 is statistically significant), (β_2 is statistically significant) (β_3 is statistically significant) and (β_4 is statistically significant).	Employee safety attitude has an intervening effect on the relationship between workplace safety and employee productivity	H_{03}: Not Supported, reject the hypothesis
H_{04}: Workplace safety, level of implementation of government workplace safety regulations and employee safety attitudes have no significant joint effect on employee productivity in manufacturing firms in Kenya.	Relationship exists since $\beta_{1...}\beta_6$ were statistically significant	Workplace safety, level of implementation of government workplace safety regulations and employee safety attitudes have a significant joint effect on employee productivity in manufacturing firms in Kenya.	H_{04}: Not Supported, reject the hypothesis

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents a summary of the key findings, conclusion, recommendations and suggestion for further studies. The summary of the key findings emanates from the findings on each study objective, whereas conclusions are made based on the summary of the key findings. Thereafter, recommendations for implementation and further research are presented.

5.2 Summary of the Findings

This section provides a summary of the findings of the research objectives, which included; investigating the effect of workplace safety on employee productivity in manufacturing firms in Kenya; to determine the moderating effect of the level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya; to evaluate the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya; and to assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya. The independent variable was workplace safety which was indicated by workplace safety programmes (workplace safety ergonomics, workplace emergency management, workplace safety transfer, and workplace safety training. The dependent variable was employee productivity measured by productive time, the accomplishment of tasks, and value-added. The moderating variable was the level of implementation of workplace safety regulations, while the intervening variable was employee safety attitudes. The study adopted a positivist research paradigm and a cross-sectional survey design since existing data among manufacturing firms were collected at a specific time, and results were generalized to represent the entire population. The findings for each study objective are summarized in the following subsections.

5.2.1 Effect of Work Place Safety on Employee Productivity Manufacturing Firms in Kenya

The study's first objective was to investigate the effect of workplace safety on employee productivity of manufacturing firms in Kenya. Hypothesis one, which stated that workplace safety has no effect on employee productivity in manufacturing firms in Kenya, was meant to fulfill objective one. The summary descriptive statistics revealed that manufacturing firms in Kenya had slightly more than moderately adopted workplace safety programmes with variations. The R-squared obtained implied that an increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management leads to an increase in employee productivity in terms of productive time, the accomplishment of tasks, and value-added. The coefficient estimates of the workplace safety measures and their effect on employee productivity revealed a significant positive relationship between all workplace safety indicators (safety ergonomics, safety emergency management, safety training, and safety transfer) and employee productivity of manufacturing firms in Kenya. The P values obtained for the model testing effect of workplace safety on employee productivity in manufacturing firms were less than the significance value of 0.05 therefore revealing that workplace safety has a statistically significant influence on the productivity of employees in manufacturing firms in Kenya. The P values did not support the hypothesis that workplace safety has no effect on employee productivity in manufacturing firms in Kenya, implying that workplace safety is a good predictor of employee productivity in manufacturing firms in Kenya.

The study also sought to determine whether there were significant variations in the relationship between workplace safety and employee productivity in different sectors of manufacturing firms in Kenya. The study's unstandardized beta coefficients of all the sectors had a positive sign, implying that an increase in workplace safety across all manufacturing sectors would lead to an increase in the dependent variable (employee productivity). The coefficient estimates for all sectors were significant, with p-values<0.05. Due to the nature of work done in the different manufacturing sectors, the statistical significance of the relationship between workplace safety and employee productivity in some sectors was statistically higher than in others. The study explained the conclusions arrived at using the domino theory (Heinrich, 1931),

the tip of the iceberg theory (McClelland, 2000), the guidelines by the International Loss Control Institute (ILCI) (2015), and the guidelines of the National Occupational Safety Association (NOSA) 5- star rating system (2016). The findings were similar to other studies that found that workplace safety influenced employee productivity favorably (Bureau of Labour Statistics report, 2019; OSHA Africa report, 2019; Michael & Merson, 2016; and Aswathappa, 2015).

5.2.2 Moderating Effect of the Level of Implementation of Government Regulations on Relationship between Work Place Safety Measures and Employee Productivity

The second objective of the study was to determine the moderating effect of the level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The study tested the null hypothesis, which stated that the level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The findings revealed that the independent variable, workplace safety, and moderating variable, the level of implementation of government workplace safety regulations, could explain variations in employee productivity. The adjusted R-squared obtained for the fitted models revealed that the inclusion of the level of implementation of government policy on the relationship between workplace safety and employee productivity improved the model's explanatory power compared to the fitted model for objective one without the moderating variable. This implied that enhancing the implementation of government workplace safety regulations would increase the effect of workplace safety on employee productivity.

The ANOVA results of the regression models estimating the moderating effect of the implementation of government regulation on the relationship between workplace safety and employee productivity implied that the fitted regression models linking the relationship between the moderator, the predictor, and the outcome are statistically significant at a 5% significance level. Further, the coefficient estimates signified that the level of government workplace safety regulation implementation had a positive and significant moderating effect on the relationship between workplace safety and employee productivity. Thus the null hypothesis that the level

of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya was rejected. Therefore the study concluded that the level of implementation of government workplace safety regulations moderated the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.

The findings were explained using the Rasmussen Risk Management theory developed by Rasmussen (1997), which identified that implementing government workplace safety regulations ensured that manufacturing firms had workplace safety programmes. When these programmes were in place, the employees were expected to be productive. In the case of the current study employee productivity improved in terms of productive time, better accomplishment of tasks, and value-added by employees. The study results were similar to other empirical studies reviewed by the current study. The results also filled the research gaps identified in the current literature: Michael & Merson (2016), Dwomoh *et al*. (2016), and Katsuro *et al*. (2018).

5.2.3 Intervening Effect of the Employee Safety Attitude on Relationship between Work Place Safety and Employee Productivity

The study's third objective was to evaluate the intervening effect of employee safety attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The null hypothesis tested was that employee safety attitude has no intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. The study results determined that 79.4% of the variation in employee productivity is explained by work safety, 3.2% of the variation in workplace safety is explained by the employee safety attitude, 3.7% of the variation in employee productivity is explained by employee safety attitude and that 76.2% of the variation in employee productivity is explained by work safety and employee safety attitude. Secondly, the study found that the coefficient estimates for model one estimating the relationship between the independent variable (workplace safety) and dependent variable (employee productivity) were statistically significant; therefore, workplace safety predicts employee productivity in manufacturing firms. The coefficient estimate obtained for model two, which estimated the relationship between employee safety attitude and

workplace safety, was statistically significant, implying that the independent variable is related to the potential intervenor. Therefore the study established that workplace safety predicted employee safety attitudes in manufacturing firms. The coefficient obtained for model three in estimating the relationship between employee safety attitudes and employee productivity was found to be statistically significant, implying that better employee safety attitudes improved employee productivity in manufacturing firms in Kenya. The study coefficient obtained for model four was statistically significant, estimating whether employee safety still predicted employee productivity when employee safety attitudes were included in the model. This indicated that workplace safety predicted employee productivity in manufacturing firms when an employee safety attitude was added to the model. Consequently, the inclusion of employee safety attitudes reduced the effect of workplace safety on employee productivity.

Therefore, these results revealed that employee safety attitude significantly intervened in the relationship between workplace safety and employee productivity. Consequently, the null hypothesis H03, which stated that employee safety attitude had no intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya, was not supported and therefore was rejected. This meant that employee safety attitude had an intervening effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. These findings were similar to a previous study by Saleh (2015). The results further clarified the contradictory results of Kao (2019), who found that employee safety attitudes had a positive effect on employee productivity, and Laura (2019), who found that employee safety attitudes had a negative impact on the relationship between workplace safety and employee productivity. The results also explained the postulates of the domino theory developed by Heinrich (1931) that workplace safety reduced unsafe acts by employees and accordingly reduced employee productivity problems brought about by disruption of work. Further, the findings explained the postulates of the risk homeostasis theory developed by Wilde (1998), which posited that employees adjust their work risk behaviour based on the level of safety within the workplace.

5.2.4 The Joint Effect of the Level of Implementation of Government Work Place Regulations and Safety Attitude on Employee Productivity in Kenya

The fourth objective of the study was to assess the joint effect of workplace safety, the level of implementation of government workplace safety regulations, and employee safety attitude on employee productivity in manufacturing firms in Kenya. The hypothesis tested was: workplace safety, level of implementation of government workplace safety regulations, and employee safety attitudes have no significant joint effect on employee productivity in manufacturing firms in Kenya. The results established that 78.7 % of the variations in employee productivity can be explained by workplace safety, level of implementation of government workplace safety regulations, and employee safety attitude. The results further show that the explanatory power of the model adj. r2 reduced from 0.91 to 0.787 when employee safety attitude was included in the model. The ANOVA results of the regression model estimating the joint effect of workplace safety, level of implementation of government workplace safety regulations, and employee safety attitude on employee productivity in manufacturing firms in Kenya revealed that the model used is statistically significant.

Secondly, the study found that when all variables were regressed jointly, the coefficient estimates for workplace safety ergonomics, workplace safety emergency management, and workplace safety training increased. In contrast, that of workplace safety transfer was reduced. This implied that the variables jointly influenced one another. The results showed that workplace safety, implementation of government workplace safety regulations, and employee safety attitude significantly affect employee productivity in manufacturing firms in Kenya. Consequently, the null hypothesis H_{04}, stating that workplace safety, level of implementation of government workplace safety regulations, and employee safety attitude have no significant joint effect on employee productivity in manufacturing firms in Kenya, was not supported and therefore was rejected. The findings were explained using the tip-of-the-iceberg theory developed by McClelland (2000). The theory tied workplace safety, safety attitudes, the level of implementation of workplace safety regulations, and employee productivity together. The study's outcomes were compatible with those of Beus et al. (2016) and Lei *et al*. (2018). Further, the findings were in line with the recommendations of the national occupational safety association (NOSA) safety

management system (2017), international loss control institute (ILCI) guidelines (2015), and the three Es of safety (engineering, education, enforcement) advocated by Heinrich (2017).

5.3 Conclusion

From the findings of the study, the following five conclusions were made. First, the first objective finding was that workplace safety affected employee productivity in manufacturing firms in Kenya. All constructs used to measure workplace safety in manufacturing firms in Kenya were found to positively influence employee productivity in manufacturing firms in Kenya. The study, hence, concluded that an increase in workplace safety in terms of workplace safety transfer, workplace safety training, workplace safety ergonomics, and workplace safety emergency management led to an increase in employee productivity in terms of productive time, the accomplishment of tasks, and value-added. Business firms that intend to improve the productivity of their employees should invest in workplace safety programmes that are effective. The prior literature supports this conclusion as workplace safety is associated with a wider range of positive employee behavioral responses. Further, it is associated with intrinsic motivation to perform tasks; the organisations with superior safety programmes are more resilient to risks hence reducing chances and extent of work interruptions.

