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The Effect of Kaizen Implementation on Perceived Waste Minimization: Muger Cement Factory

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advisor : Abraraw Chane (Ph.D)

**A Thesis Submitted to Addis Ababa University School of Commerce in
Partial Fulfillment of the Requirements for the Master of Art Degree in
Human Resource Management**

**Addis Ababa University School of Commerce
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Declaration

I, the undersigned, hereby declare that this masters' thesis entitled "***The Effect of Kaizen implementation on perceived waste minimization: Mugher Cement Factory***" is my original work and has not been used by others for any other requirements in any other university and all sources of information in the study have been appropriately acknowledged.

Berhanemaskel Gebre

Student

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June 2019

Date

Letter of certification

This is to certify that Berhanemaskel Gebre has carried out his thesis on the topic entitled “*The Effect of Kaizen implementation on perceived waste minimization: Mugher Cement Factory*” This work is original in nature and suitable for the award of Masters of Arts (MA) in Human Resource Management.

Abraraw Chane (Ph.D)

june 2019

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LIST OF ABBREVIATIONS

- **CIC:** chemical industry corporation
- **FDRE:** Federal Democratic Republic of Ethiopia
- **EKI:** Ethiopian Kaizen Institute
- **GDP:** Growth Domestic Product
- **GRIPS:** national graduate institute for policy study
- **GEMBA:** work place
- **JICA:** Japan International Cooperation Agency
- **MOI :** Ministry of industry
- **MCF:** Mughher cement factory
- **PDCA:** Deming cycle stands for Plan – Do – Check – Act
- **SPSS:** Statistical Package for Social Science
- **TPS:** Total production system

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Abstract

The purpose of this study is to identify the effect of kaizen implementation on perceived waste minimization in Muger cement factory. The factory is one of the pioneer cement products manufacturing industry in the country. It attains greater end result by implementing level one kaizen. kaizen is the means of continuous improvement involving everyone from top management to shop floor workers. This achievement enables the company to be role model. these days the factory try to implement level two kaizen side by side with level one. Due to various reasons however the current status of factory's overall kaizen implementation level goes back ward from time to time. Consequently, this thesis focuses on identifying the effect of kaizen on waste minimization practice in the factory. The study design is descriptive research. Both qualitative and quantitative data were used. This thesis presents the results of a survey with final ten main items which are factors affecting for basic Kaizen implementation, four indicators for waste minimization practice and the theoretical model that demonstrates the relationship between kaizen and waste minimization. The questionnaire was applied to 100 senior expert, team leader and department head from whole departments of Muger main plant, Terek and Addis Ababa branch plants. The survey was validated using statistical validation using the Cronbach alpha index; the result is 0.788. This shows that there is an internal consistency among items. Descriptive mean is used for measuring the level of current status of kaizen and waste minimization practice in the factory. The result reveal that both kaizen and waste minimization practice exercise moderately high in the factory. Correlate and regression model of analysis was used to know the relationship between kaizen implementation and waste minimization practice. The result showed almost all kaizen parameter have positive correlation with waste minimization practice whereas some kaizen practice such as standardization, sustainability and management commitment for kaizen practice show gap. All in all, the result shows that Muger cement factory kaizen implementation practice have positive effect on waste minimization practice moderately high. It needs extra effort and strong refreshment program.

Key words: Kaizen, waste minimization, employee perception, Muger cement.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The business world is becoming very competitive with the emergence of modern technologies. New methods of carrying out businesses to provide customers with a better quality of products or services. Customers' satisfaction is the focal point for every business which means business owners must use all possible means to make their customers satisfied. Satisfied customers may become loyal customers thereby increasing the profit margin of the company. It is for this reason change