Secondly, based on the findings on differences in the relationship between workplace safety and employee productivity in different sectors of manufacturing firms, the study found that workplace safety affected employee productivity regardless of the sector. Accordingly, the conclusion was that increased workplace safety would lead to an increase in employee productivity regardless of the manufacturing sector the firm belonged to since the coefficient estimates for all sectors were found to be positive and significant. In addition, the statistical significance of the relationship between workplace safety and employee productivity in some sectors was statistically higher than in others. Consequently, it was concluded that the nature of the manufacturing sector in terms of work done, mechanisation, and labor intensiveness affected the contribution of workplace safety on employee productivity. Therefore a firm should consider the sector it belongs to when

determining the extent to invest in workplace safety programmes. Firms in less safety-prone sectors should have different natures of safety programmes.

Third, based on the findings of the second objective, the study established that the level of implementation of government workplace safety regulations moderates the relationship between workplace safety and employee productivity in manufacturing firms in Kenya. Accordingly, the conclusion was that better implementation of government workplace safety regulations led to better workplace safety programmes. When these programmes are in place, employee productivity is boosted regarding improved productive time, a better accomplishment of tasks, and value-added.

Fourth, based on the findings of the third specific objective, employee safety attitude significantly intervenes in the relationship between workplace safety and employee productivity. Accordingly the study concluded that workplace safety attitude is essential for influencing workplace safety and, consequently, employee productivity. The study further concluded that employee attitudes predict workplace safety and productivity in manufacturing firms and that negative workplace safety attitude reduces the impact of workplace safety on employee productivity. Further, the study concluded that a manufacturing firm that invests more in workplace safety positively improves employees' safety attitudes.

Fifth, based on the findings of the fourth specific objective that workplace safety, level of implementation of government workplace safety regulations, and employee safety attitude have a significant joint effect on employee productivity in manufacturing firms in Kenya, the study concluded that to attain employee productivity a firm should jointly adopt workplace safety programmes, ensure implementation of government workplace safety regulations and enhance positive employee safety attitude. Further, the study concluded that these variables influence each other. Consequently, an organization that installs one aspect but leaves another will suffer from employee productivity problems in terms of reduced work time, reduced contributed value, and reduced accomplishment of task.

5.4 Recommendations

The following recommendations are fronted on the basis of the findings and conclusions of the study:

5.5.1 Recommendations for Practice

The study established that there was a significant relationship between workplace safety and employee productivity in the manufacturing sector, therefore the study recommends that manufacturing firms should invest in workplace safety through safety ergonomics, safety emergency management, safety training and safety transfer since the safety aspects predict employee productivity in terms of value added, degree of accomplishment of tasks and productive time. Human resource managers and other safety professionals should analyze their situation and facility and develop a policy and plan of action that ensures safety in their workplaces. This will enable employees to accomplish tasks without defects, meet their performance targets, increase their contributed value and productive time.

The study established that the level of implementation of government workplace safety regulations moderates on the relationship between workplace safety and employee productivity therefore the study recommends that workplace safety programmes should be aligned to government workplace safety regulations as they moderate on the relationship between workplace safety and employee productivity. Further, the Government directorate of occupational safety should enhance safety inspections to manufacturing firms to ensure full implementation of government workplace safety regulations. This will enhance employee productivity in the manufacturing sector, enhance conformity to ISO31000 (2018) risk management quality standards, improve Kenya's manufacturing sector's competitiveness position and contribution to gross domestic product of the country. Further full implementation of government workplace safety regulations will enhance preparedness to workplace pandemics such as the COVID-19. The study established that if firms full implemented OSHA (2013) government regulations, their employees would be protected from the effects of COVID-19 in the workplaces.

The results showed that employees in manufacturing companies in Kenya had bad safety attitudes. The study depicted that they exhibited behaviors that kept them

unsafe for productivity in their job. The intervening effect of employee safety attitudes on the relationship between employee safety attitudes and employee productivity was found to be significant. This study therefore recommends that there should be involvement of employees in designing safety programmes and policy to ensure they feel invested and have a responsibility towards safety. Use of safety champions, appointed among the employees would enhance employee involvement and responsibility towards safety. Involvement in such a way that employees are encouraged to offer their contributions would enhance positive attitudes towards safety and therefore would reduce workplace safety and employee productivity problems in the manufacturing sector in Kenya. Further the ideas and contributions of employees should be taken seriously as this will ensure better safety culture and better productivity of employees.

The study established positive and high correlation between safety training, safety transfer and degree of implementation of government workplace safety regulations, this study therefore recommends that that employees should be sent on regular and seasoned training courses on safety management so that they can appreciate the need for safety and proper safety attitude on their productivity. Further the study recommended that increased implementation of government workplace safety regulations, safety transfer to safety consultants and insurance companies would be an effective way to enhance positive safety attitudes among the employees. Lastly manufacturing firms and the regulator should launch a programme that recognizes and rewards safe employee work practices; this will enhance positive employee safety attitudes among employees.

5.5.2 Recommendations for Policy

The study findings established that workplace safety was critical for employee productivity. This study accordingly recommends that policy makers should come up with a policy document that explains in detail and specifically how safety programmes are to be effected. This is expected to reduce employee productivity issues in the manufacturing sector. Further, the policy makers should ensure that the policy directions is aligned to international safety requirements to seal the current loopholes in workplace safety and employee productivity in the manufacturing sector in Kenya.

Second, the study established that implementation of government safety regulations moderated the relationship between workplace safety and employee productivity in the manufacturing sector in Kenya. The study therefore recommends that the government through the directorate of occupational safety should device a policy that allows for frequent monitoring of the firms to check on compliance therefore ensure full implementation of government workplace safety regulations. Persistent monitoring of safety programmes and advocacy for appropriate safety programmes in the sector will ensure full implementation of government safety regulations ensuring workplace safety and employee productivity in the manufacturing firms.

Third, the study established that employee safety attitudes significantly intervened on the relationship between workplace safety and employee productivity. The study therefore recommends that policy makers should give policy directions requiring mandatory safety training for employees therefore eliminating negative safety attitudes by employees. Further, the government and policy makers should come up with a training manual that guides the manufacturing sector on the safety training areas. The document should have specific phases showing frequency of training for new hires and existing employees. This will ensure that the manufacturing sector is mandated to train employees persistently hence ensuring workplace safety and productivity in the sector. Further the policy training manual should have guidelines for involving employees in the design of safety programmes and training manuals hence ensuring that employees feel personally involved in safety. The government should have a mandatory requirement that the manufacturing firms have safety committees with membership that includes employees. This will enhance their involvement in safety programmes and foster positive safety attitudes among the employees.

5.5.3 Recommendations for Methodology

The study made two main recommendations for methodology. First, it made recommendations for existing theoretical framework advancement based on its findings that addressed weaknesses in the theories. Second, the study recommended methodologies that future studies could use.

To begin with, the domino theory, which viewed workplace safety as the nature of programmes in place in a workplace, needed to fully indicate which programmes should be adopted for workplace safety and productivity. This study recommends that the theory be expanded to indicate that workplace safety programmes should be in the form of ergonomics, emergency management, safety training, and safety transfer to ensure optimal employees' productivity. The current study has provided empirical evidence of the intervening effect of employee safety attitudes on employee productivity. Therefore, the risk homeostasis theory should be updated to link employee safety attitudes with workplace safety and employee productivity. The tip of the iceberg theory predicted that workplace safety might significantly affect organizational outcomes. The current study determined that workplace safety influences employees' productivity outcomes through the value-added, degree of accomplishment of tasks, and productive time. The tip of the iceberg theory should be updated to specifically indicate that workplace safety influences the value added, the degree of accomplishment of tasks, and productive time by employees.

Rasmussen's risk management theory predicted that lack or inadequate implementation of workplace safety regulations might affect workplace safety and employee accomplishments at work. The study adds to the development of this theory by revealing, from empirical evidence in manufacturing firms in Kenya, that the level of implementation of government workplace protections moderates the relationship between workplace safety and employee productivity. The study models were guided by the theory of production advanced by Cobb and Douglas (1928). The theory postulated that output is a function of land, labor, and capital inputs. The current study determined that when organizations invest in workplace inputs (ergonomics, emergency management, safety training, and safety transfer), they attain better output in employees' productivity. Therefore this study recommends that the theory be advanced to include workplace safety as an input for employee productivity.

Finally, the study recommended methodologies that future studies could use. The current study used a cross-sectional sample to test the hypotheses of relationships of causality. The study recommends that future studies use alternative empirical measuring and testing methods. Due to the dynamic nature of workplace risks and

employee productivity, it is necessary for future studies to resort to case studies, panel data, time series, or mixed research methodologies.

5.5 Suggestions for Further Studies

The study recommends the following research areas to be considered in the future studies:

1. The contextual and organizational factors in non-manufacturing organizations are not the same as those in the manufacturing firms in Kenya and, therefore, would influence the study variables differently. For that reason, similar studies can be conducted on the other non-manufacturing sectors in Kenya.
2. Future studies could use diverse respondents, such as operations managers, technical managers, heads of various units, and safety managers, instead of single key informants in each manufacturing firm. In addition, the studies could explore the influence of organizational characteristics such as firm size, age, and location on the relationship between workplace safety and employee productivity in manufacturing firms.
3. Future research could consider exploring historically contextualized analyses and longitudinal research design. Longitudinal studies for at least five years can examine the evolutionary effect of workplace safety on employee productivity in manufacturing firms in Kenya.
4. The current study only collected secondary data on employee productivity in manufacturing firms in Kenya; future research could utilize a stopwatch to collect data on the exact time taken for employees when performing tasks and compare in results from workplaces with proper workplace safety and those with inadequate workplace safety.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Questionnaire on Workplace Safety, the Level of Implementation of Government Workplace Safety Regulations, Employee Safety Attitude, and Employee Productivity in Manufacturing Firms in Kenya

INTRODUCTION

The information provided will be treated with utmost confidentiality and will only be used for academic purpose only. You are strongly advised to tick or fill in the blank spaces for each question appropriately. **Please do not indicate your name.**

INSTRUCTIONS

1. Please answer the questions to the best of your knowledge.
2. Fill your responses in the spaces provided
3. Please put a tick (√) where applicable.

Part One:- Respondent and Organizational Profile

1. What is your position in the Company _____
2. Years you have been working in the institution
   (a) Below 2 years [ ]
   (b) 2-5 years [ ]
   (c) Over 5 years [ ]
3. Manufacturing sub-sector in which your organization falls(tick as appropriate)

(a)	Services and Consultancy	[ ]
(b)	Building, Mining and Construction	[ ]
(c)	Chemical and Allied Sector	[ ]
(d)	Energy electrical and electronics	[ ]
(e)	Foods and Beverage	[ ]
(f)	Leather and Footwear	[ ]
(g)	Metal and Allied Sector	[ ]
(h)	Motor Vehicle and Accessories	[ ]
(i)	Paper and Board	[ ]
(j)	Pharmaceutical and Medical	[ ]
(k)	Plastic and Rubber	[ ]
(l)	Fresh Produce	[ ]
(m)	Textiles and Apparels	[ ]
(n)	Timber, wood and furniture	[ ]

Part Two:- Workplace Safety Ergonomics

The statements presented below describe aspects of workplace safety ergonomics in organizations. Please respond by indicating the extent to which you agree that the statement describes your firm by ticking '√' in the appropriate box (from 1 to 5); where: Where 5 is Strongly agree(SA); 4 is Agree(A) ; 3 is Neutral(N) ; 2 is Disagree (D)while 1 is Strongly Disagree(SD).

	Statement	SA	A	N	D	SD
a	My firm has a separate budget for employee safety					
b	My firm does safety audits to determine workplace, procedure and equipment safety					
c	My firm has a hazard reporting programme					
d	There is sufficient illumination in our workplace					
e	My firm has noise diversion controls to protect employees from the sound energy					
f	My firm has anti vibration equipment					
g	My firm uses robotics to reduce dangers of contact and to ease work procedures					
h	Adequate Security cameras are used to monitor work and deter unsafe incidents					
i	There are metal detectors at entry points to reduce security threats on employees					
j	My firm has heat, smoke and combustion gas detectors					
k	There are warning signs at the location of the hazard and other conspicuous locations					
l	My firm has gas, fumes, exhaust regulators					
m	My firm has ventilation and temperature regulators					
n	Personal protective equipment is provided and worn at all time					
o	There is sufficient cleanliness to reduce exposure to incidents					
p	My firm designs the job effectively to prevent harmful occurrences.					

Part Three:- Workplace Safety Emergency Management

The statements presented below describe aspects of safety emergency management in organizations. Please respond by indicating the extent to which you agree that the statement describes your firm by ticking '√' in the appropriate box(from 1 to 5); Strongly agree(SA); 4 is Agree(A) ; 3 is Neutral(N) ; 2 is Disagree (D)while 1 is Strongly Disagree(SD).

	Statement	SA	A	N	D	SD
a	My firm has a written emergency response and evacuation plan					
b	Facility is fully equipped for emergencies; all systems and equipment are in place; e.g firefighting, or first aid and medical care					
c	Emergency phones and directions are in place in case of emergencies					
d	My firm has made arrangements with medical providers such as hospitals, emergency transport services, and health care providers incase more extensive medical care is needed for workers					
e	Firm maintains a first-aid log, a record of injuries that could have been potentially worse or recordable for OSHA record keeping					
f	Evacuation exits are wide enough, clear and unobstructed					

Part Four:- Workplace Safety Training

The statements presented below describe aspects of safety training in organizations. Please respond by indicating the extent to which you agree that the statement describes your firm by ticking '√' in the appropriate box(from 1 to 5); where 5 is Strongly agree(SA); 4 is Agree(A) ; 3 is Neutral(N) ; 2 is Disagree (D)while 1 is Strongly Disagree(SD).

	Statement	SA	A	N	D	SD
a	My firm does safety training audits to determine employee comprehension of procedures and rules					
b	My firm has a written safety policy statement that educates employees on the safety aspects of their job					
c	My firm conducts safety drills as part of our training programmes					
d	Employees are trained to identify the symptoms of occupational over exposure to chemicals and other safety risks					
e	My firm does safety training for new hires(employees)					
f	Safety rules and procedures are incorporated into jobsite operations					
g	My firm has safety rules regarding dress code, conduct, and expectations					
h	My firm conducts safety talks, conferences and seminars which are well documented as with other safety training					
i	My firm has a safety committee that conducts risk assessments, education sessions, safety guidelines and announcements.					

Part Five :-Workplace Safety Transfer

The statements presented below describe aspects of safety transfer in organizations. Please respond by indicating the extent to which you agree that the statement describes your firm by ticking '√' in the appropriate box(from 1 to 5); where: 5 is Strongly agree(SA); 4 is Agree(A) ; 3 is Neutral(N) ; 2 is Disagree (D)while 1 is Strongly Disagree(SD).

	Statement	SA	A	N	D	SD
a	My firm has a group health insurance for staff					
b	My firm has personal accident insurance covers					
c	Employees are covered in the companies liability insurance covers					
d	My firm has hired private security to guarantee safety of all employees and their property at work					
e	My firm uses external safety consultants to survey our workplace and suggest corrective actions					

Part Six:- Level of Implementation of Government Workplace Safety Regulations

The statements presented below describe aspects implementation of government workplace safety regulations .Please respond by indicating the extent to which you agree that the statement describes your firm by ticking '√' in the appropriate box(from 1 to 5); where: 5 is Strongly agree(SA); 4 is Agree(A) ; 3 is Neutral(N) ; 2 is Disagree (D)while 1 is Strongly Disagree(SD).

	Statement	SA	A	N	D	SD
a.	Personnel concerned with the work site are regularly trained on safety aspects in compliance with OSHA rules					
b.	The directorate of occupational safety officers has approved my firms compliance with OSHA rules					
c.	My firm has inventory of procedures and responsibilities for the identification and correction of workplace hazards					

e.	Firm examines new machines and procedures for safety before they are used in the workplace					
f.	My firm Checks employee compliance with OSHA rules					
g.	We have an Hazard communication plan as required by OSHA regulation					
h.	All occupational safety reportable incidents are investigated and effective prevention is implemented					
i.	We us appropriate labels and other forms of hazard warning as required by OSHA					
j.	Employees are provided with personal protective equipment (PPE) which are OSHA approved					
k	Our employees have frequently filed safety complaints with OSHA and requested an inspection					
l.	Our WIBA pays workmen injured or who meet death in accident arising out of an in the course of employment.					
m	Our WIBA policies pay medical expenses of the employee as a result of workplace incidents.					
n.	My organization imposes compulsory personal accident cover for all employees as required by law					

Part Seven:- Workplace Safety Attitude

The statements presented below describe aspects of workplace safety attitude in organizations. Please indicate the extent to which you agree that each of the statements describes your firm by ticking '√' in the appropriate box (from 1 to 5); Where: 5 is Strongly Disagree(SD) ; 4 is Disagree(D) ; 3 is Neutral(N) ; 2 is agree(A) while 1 is Strongly agree(SA).

	Statement	SA	A	N	D	SD
a.	Employees are aggressive and overconfident while operating machines, leading to machine breakdown and endangering their safety.					
b.	Employees take unnecessary risks and ignore safety procedures.					
c.	Employees are not alert for any emergencies					
d.	Employees avoid work that seems risky due to safety phobias.					
e.	Employees are selfish and exhibit behaviour that may endanger others.					
f.	Employees over speed at work to be productive.					
g.	Employees are not eager to propose safety improvements					
h.	Employees do not ask questions about any unclear safety procedures or precautions.					
i.	Employees do not pay attention to safety training or follow trained procedures.					

Part Eight:- Employee Productivity

Please fill in the following information concerning your establishment

	Statement	Total
a.	Total number of staff in your establishment	
b.	Total revenues earned by your establishment (Ksh.)	

Please fill in the following information concerning your establishment

	Statement	Total	Period in days
a.	Total number of staff put to bed rest as a result of back pain and other related work injuries		
b.	Total number of Employees and supervisors are involved in the safety investigation process as witnesses		
c.	Number of Employees put on restricted work only because they could not do their usual work		
d.	Number of Employees that have been absent as a result of injuries		
e.	Total number of employee complains of noise-induced hearing loss, poisonings, heat exhaustion, heat cramps, fainting ,heat rash, sensation of fingers and hands.		

Please fill in the following information concerning your establishment

	Statement	Total
c.	Total number of employees who met their set performance targets as per employee dashboard/ Performance Contracts	

APPENDIX II: ANALYTICAL MODEL AND INTERPRETATION

Objective	Hypotheses	Model	Type of Analysis	Interpretation
To investigate the effect of workplace safety on employee productivity in manufacturing firms in Kenya.	H_{01}: Workplace safety has no effect on employee productivity in manufacturing firms in Kenya.	$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_4$ **Where:** Y_1 is Employee productivity β_0 is regression constant $\beta_1 \ldots B_4$ = Coefficients X_1 is Safety Ergonomics X_2 is Emergency management $X_3$is Safety training X_4 is Safety transfer e_4 **is** error term	Multiple regression analysis.	Relationship exists if any of $\boldsymbol{\beta_{1...}\beta_4}$ **is statistically significant.**
To assess the moderating effect of level of implementation of government workplace safety regulations on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	H_{02}: Level of implementation of government workplace safety regulations has no moderating effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_1 * X_5 + \beta_7 X_2 * X_5 + \beta_8 X_3 * X_5 + \beta_9 X_4 * X_5 + e_5$ **Where:** Y_1 is Employee productivity a_0 is regression constant $\beta_1 \ldots B_5$ = Coefficients X_1 is Safety Ergonomics X_2 is Emergency management $X_3$is Safety training X_4 is Safety transfer X_5 is level of implementation of government workplace safety regulations E_5 **is** error term	Multiple regression analysis	Level of implementation of government workplace safety regulations will qualify as a moderating variable if the interaction terms are statistically significant.
To evaluate the intervening effect of employee safety	H_{03}: Employee safety attitude has no intervening	The **first step** was to show there is a relationship between the independent variable and dependent variable which	Linear Regression analysis	Intervention occurs if workplace safety predicts employee

attitude on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	effect on the relationship between workplace safety and employee productivity in manufacturing firms in Kenya.	may be intervened. $Y = \alpha_0 + \beta_1 X_1 + \varepsilon_0$ Where Y is the dependent variable (employee productivity), α_0 is the y intercept, β_1 is the regression (beta) coefficient, X_1 is the independent variable (workplace safety) and ε_0 is the regression error term. The **second step** was to show that the independent variable is related to the potential intervenor. $M = \alpha_1 + \beta_2 X_1 + \varepsilon_1$ Where M is the intervening variable (employee safety attitudes), α_1 is the y intercept, β_2 is the regression (beta) coefficient, X_1 is the independent variable (workplace safety) and ε_1 is the regression error term. The **third step** was to show that the potential intervener is related to the dependent variable. $Y = \alpha_2 + \beta_3 M + \varepsilon_2 x$ Where: Y is the dependent variable, α_2 is the y intercept, β_3 is the regression (beta) coefficient, M is the intervening variable and ε_2 is the regression error term. In the **fourth and final step**, the dependent variable was regressed on the independent variable and the potential intervener in blocks. $Y = \alpha_3 + \beta_4 X_1 + \beta_5 M + \varepsilon_3$	Linear Regression analysis Linear Regression analysis	productivity in manufacturing firms (**β_1 is statistically significant)**, workplace safety predicts employee safety attitude (**β_2 is statistically significant)**, employee safety attitude predicts employee productivity in manufacturing firms (**β_3 is statistically significant)** and still workplace safety predicts employee productivity in manufacturing firms when employee safety attitude is in the model (**β_4 is statistically significant)**.

		Where: Y is the dependent variable (Employee productivity), α_3 is the y intercept, β_4 and β_5 are regression (beta) coefficients, X_1 is the independent variable (workplace safety), M is the intervening variable (employee safety attitudes) and ε_3 is the regression error term.	Linear Regression analysis	
To assess the joint effect of workplace safety, level of implementation of government workplace safety regulations and employee safety attitude on employee productivity in manufacturing firms in Kenya.	H_{04}: Workplace safety, level of implementation of government workplace safety regulations and employee safety attitude have no significant joint effect on employee productivity in manufacturing firms in Kenya.	$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + e_5$ **Where:** Y_1 is Employee productivity a_0 is regression constant $\beta_1 \ldots B_5$ = Coefficients X_1 is Safety Ergonomics X_2 is Emergency management $X_3$is Safety training X_4 is Safety transfer X_5 is level of implementation of government workplace safety regulations X_6 is employee workplace safety attitudes e_4 **is** error term	Multiple regression analysis	Relationship exists if at least one of $\boldsymbol{\beta_1 \ldots \beta_6}$ **is statistically significant.**

APPENDIX III: SUMMARY OF RESEARCH GAPS

Author	Focus of the study	Methodology	Findings	Knowledge gap	Focus of the current study
Abuga, C. (2017).	Effects of occupational Safety and Health Programs on organisations (A Case Of Pyrethrum Board of Kenya) International Journal of management perspectives	The study employed a descriptive research design. The population was 132 employees of pyrethrum board of Kenya. Pearson correlation was carried out to establish the relationship between the research variables.	The study established that ,in attempt to satisfy safety need, certain organizations incorporate into their policy thrusts, guaranteeing workers' safe work execution under a climate capable of enhancing the physical, mental, and emotional conditions.	The study failed to investigate whether employees associates safety programmes with productivity	This study investigated the actual effect of employee safety on employee productivity
Amedome, S. N., & Gbadago, P. (2017).	The impact of occupational health and Safety Measures on Employee Performance at the South Tongu District Hospital. Global Journal of Medical Research.	The study sample 116 employees of the Hospital including 5 management members. Data was collected using questionnaire. Data analysis methods were not shown	The benefits associated with the OHS measures of the hospital was found to include improved staff morale, stress reduction, reduced injuries and illnesses, improved health, increased job satisfaction, reduced medical expenses and increased productivity. The study did not show how it tested for these aspects of job performance	The study recommends a study on effect of employee safety measures on employee productivity should conducted	This study sought to determine the effect of employee safety on employee productivity, to establish the intervening effect of employee safety attitudes on this relationship. Further, determine the moderating effect of implementation of government safety regulations on the relationship between

					employee safety and employee productivity
Bieder, C., Gilbert, C., Journé, B., & Laroche, H. (Eds.). (2018).	Studied critical literature review on the relationship between safety taining and professional skills by employees in the transportation systems	A critical literature review of 16 studies on safety training and professionalism	The study determined that safety training may boost employee productivity by addressing attitude to risk (chronic unease) therefore improving employee productivity.	The established that the link between employee productivity and safety training is relatively unexplored by the academic world .The study opines that safety training may boost employee productivity by addressing attitude to risk (chronic unease) therefore improving productivity. The study methodology did not collect primary data hence did not generate original findings.	This study sought to establish the relationship between employee safety training and employee productivity.
Chullen, W.K. (2014).	Occupational health and safety issues in Sugar Companies in Kenya.	Data was collected from employees in sugar companies using questions and analyzed using frequencies and percentages.	The study established the various safety exposures that face employees such as burns, cuts and back problems and recommended that safety programmes may solve occupational incidents	Methodology used did not allow for a test of relationship between variables.	This study sought to investigate the actual effect of employee safety on employee productivity using regression and correlation analysis allowing a test of

			hence boosting productivity of employees		relationship between variables.
Cudjoe, S.F. (2017).	Studied occupational health and safety practices on Labour productivity at the Tetteh Quarshie memorial hospital.	Data collected through questionnaires and personal observations and presented in frequencies and percentages	Study indicated that employee performance was positively associated with workplace safety. Study did not indicate how employee performance was measured.	Methodology used did not allow for a test of relationship between variables. Study did not establish the intervening effect of employee safety attitudes on the relationship between employee safety and productivity.	This study sought to investigate the actual effect of employee safety on employee productivity using regression and correlation analysis allowing a test of relationship between variables. Further the current study used productive time, accomplishment of tasks and added value as measures of employee productivity.
Dorman, P. (2016).	Effect of OSHA regulations on safety and well-being at work in Kenya power: an overview:	Descriptive research design. The target population of the study was internal audit managers and other internal audit staff. This limit the scope as the perception of others key stakeholder was not incorporated. Data was analysed in percentages	The findings revealed a relationship exists between employees' perceived safety and job morale.	The study addressed one construct of employee safety i.e OSHA regulation. Methodology used did not allow for a test of relationship between variables.	The current study assessed the moderating effect of government workplace regulations on the relationship between employee safety and employee productivity.

Hesapro, W. (2017).	Making the Link between Health and Productivity at the Workplace—A Global Perspective.	The study is a critical review of various studies done on the field of safety and organizational productivity. It reviews 21 studies on both study areas.	The study established that none of the reviewed studies has been done on the actual aspects of employee productivity such as actual implementation of tasks	The study was critical literature review hence did not generate original findings on employee productivity and safety.	Current study used three measures of employee productivity and generated original findings on the relationship between employee safety and productivity.
Grawitch,M. J. (2015).	The path to a healthy workplace: A critical review linking healthy workplace practices, employee well-being, and organizational improvements.	The study employed a descriptive research design. The population of the study was not indicated. Data analysis procedures also were not indicated	The study concludes that safety procedures and risk management, safety and health rules, and organizational safety support had indirect effects on job performance of the employees.	The study focused on causes of occupational health and safety and does not focus on ways to ensure organizational safety like- safety procedures and risk management, safety and health rules, first aid support and training, occupational accident prevention, and organizational safety support.	This study investigated the actual programmes put in place for safety and their effect on employee productivity
Huang, Y. H., Robertson, M. M., Lee,	Supervisors association safety training with safety	Survey sample of 1831 truck drivers and their 219 super-visors at	The study found that employee safety climate perceptions sig-nificantly predicted self-reported safety	Study indicated that absence of safety programmes influence safety	Current study investigated all constructs of employee safety (ergonomics, training, emergency

J., Rineer, J., Murphy, L. A., Garabet, A., & Dainoff, M. J. (2022).	behavior and outcomes for lone workers among long truck drivers in the USA	four different trucking companies. Factor analysis and variance was used to analyze data	behavior (directly) and injury outcomes(indirectly)	behavior which affects work of the employee. The study focused only on one construct of employee safety i.e safety training	management, transfer, safety attitudes, implementation of government safety policies and their effect on employee productivity.
Iheanacho, M.U., & Tom, E. E. (2016)	Effects of industrial safety and health on employees 'job performance in selected cement companies in cross river state, Nigeria.	Simple random technique. Hat - and -draw (balloting) method was employed in selected 100 staff from the selected manufacturing companies. The study used correlation analysis to present findings	The study found that industrial safety and health has effect on Employee productivity ,Employee/customer relationship, Subordinate/management relationship, Employee turnover.	The findings fail to indicate what the study meant on employees safety and health.	Current study investigated all constructs of employee safety (ergonomics, training, emergency management, transfer, safety attitudes, implementation of government safety policies and their effect on employee productivity.
Karanikas, N., Melis, D. J., &Kourousis, K. I. (2017).	The Balance Between Safety and Productivity and its Relationship with Human Factors and Safety Awareness and Communication in Aircraft	The study was carried out at two Australian aircraft manufacturing facilities where a Likert scale questionnaire was administered to a purposively selected sample. Case study design	Although human factors were the leading causes of accidents, these accidents could be influenced by safety related practices and preparedness policies	-Study focused on safety awareness but did not relate this to productivity. -Study used median and percentages hence did not test for relationships between variables.	Current study investigated all constructs of employee safety. Further it used correlation and regression analysis which enabled a test of relationships between variables.

	Manufacturing.				
Kingsley, A. (2012)	Impact of office ergonomics on the performance of the employees in Ghana National petroleum Corporation	Target population was the entire staff of the Ghana National Petroleum Corporation. Simple random sampling. Results presented through graphs, pie charts, and tables and Pictures. Frequency and percentages used to analyze data. This did not allow a test of relationship.	The study revealed that employees were dissatisfied with the office designs, finishes and furnishing hence this might have affected their performance at work.	This study failed to specify what aspects in finishes, furnishes and designs that the employees were dissatisfied about and failed to link this to employee performance. The study failed to show what ergonomic features that the organization had put in place and relate this to employee performance. Further, the study did not show how employee performance was measured.	Current study investigated all constructs of employee safety. Further it used correlation and regression analysis which enabled a test of relationships between variables. Study focused on manufacturing firms across several sectors to enable generalization of the findings.
Olabode, S.O., Adesanya, A.R., and Bakare, A.A. (2017)	Ergonomics awareness on employee performance in Nigerian organisations	Critical literature review on studies on ergonomics. No primary data was collected	The study identified major types of ergonomics and identified that few studies have focused on safety ergonomics	Study only looked at one aspect of employee ergonomics. It has no methodology and only does literature review on	Current study focused on safety ergonomics alongside other constructs of employee safety.

				comfort ergonomics.	
Oluoch, E.O. (2015)	Effect of occupational safety and health programmes on employees at kenya power company limited.	The target population was employees of Kenya power limited Kenya. Descriptive survey research design. Data analysis using mean and standard deviations.	The key finding of this study is Organizations have failed to put in place adequate health and safety measures in the workplace to safeguard the employees and management.	The study lacks specific objectives of the study. The literature is all about OSHA and study fails to indicate specific programmes installed for employee safety. The analysis only focuses on safety training and safety committees, therefore fails to capture other programmes for employee safety. Many aspects of employee performance and safety are not captured in this study	Current study sought to determine why despite manufacturing firms having safety programmes, employee productivity is still low. Current study used three measures of employee productivity and generated original findings on the relationship between employee safety and productivity.
Perrow, C (2014)	Studied the link between workplace high risk technologies and firm	A comprehensive critical review on workplace safety and organizational productivity.	Study reaveled that introducing safety programmes may make employees feel uncomfortable about their new job demands. They may	Study did not analyses primary data hence allowing for original findings. Focused on effect	Currrent study generated original findings on effect of workplace safety on employee performance

	performance/ productivity.		experience increased stress, more worry about their job tenure, heightened feelings of detachment, and diminishing motivation to perform at peak.	of safety on performance of all employees	
Sawe, N.G (2013)	Effects of occupational health and safety practices on employees' productivity in Mumias Sugar Company, Kenya.	The target population of the study was managers and other internal support staff. Descriptive research design. Data was analysed using percentages and Multiple regression analysis.	The study notes that safety rules, safety procedures, safety policies, safety manuals and safety drills only exist on paper while none exists in practice.	The objectives and results of the study do not address what programmes that organizations had put in place for workplace safety and their influence on employee productivity.	Current study investigated all constructs of employee safety. Further it used correlation and regression analysis which enabled a test of relationships between variables. Study focused on manufacturing firms across several sectors to enable generalization
Sheida, M (2014)	Relationship between Safety and Staff Performance in Hospital.	The study was a correlational study. The statistical population included all employees of the hospitalization wards of Tehran Imam Khomeini Hospital (n = 200), who were selected by simple random	The results indicated that there is a significant relationship between the safety of the hospital and each of the factors affecting the staff performance. "Quality" indicator shows the strongest correlation with safety followed by "cost", "accountability", "discipline" and "quantity".	The study did not focus on various aspects of a safety system but focus on safety as whole and assumes employees know what it meant by safety -Further the study used quality, cost, accountability, discipline and quantity to measure	Current study focused on employee safety and productivity using a wider scope of measures (productive time, value added and degree of accomplishment of tasks).

		sampling method . Data collection was done using a questionnaire		employee performance	
Wilson, L. L. (2010).	Framework for evaluating emergency preparedness alternatives at higher education Institutions	Telephone interviews were the primary mechanism of data collection. Study was not specific on the exact sampled population	The study found out that 30% of the organisations did not have emergency plans and equipment.	The study did not establish the link between emergency management and employee productivity. Data that was explained emanated from other studies done on business continuity and not the targeted population.	Current study assessed the effect of emergency programmes on employee productivity. Study collected data on safety protections within the institutions and established their effect on employee productivity.
Yankson, E (2017)	Effect of health and safety standards on productivity in Ghana rubber estates limited.	Data was collected from employees in rubber estates using questionnaires and analyzed using frequencies and percentages. Descriptive survey research design.	The study established that there is low awareness of safety policies and standards.	This study does not indicate specifically which safety policies were being investigated. Study did not indicate how employee productivity was measured.	Current study focused on employee safety and productivity using a wider scope of measures (productive time, value added and degree of accomplishment of tasks).
Young, H.J. (2014).	Management of safety of employes in Kenyan companies.	The study target population comprised of employees. Descriptive survey	The study found out that performance of employees to be influenced by their perceived safety in their workplace.	Study used purposive sampling to collect data from company employees.	Current study focused on employee safety and productivity using a wider scope of measures (productive time, value

		research design. Data analysis was done in form of frequencies and percentages. This did not allow for testing of hypothesis.	This study also recommended that it would be important to test the actual influence of safety management systems on performance of institutions	Purposive sampling yields a non-probability sample hence data collected may have been biased The study also failed to indicate the programmes put in place to protect employees. The study also lacks well defined objectives.	added and degree of accomplishment of tasks)..

APPENDIX IV: DIAGNOSTIC TESTS

Test	Test used	Indicators
Normality	Shapiro–Wilk test	The null hypothesis was that data was normally distributed. If Shapiro statistic-value >0.05 then this implies normality, the null hypothesis was rejected.(Razali,Nornadiah, wah & yap,2011)
Heteroscedasticity	Breusch-pagan test	It tested the null hypothesis that the variance of the residuals was homoscedastic (has a constant variance).If the p value was greater than 0.05,then the null hypothesis was rejected(Wooldridge, 2015)
Multicollinearity	Variance inflation factor test	The values start from 1 and will have no upper limit. Values of 1 indicated there is no correlation between the independent variable and others variables .Values between 1 and 10 suggested a moderate correlation, but not severe enough to warrant corrective measures. Values greater than 10 represented critical levels of multicollinearity indicating the coefficients are poorly estimated, and the p-values are therefore questionable (Jim ,2013).
Autocorrelation	Durbin Watson (DW) test	If the DW test statistic values are near 2 then there is absence of both positive and negative autocorrelation. Autocorrelation was eliminated by correct specification of the functional form of the model (Verbeek, 2012).

APPENDIX V: OPERATIONALIZATION OF VARIABLES

Variable	Type of the Variable	Indicators	Measurement
Workplace safety ergonomics	Independent	**Hazard Detectors:** Safety audits /workplace analysis, hazard & accident reporting, intelligence services, heat detectors, combustion gas and smoke detectors. **Protective Devices:** Sound, illumination , noise vibration absorption, robotics and CCTV (Closed-CircuitTelevision) cameras, screening and background checks , unauthorized entry, fire control and security alarms, safety warnings, safe working tools and workplaces, facility planning and design, audits, sanitary conveniences: changing rooms, portable water **Effects Analysis:** Symptoms of over exposure	Percentage rate
Workplace safety emergency management	Independent	Rescue response and evacuation plans, safe assembly and exit points, corrective actions, emergency shut off, emergency equipment: first aid facilities	Percentage rate
Workplace safety training	Independent	Safety induction training , safety seminars, talks and workshops, safety committee and safety manuals, safety rules, procedures and policies safety drills, regular briefs	Percentage rate
Workplace safety transfer	Independent	Group health insurance, private security, safety consultants, safety liability insurance, personal accident insurance.	Percentage rate
Government workplace safety regulation	Moderating	. WIBA . OSHA . Compulsory personal accident insurance	Percentage rate
Workplace safety attitude	Intervening	. Response to safety practices either positively or negatively	Percentage rate
Employee productivity	Dependent	- Productive time	Period in days
		- Accomplishment of tasks	Tasks accomplished out of the standard tasks
		- Value added	Total firm revenues / Number of employees

APPENDIX VI: MANUFACTURING FIRMS IN KENYA

Building, Mining and Construction Sector			
No.	Company	No.	Company
1	African Diatomite	16	Kenbro Industries Ltd
2	ARM Cement Ltd	17	Kenya Builders & Concrete Ltd
3	Bamburi Cement Limited	18	Krystalline Salt Ltd
4	Bamburi Special Products Ltd	19	Kurawa Industries Ltd
5	Central Glass Industries	20	Malindi Salt Works
6	East Africa Portland Cement	21	Manson Hart Kenya Ltd
7	Flamingo Tiles (Kenya) Limited	22	Mombasa Cement Ltd
8	Glenn Investments Ltd	23	Orbit Enterprises Ltd
9	Homa Lime Company Ltd	24	Saj Ceramics Ltd
10	International Energy Technik Ltd	25	Kemu Salt Packers Production Ltd
11	Karsan Murji & Company Limited	26	Savannah Cement
13	Boyama Building materials	27	Space and Style Ltd
14	International Green structures manufacturing Kenya Ltd	28	Tile and carpet centre Ltd
15	Kemu Salt Packers Production Ltd	29	Wareng Ndovu Enterprises 2005 Ltd
Chemical & Allied Sector			
1	Anffi Kenya Ltd	50	Leatherlife (EPZ) Ltd
2	Basco Products (K) Ltd	51	L'Oreal East Africa Ltd
3	Bayer East Africa Ltd	52	Maroo Polymers Ltd
4	Beiersdorf East Africa Ltd	53	Match Masters Ltd
5	Blue Ring Products Ltd	54	Metoxide Africa Ltd
6	BOC Kenya Limited	55	Milly Glass Works Ltd
7	Buyline Industries Limited	56	Murphy Chemicals Ltd
8	Canon Chemicals Limited	57	Odex Chemicals Ltd
9	Carbacid (CO2) Limited	58	Orbit Chemicals Industries Limited
10	Chemicals and Solvents (EA) Ltd/ IMCD Kenya Ltd	59	Osho Chemicals Industries Ltd
11	Chrysal Africa Limited	60	Pan Africa Chemicals Ltd
12	Continental Products Ltd	61	Polychem East Africa
13	Cooper K –Brands Ltd	62	Procter & Gamble East Africa Ltd
14	Crown Gases Ltd	63	Pyrethrum Board of Kenya
15	Crown Paints (Kenya) Ltd	64	PZ Cussons EA Ltd
16	Darfords Enterprises Ltd	65	Reckitt Benckiser (E.A.) Ltd
17	Decase Chemicals Ltd	66	Revolution Stores Ltd
18	Deluxe Inks Ltd	67	Rok Industries Ltd
19	Desbro Kenya Limited	68	Rumorth Group of Companies Ltd
20	Doric Industries Ltd	69	Sadolin Paints (E.A.) Ltd
21	Eastern Chemicals Industries	70	SC Johnson and Son Kenya
22	Elex Products Ltd	71	Seweco Paints Ltd
23	European Perfumes & Cosmetics Co. Ltd	72	Shreeji Chemicals Limited
24	Eveready Batteries East Africa Ltd	73	Soilex Prosolve Limited
25	Galaxy Paints & Coating Co. Ltd	74	Strategic Industries Limited
26	Grand Paints Ltd	75	Supa Brite Ltd
27	Haco Tigerbrands East Africa Ltd	76	Superfoam Ltd

28	Henkel Kenya Ltd	77	Syngenta East Africa Ltd
29	Interconsumer Products Ltd	78	Synresins Ltd
30	Johnson Diversey East Africa Ltd	79	Tata Chemicals Magadi Ltd
31	Jumbo Mattress Industries Ltd		
32	Kamili Packers Ltd		
33	Kel Chemicals Limited		
34	Kemia International Ltd		
35	Ken Nat Ink & Chemicals Ltd		
36	Kridha Limited		
37	Chemraw EA Ltd		
38	Crop Nutrition Laboratory Services		
39	Diversey Eastern & Central Africa Ltd		
40	Flame Tree Africa		
41	Henkel Polymer Company Ltd		
42	Highchem East Africa Ltd		
43	Kuza Project		
44	Kip Melamine Co. Ltd		
45	Norbook Kenya Ltd		
46	Reckitt Benckiser (E.A.)Ltd		
47	Sanergy		
48	Synergy Gases(K) Ltd		
49	Valencia Cosmetics Ltd		
Energy, Electricals & Electronics Sector			
1	Amedo Centre Kenya Ltd	29	Marshall Fowler (Engineers)
2	Asano International Limited	30	Metlex International Ltd
3	Assa Abloy East Africa Limited	31	Metsec Ltd
4	Aucma Digital Technology Africa Ltd	32	Mustek East Africa Limited
5	Avery East Africa Ltd	33	Nationwide Electrical Industries Ltd
6	Baumann Engineering Limited	34	Optimum Lubricants Ltd
7	Biogas Power Holdings (EA) Ltd	35	Ouru Power Limited
8	Centurion Systems Limited	36	PCTL Automation Ltd
9	Daima Energy Services Ltd	37	Pentagon Agencies
10	Digitech East Africa Limited	38	Power Technics Ltd
11	East African Cables Ltd	39	Protel Studios
12	Holman Brothers (E.A.) Ltd	40	Reliable Electricals Engineers (Nrb) Ltd
13	IberaAfrica Power (EA) Ltd	41	Roka Industries Ltd
14	International Energy Technik Ltd	42	Socabelec (EA) Ltd
15	Karan Biofuel Limited	43	Sollatek Electronics (Kenya) Limited
16	Kenwest Cables Ltd	44	Specialised Power Systems Ltd
17	Kenya Petroleum Refineries Ltd	45	Synergy-Pro
18	Kenya Power Ltd	46	
19	Libya Oil Kenya Limited	47	
20	Manufacturers & Suppliers (K) Ltd	48	
21	Aial Group Ltd	49	
22	Philips EA Ltd	50	
23	Powerex Lubricants Ltd	51	
24	Repelectric (K) Ltd	52	
25	Scales & Software (K) Ltd	53	
26	Solar Power & Infrastructure Limited	54	
27	Synergy Lubricants Solutions	57	

28	Vivo Energy Kenya Ltd		
Food, Beverages & Tobacco Sector			
1	Africa Spirits Limited	121	Kenshop Supermarket (TI) Hot Bread Section
2	Agricultural & Veterinary Supplies	122	Kenya Meat Commission
3	Agriner Agricultural Development	123	Kenya Nut Company Ltd
4	Agro Chemical and Food Company	124	Kenya Seed Company Ltd
5	Alliance One Tobacco Kenya Ltd	125	Kenya Sweets Ltd
6	Al-Mahra Industries Ltd	126	Kenya Tea Development Agency
7	Alpha Fine Foods Ltd	127	Kenya Tea Growers Association
8	Alpine Coolers Limited	128	Kenya Tea Packers Ltd (KETEPA)
9	Aquamist Limited	129	Kenya Wine Agencies Limited
10	Arkay Industries Ltd	130	Keroche Industries Ltd
11	Bakers Corner Ltd	131	Kevian Kenya Ltd
12	Bakex Millers Ltd	132	Kibos Sugar and Allied
13	Belat Enterprises	133	Kinangop Dairy Limited
14	Belfast Millers Ltd	134	Kisii Bottlers Ltd
15	Beverage Services (K) Ltd	135	Kitui Flour Mills Ltd
16	Bidco Oil Refineries Ltd	136	Koba Waters Ltd
17	Bio Food Products Ltd	137	Krish Commodities Ltd
18	Bounty Limited	138	Kuguru Food Complex Ltd
19	The Breakfast Cereal Company (K) Ltd	139	Kwality Candles and Sweets Ltd
20	British American Tobacco Kenya	140	London Distillers (K) Ltd
21	Broadway Bakery Ltd	141	Mafuko Industries Limited
22	Brookside Dairy Ltd	142	Mama Millers Limited
23	Bunda Cakes & Feeds Ltd	143	Manji Food Industries Limited
24	Butali Sugar Mills Ltd	144	Mastermind Tobacco (K) Ltd
25	Buzeki Dairy Limited	145	Mayfeeds Kenya Limited
26	C. Dormans Ltd	146	Melvin Marsh International
27	C. Czarnikow Sugar East Africa Ltd	147	Menengai Oil Refineries Ltd
28	Cadbury Kenya Limited	148	Milly Fruit Processors Ltd
29	Caffe Del Duca Ltd	149	Mini Bakeries (Nbi) Ltd
30	Candy Kenya Ltd	150	Miritini Kenya Ltd
31	Capwell Industries Limited	151	Mjengo Limited
32	Centrofood Industries Limited	152	Mombasa Maize Millers
33	Chai Trading Company Limited	153	Mount Kenya Bottlers Ltd
34	Chemilil Sugar Company Ltd	154	Mumias Sugar Company
35	Chirag Kenya Limited	155	Munyiri Special Honey Ltd
36	Coast Silos (K) Ltd	156	Mzuri Sweets Ltd
37	Coastal Bottlers Limited	157	Nairobi Bottlers Ltd
38	Coca-Cola East & Central Africa Ltd	158	Nairobi Flour Mills Ltd
39	Coffee Agriworks Ltd	159	NAS Airport Services Ltd
40	CoffTea Agencies	160	New Kenya Co-Operative Creameries Ltd
41	Corn Products Kenya Ltd	161	NesFoods Industries Ltd
42	Danone Baby Nutrition Africa and Overseas	162	Nestle Foods Kenya Ltd
43	Tropikal Brand (Africa) Ltd	163	Nicola Farms Ltd
44	Del Monte Kenya Ltd	164	Njoro Canning Factory (Kenya) Ltd
45	Diamond Industries Ltd	165	Norda Industries Ltd
46	East African Breweries Ltd	166	Nutro Manufacturers EPZ Ltd

47	East Africa Sea Food Ltd	167	Palmhouse Diaries Ltd
48	East Africa Seed Co. Ltd	168	Patco Industries Limited
49	Edible Oil Products	170	Pearl Industries Ltd
50	Eldoret Grains Ltd	171	Pearly Waters Limited
51	Ennsvalley Bakery Ltd	172	Pembe Flour Mills Ltd
52	Equator Bottlers Ltd	173	Premier Flour Mills Ltd
53	Erdemann Co. (K) Ltd	174	Premier Food Industries Limited
54	Europack Industries Limited	175	Pride Industries Ltd
55	Excell Chemicals Ltd	176	Pristine International Ltd
56	Farmers Choice Ltd	177	Proctor & Allan (E.A.) Ltd
57	Fresh Produce Exporters Association of Kenya	178	Promasidor Kenya Ltd
58	Frigoken Ltd	179	Pwani Oil Products Ltd
59	Giloil Company Limited	180	Rafiki Millers Ltd
60	Githunguri Dairy Farmers Co-operative Society	181	Razco Ltd
61	Global Fresh Ltd	182	Re-Suns Spices Limited
62	Global Tea & Commodities (K) Limited	183	Rift Valley Bottlers Ltd
63	Gold Crown Beverages (K) Ltd	184	Sameer Agriculture & Livestock (Kenya) Ltd
64	Gold Crown Foods (EPZ) Ltd	185	SBC Kenya Limited
65	Gonas Best Ltd	186	Sigma Supplies Ltd
66	Green Forest Foods Ltd	187	Spectre International Ltd
67	Happy Cow Ltd		
68	Heritage Foods Kenya Ltd		
69	Highlands Canners Ltd		
70	Highlands Mineral Water Company		
71	Insta Products (EPZ) Ltd		
72	Jambo Biscuits (K) Ltd		
73	James Finlay Kenya Ltd		
74	Jetlak Foods Ltd		
75	Juja Coffee Exporters		
76	Kabianga Dairy Ltd		
77	Eastern Produce (K)Kakuzi		
78	Kambu Distillers Limited		
79	Kamili Packers Ltd		
80	Kapa Oil Refineries Limited		
81	Karirana Estate Ltd		
82	Kenafric Industries Ltd		
83	Kenblest Limited		
84	Kenchic Limited		
85	Kensalt Ltd		
86	Aariva Ltd		
87	Agri Pro-Pak Ltd		
88	Alpha Grain Millers Ltd		
89	Belsize Industries Ltd		
90	Brown Biashara Ltd		
91	Burton and Mamber Company Ltd		
92	Capel Food Ingredients		
93	Doinyo Lessos Creameries Ltd		
94	Dutch Water Ltd		
95	Elekea Ltd		
96	FRM EA Packers Ltd		

97	Glacier Products(Amor Mia,Dairyland,Mio)		
98	Grain Bulk Handlers		
99	Honey Care Africa Ltd		
100	Jjasm Mini-Distillery		
101	Kerio Valley Development Authority		
102	Mamboleo Distillers Ltd		
103	Kentaste Products Ltd		
104	Kwale International Company Ltd		
105	Kenya Horticultural Exporters(1977)		
106	Kirinyaga Flour Millers		
108	Nicey Nicey Maize Millers		
108	Nzoia Sugar Company Ltd		
109	Olivado EPZ		
110	Purple Iris Africa		
111	Scrumptious Eats Ltd		
112	Selecta Kenya Gmbh & Sons.KG		
113	Stawi foods and Fruits Ltd		
114	Supa Snacks Ltd		
115	Tropical Heat Limited		
116	Tropikal Brand (Afrika)Ltd		
117	Vinepack Ltd		
118	Vava Coffee Ltd		
119	Victory Farms Limited 106 Thigiri Lane		
120	Wanji food Industries Ltd		
Leather & Footwear Sector			
1	Alpharama Limited	7	Leather Industries of Kenya Limited
2	Athi River Tanneries Ltd	8	Maridadi Seasons Handcraft
3	Bata Shoe Company (Kenya) Ltd	9	Sandstorm Africa Limited
4	Budget Shoes Limited		
5	C & P Shoe Industries Ltd		
6	Macquin Shoes Ltd		
Metal & Allied Sector			
1	African Marine & General Engineering Co. Ltd	46	Kitchen King Ltd
2	Alloy Steel Casting Ltd	47	Laminate Tube Industries
3	Apex Steel Limited	48	Mabati Rolling Mills Limited
4	ASL Limited- Steel Division	49	Marvel Lifestyle Ltd
5	ASP Company Ltd	50	Mecol Limited
6	Athi River Steel Plant	51	Metal Crowns Ltd
7	Atlantic Ltd	52	Modulec Engineering Systems
8	Blue Nile Wire Products Ltd	53	Nail & Steel Products Ltd
9	Booth Extrusions Limited	54	Nampak Kenya Ltd
10	Brollo Kenya Limited	55	Napro Industries Limited
11	City Engineering Works (K) Limited	56	Narcol Aluminium Rolling Mills
12	Cook 'N Lite Ltd	57	Ndume Ltd
13	Corrugated Sheets Ltd	58	Northstar Packaging Ltd
14	Crystal Industries Ltd	59	Orbit Engineering Ltd
15	Davis & Shirtliff Ltd	60	Rolmil Kenya Ltd
16	Devki Steel Mills Ltd	61	Roliumil Kenya Ltd
17	Doshi Enterprises Ltd	62	Safal Mitek Ltd
18	East Africa Spectre Limited	63	Sheffield Steel Systems Ltd

19	East African Foundry Works (K) Ltd	64	Siya Industries (K) Ltd
20	Easy Clean Africa Limited	65	Soni Technical Services Ltd
21	Eldoret Farm Machinery	66	Southern Engineering Co. Ltd
22	Elite Tools	67	Specialised Engineering Co. (EA) Ltd
23	Farm Engineering Industries Limited	68	Standard Rolling Mills Ltd
24	Friendship Container Manufacturer Ltd	69	Steel Structures Ltd
25	Ganglong International Company	70	Steelmakers Ltd
26	General Aluminium Fabricators Ltd	71	Steelwool (Africa) Ltd
27	Greif East Africa Ltd	72	Tarmal Wire Products Ltd
28	Heavy Engineering Ltd	73	Technoconstruct Kenya Ltd
29	Hobra Manufacturing Ltd	74	Technosteel Industries Limited
30	Insteel Limited	75	Tononoka Rolling mills Ltd
31	Iron Art Limited	76	Tononoka Steel Ltd
32	Kaluworks Ltd	77	Vicensa Investments Ltd
33	Kens Metal Industries	78	Viking Industries Ltd
34	Kenya General Industries Ltd	79	Warren Enterprises Ltd
35	Kenya United Steel Company (2006)	80	Welding Alloys Limited
36	Elite Tools	81	Wire Products Ltd
37	Agro-Irrigation & Pump	82	Ashut Engineers ltd
38	Allied East Africa Ltd	83	Hebatullah Brothers Ltd
39	Container Technology Ltd		
40	Fine engineering works Ltd		
41	Arvind Engineering Ltd		
42	Skyline Holdings Ltd		
43	St Theresa Industries		
44	Sufuria World Ltd		
45	Zenith Steel Fabricators Ltd		
	Motor Vehicle & Accessories Sector		
1	Alamdar Trading Company Limited	31	Kenya Grange Vehicle industries Ltd
2	Associated Battery Manufacturers (EA) Ltd	32	Kenya Vehicle Manufacturers Limited
3	Assemblers Ltd	33	King-Bird (K) Ltd
4	Auto Ancilliaries Ltd	34	Labh Singh Harnam Singh Ltd
5	Auto Industries Ltd	35	Mann Manufacturing Co. Ltd
6	Auto springs Manufacturers Ltd	36	Master Fabricators Ltd
7	Autofine Filters & Seals Ltd	37	Megh Cushion Industries Ltd
8	Automotive & Industrial Battery Manufacturers	38	Motorbike Africa Ltd
9	Banbros Ltd	39	Mutsimoto Company Limited
10	Bhachu Industries Ltd	40	Pipe Manufacturers Ltd
11	BMG Holdings Ltd	41	Sohansons Limited
12	Choda Fabricators Ltd	42	Songyi Motorcycles International Ltd
13	Chui Auto Spring Industries Ltd	43	Theevan Enterprises Ltd
14	CMC Motors Group Ltd	44	Turaco Limited
15	Foton East Africa Ltd	45	Toyota Kenya Ltd
16	General Motor East Africa Limited	46	Transtrailers Limited
17	Handa (K) Ltd	47	Unifilters Kenya Ltd
18	Igo Holdings Ltd	48	Uni-Truck World Ltd
19	Impala Glass Industries Ltd	49	Varsani Brakelinings Ltd
20	Kenya Coach Industries Ltd	50	Ace Motors Ltd

21	Associated Vehicle Assemblers Ltd	51	Dodi Autotech(K) Ltd
22	Auto Ancillaries Ltd		
23	Cica Motors		
24	Kenyon Ltd		
25	King Finn Kenya Ltd		
26	Kibo Africa Ltd		
27	Plateau Motors Ltd		
28	Rockey Africa Ltd		
29	R.T.(East Africa) Ltd		
30	Ruidu(Kenya) Company Ltd		
Paper & Board Sector			
1	Adpak International Limited	45	Kartasi Industries Limited
2	Allpack Industries Ltd	46	Kenafric Diaries Manufacturers Limited
3	Andika Industries Ltd	47	Kenya Litho Ltd
4	Associated paper & Stationery Ltd	48	Kenya Stationers Ltd
5	Autolitho Ltd	49	Kim-Fay East Africa Ltd
6	Bag and Envelope Converters	50	Kul Graphics Ltd
7	Bags & Balers Manufacturers (K) Ltd	51	L.A.B International Kenya Limited
8	Belsize Industries Ltd	52	Label Converters
9	Brand Printers Ltd	53	Manipal International Printing Press Ltd
10	Carton Manufacturers Ltd	54	Modern Lithographic (K) Ltd
11	Cartubox Industries (E.A) Ltd	55	Mufindi Paper Ltd
12	Cempack Solutions Ltd	56	Nation Media Group Limited-Printing Plant
13	Chandaria Industries Ltd	57	National Printing Press Limited
14	Colour Labels Ltd	58	Packaging Manufacturers (1976) Ltd
15	Colour Packaging Limited	59	Paper House of Kenya Ltd
16	Colourprint Ltd	60	Paperbags Limited
17	D.L Patel Press Ltd	61	Phoenix Matches Ltd
18	Dodhia Packaging Limited	62	Pressmaster Ltd
19	East Africa Packaging Industries Limited	63	Printing Services Ltd
20	East Africa Paper Converters Ltd	64	Printpak
21	Elite Offset Ltd	65	Printwell Industries Ltd
22	Ellams Products	66	Punchlines Ltd
23	English Press Limited	67	Ramco Printing works Ltd
24	Euro Packaging Ltd	68	Regal Press Kenya Ltd
25	Flora Printers Ltd	69	Stallion Stationary manufacturers Ltd
26	Fortunes Printers & Stationers Ltd	70	Standard Group Ltd
27	Franciscan Kolbe Press	71	Statpack Industries Ltd
28	General Printers Limited	72	Taws Limited
29	Graphics & Allied Ltd	73	Tetra Pak Ltd
30	Guaca Stationers Ltd	74	The Rodwell Press Ltd
31	Highland Paper Mills Ltd		
32	Icons Printers Ltd		
33	Interlabels Africa Ltd		
34	International Paper & Board Supplies Ltd		
35	De La Rue Currency and Security Print Ltd		

36	Digital Hub Ltd		
37	Avery Dennison Kenya Ltd		
38	Ellams Products Ltd		
39	Essential Manufacturing		
40	Ubuntu Paper mills		
41	Ndalex Digital Technology		
42	Palmy Enterprises		
43	Prime Cartons Limited		
44	Rushabh Industries ltd		
45	The Print Exchange		
Pharmaceutical & Medical Equipment Sector			
1	African Cotton Industries Ltd	17	KAM Industries
2	Alpha Medical Manufacturers Ltd	18	Laboratory & Allied Limited
3	Benmed Pharmaceuticals Limited	19	Manhar Brothers (K) Ltd
4	Beta Healthcare International	20	Medivet Products Ltd
5	Biodeal Laboratories Ltd	21	Novelty Manufacturing Ltd
6	Biopharma Ltd	22	Osschemie (K) Limited
7	Cosmos Limited	23	Pharm Access Africa Ltd
8	Dawa Limited	24	Pharmaceutical Manufacturing Co. (K) Ltd
9	Elys Chemical Industries Limited		
10	Gesto Pharmaceuticals Ltd		
11	GlaxoSmithkline Kenya Ltd		
12	Global Merchants Ltd		
13	Autosterile(EA)		
14	Essential Drugs Ltd		
15	Njimia(K) Ltd		
16	Zain Pharmaceuticals		
Plastics & Rubber Sector			
1	ACME Containers Ltd	51	Polly Propelin Bags Ltd
2	Afro plastics (K) Ltd	52	Polyblend Limited
3	Betatrad (K) Ltd	53	Polyflex Industries Limited
4	Bluesky Industries Ltd	54	Polythene Industries Ltd
5	Bobmil Industries Ltd	55	Premier Industries Ltd
6	Cables & Plastics Ltd	56	Princeware Africa (Kenya) Ltd
7	Complast Industries Limited	57	Prosel Ltd
8	Dune Packaging Limited	58	Pyramid Packaging Ltd
9	Dynaplas Limited	59	Qplast Industries Ltd
10	Elgitread (Kenya) Ltd	60	Raffia Bags (K) Ltd
11	Elgon Kenya Ltd	61	Rubber Products Ltd
12	Eslon Plastics of Kenya Ltd	62	Safepak Limited
13	Five Star Industries Ltd	63	Sameer Africa Ltd
14	General Plastics Limited	64	Sanpac Africa Ltd
15	Hi-Plast Ltd	65	Shiv Enterprises (E) Ltd
16	Jamlam Industries Ltd	66	Signode Packaging Systems Ltd
17	Kamba Manufacturing (1986) Ltd	67	Silpack Industries Limited
18	Kenpoly Manufacturers Limited	68	Singh Retread Ltd
19	Kentainers Ltd	69	Solvochem East Africa Ltd
20	Kenya Suitcase Manufacturers Limited	70	Springbox Kenya Ltd
21	L.G. Harris & Co. Ltd	71	Styroplast Limited
22	Lakhir Plastics Limited	72	Sumaria Industries Ltd
23	Laneeb Plastic Industries Ltd	73	Super Manufacturers Ltd
24	Malplast Industries Ltd	74	Techpak Industries Ltd

25	Metro Plastics Kenya Limited	75	Thermopak Limitited
26	Mombasa Polythene Bags Ltd	76	Thermos Limited
27	Nairobi Plastics Ltd	77	Treadsetters Tyres Ltd
28	Ombi Rubber Roilers Ltd		
29	Packaging industries Ltd		
30	Packaging Masters Limited		
31	Plastic Electricons		
32	Plastics & Rubber Industries Ltd		
33	Africa PVC Industries Ltd		
34	Brush Manufacturers Ltd		
35	Canaaneast Company Ltd		
36	Cocorico Investment Ltd		
37	Coninx Industries Ltd		
38	EnviroHub Holding Company		
39	Elson Plastic Of Kenya Ltd		
40	Finlay Brushware Ltd		
41	Kwality Packaging House Ltd		
42	Mega (EA) Plastics		
43	Nakuru Plastics Ltd		
44	Plast Packaging Industries Ltd		
45	RitePak Ltd		
46	SmartPack Ltd		
47	Styroplast Ltd		
48	Torrent East Africa Ltd		
49	Treadsetters Tyres Ltd		
50	Umoja Rubber Products		
Textile & Apparels Sector			
1	Allitex EPZ Ltd	41	Mega Spin Ltd
2	Alpha Knits Ltd	42	Midco Textiles (EA) Ltd
3	Apex Apparels (EPZ) Ltd	43	Mombasa Apparels
4	Ashton Apparel EPZ Ltd	44	Nakuru Industries Ltd
5	Bedi Investments Limited	45	New Wide Garments (K) Ltd
6	Comfort The Children International	46	Ngecha Industries Ltd
7	Dharamshi & Co Ltd	47	Oriental Mills Ltd
8	Esmailji Sheikh Essaji & Sons	48	Penny Galore Ltd
9	Fantex (K) Ltd	49	Protex Kenya EPZ Ltd
10	Forces Equipment (Kenya)Ltd	50	Ricardo EPZ Int. Co. Ltd
11	Future Garment (EPZ) Ltd	51	Rivatex (East Africa) Ltd
12	Global Apparels Kenya EPZ Ltd	52	Royal Garment Industries Ltd
13	Hantex Garments EPZ Ltd	53	Rupa Mills Ltd
14	Insight Kenya	54	Senior Best Garments Kenya EPZ
15	Kamyn Industries Limited	55	Shin-Ace Garments Kenya (EPZ)
16	Kapric Apparels EPZ Ltd	56	Soko International
17	Kavirondo Filments Ltd	57	Spin Knit Limited
18	Kema (EA) Ltd	58	Spinners & Spinners Ltd
19	Ken-Knit (Kenya) Ltd	59	Squaredeal Uniforms Centre Ltd
20	Kenya Knit Garment (EPZ) Ltd	60	Straightline Enterprises
21	Kenya Shirts Manufacturing Company Ltd	61	Summit Fibres Limited
22	Kenya Tents Limited	62	Sunflag Textiles & Knitwear Mills
23	Kenya Trading (EPZ) Ltd	63	Tarpo Industries Limited
24	Kikoy Co. Ltd		

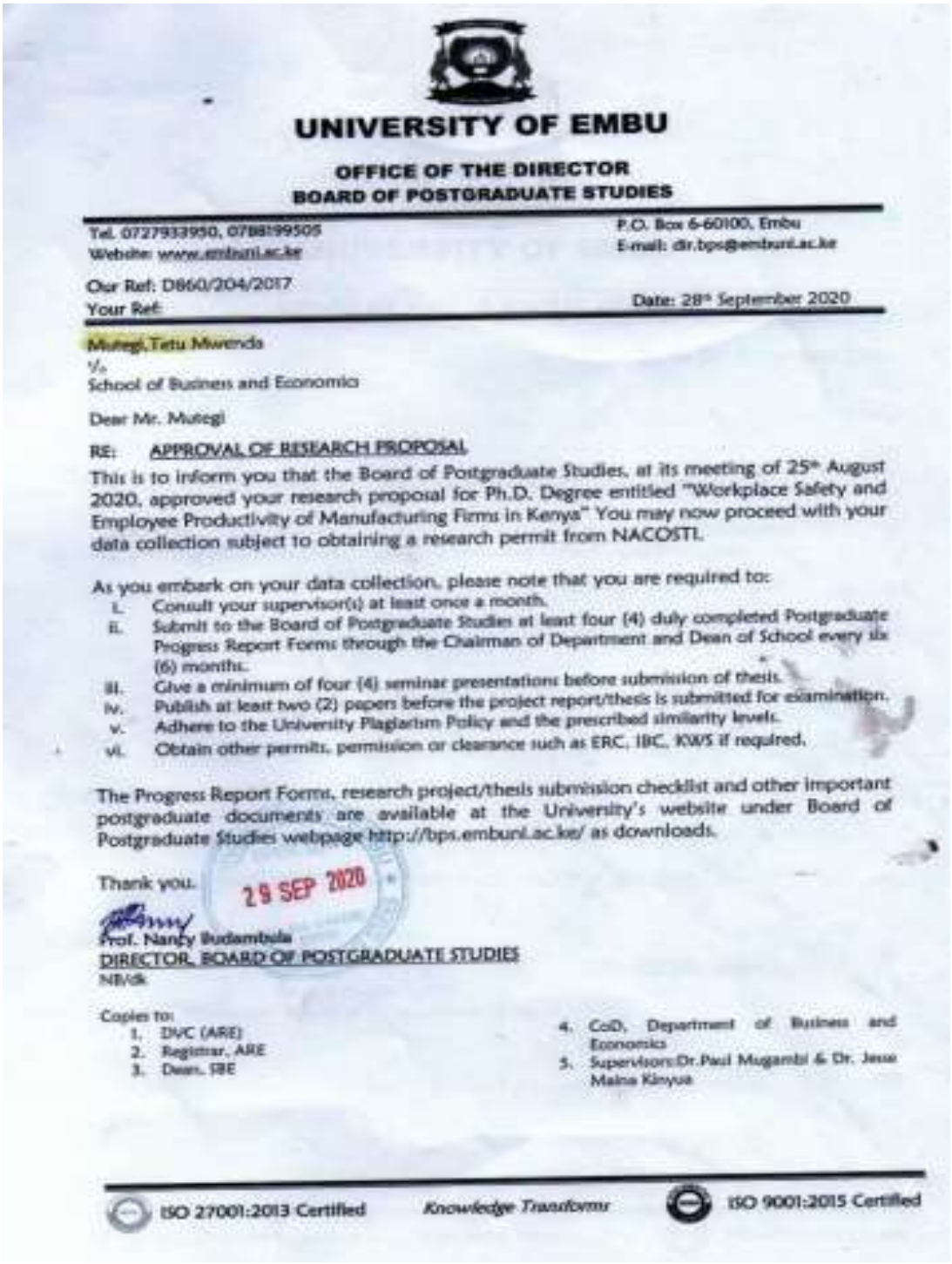
25	Kikoy Mall		
26	Kikoy Mall EPZ Ltd		
27	Le Stud Limited		
28	Leena Apparels Ltd		
29	Lifeworks Shukrani Limited		
30	Mega Garments Industries Kenya (EPZ)		
31	Adpack Ltd		
32	Akinyi Odongo Kenya Ltd		
33	Blue Waves Enterprises Ltd		
34	Brilliant Garments EPZ Ltd		
35	Chalange Industries Ltd		
36	Ethical Fashion Artison EPZ Ltd		
37	Gone Fishing Ltd		
38	Leeways Control Sysytems and Suppliers		
39	Thika Cloth Mills Ltd		
40	Zaritex Knitwear Kenya		
Timber, Wood & Furniture Sector			
1	Comply Industries Ltd	11	PG Bison Ltd
2	Economic Housing Group Ltd	12	Rai Plywoods (Kenya) Ltd
3	Fine Wood Works Ltd	13	Rosewood Furniture Manufacturers
4	Furniture International Limited	14	Shah Timber Mart Ltd
5	Kenya Wood Limited	15	Fun Kidz
6	Neo Interior Decorators Ltd	16	House of Sahara Enterprises ltd
7	Newline Ltd	17	Savanna Saw Mills
8	Panesar's Kenya Ltd	18	Turea Ltd
9	Woodtex Kenya Ltd	19	Biashara Master Sawmills
10	African Retail Traders		
Services and Consultancy			
1	E-Momentum Interactive Systems Ltd	71	Raiser resouces ltd
2	Ernst & Young	72	Red lands roses ltd
3	Express Communication Ltd	73	Rentco east africa ltd
4	Flexi Personnel Ltd	74	Rongai workshop and transport ltd
5	GE East Afrika Services Ltd	75	Safaricom ltd
6	Gems Skills(Kenya)Ltd	76	Safechem [k] ltd
7	Grain Bulk Handlers	77	Sagissa process engineering [k] ltd
8	Grant Thornton Consulting Ltd	78	Samco holdings ltd
9	GS1 Kenya	79	sperkjet east africa ltd
10	Halliday Finch Ltd	80	Service shoes africa ltd
11	Hot Appliances Limited	81	Sevenseas technology
12	House of Major	82	Siemens ltd kenya
13	Htm Capital Ltd	83	Spectrum network ltd
14	IDB Capital Ltd	57	Sproxil east africa
15	Ikapamedia East Africa	58	Standard chartered bank [k] ltd
16	Industrial & Commercial Dev Corp.(ICDC)	59	Stanlib kenya ltd
17	Industrial and Scientific Support Services	60	Strategic value ltd
18	Industrial Promotion Services(K) Ltd	61	Stratostaff EA ltd
19	International Energy Technik Ltd	62	Swivel marketing ltd

20	Intraspeed Arcpro Kenya Ltd	63	Symbiotic media consortium
21	Insight Management Consultants Ltd	64	Syspro kenya ltd
22	Institute of Packaging Proffessionals	65	Techno brain ltd
23	International supply Chain Solutions Ltd	66	The co-operative bank of kenya ltd
24	Intersoft Ltd	67	The copy cat ltd
25	Intertek International Ltd	68	The helios group
26	Intertek Testing Services(EA)(PTY)Ltd	69	The leadership group ltd
27	Ipay Ltd	70	Tracesoft ltd
28	Josper Occupational Health and Safety	71	Transoceanic project development kenya ltd
29	Kaizen Institute Africa	72	Umati capital [kenya] ltd
30	Kanaga & Associate Advocates	73	Underwriting africa insurance brokers
31	Karcher Ltd	74	Vehicle and enquipment leasing ltd
32	Kensil Ltd	75	Broadcast Solution International
33	Kenya Fire Appliances Co.Ltd	76	Bureau Varitas Kenya Ltd
34	Kenya Flower Council	77	Capital Colours Creative Designers
35	Kenya National Cleaner Production Center	78	Ceven Ltd
36	AAM Resources	79	CFL Advocates
37	Access Alliance Ltd	80	Chase Bank (K) Ltd
38	Adafric Communications Ltd	81	Chemtech International Ltd
39	African Banking Corporation Ltd	82	City Clock (K) Ltd
40	Africote Ltd	83	Cityscape Trends Services Ltd
41	Agricultural Employers Association	84	Commercial Bank of Africa
42	Alexander Forbes Brokers	85	Compulynx Ltd
43	Analabs Ltd	86	Control Risks East Africa
44	Andaris Energy Limited	87	Consumers Options Ltd
45	Andest bites Ltd	88	Danish Cleantech Group
46	ASKADOC	89	Delegation of German Industry
47	Bank of Africa	90	Deloitte & Commerce
48	Bast East Africa Ltd	91	Delloite & Touche
49	Bluekey Software solution (K) Ltd	92	Diverse Management Consultancy
50	Bold limited	93	East African Development Bank
51	Brand ID Technology (EA) Ltd	94	Broadcast Solution International
52	Broadcast Solution International	95	Bureau Varitas Kenya Ltd
53	Bureau Varitas Kenya Ltd	96	Consumers Options Ltd
54	Capital Colours Creative Designers Ltd	97	Danish Cleantech Group
55	Ceven Ltd	98	Delegation of German Industry and Commerce
56	CFL Advocates	99	Deloitte & Commerce
57	Chase Bank (K) Ltd	100	Delloite & Touche
		101	Nokia Siemens Networks Kenya Ltd

Total= 853

Source, KAM Manufacturers and Exporters Directory, 2019/2020

APPENDIX VII: APPROVAL OF RESEARCH PROPOSAL



UNIVERSITY OF EMBU

OFFICE OF THE DIRECTOR
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P.O. Box 6-60100, Embu
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Our Ref: D860/204/2017
Your Ref:

Date: 28th September 2020

Mutegi,Tetu Mwenda
c/o
School of Business and Economics

Dear Mr. Mutegi

RE: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Board of Postgraduate Studies, at its meeting of 25th August 2020, approved your research proposal for Ph.D. Degree entitled "Workplace Safety and Employee Productivity of Manufacturing Firms in Kenya" You may now proceed with your data collection subject to obtaining a research permit from NACOSTI.

As you embark on your data collection, please note that you are required to:

i. Consult your supervisor(s) at least once a month.
ii. Submit to the Board of Postgraduate Studies at least four (4) duly completed Postgraduate Progress Report Forms through the Chairman of Department and Dean of School every six (6) months.
iii. Give a minimum of four (4) seminar presentations before submission of thesis.
iv. Publish at least two (2) papers before the project report/thesis is submitted for examination.
v. Adhere to the University Plagiarism Policy and the prescribed similarity levels.
vi. Obtain other permits, permission or clearance such as ERC, IBC, KWS if required.

The Progress Report Forms, research project/thesis submission checklist and other important postgraduate documents are available at the University's website under Board of Postgraduate Studies webpage http://bps.embuni.ac.ke/ as downloads.

Thank you.

29 SEP 2020

Prof. Nancy Budambula
DIRECTOR, BOARD OF POSTGRADUATE STUDIES
NB/sk

Copies to:
1. DVC (ARE)
2. Registrar, ARE
3. Dean, SBE
4. CoD, Department of Business and Economics
5. Supervisors:Dr.Paul Mugambi & Dr. Jesse Maina Kinyua

ISO 27001:2013 Certified *Knowledge Transforms* ISO 9001:2015 Certified

APPENDIX VIII: RESEARCH LICENSE FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **505433**

Date of Issue: **23/October/2020**

RESEARCH LICENSE

This is to Certify that Mr.. TETU MUTEGI MWENDA of University of Embu, has been licensed to conduct research in Kiambu, Machakos, Mombasa, Nairobi on the topic: WORKPLACE SAFETY AND EMPLOYEE PRODUCTIVITY OF MANUFACTURING FIRMS IN KENYA for the period ending : 23/October/2021.

License No: **NACOSTI/P/20/7282**

505433

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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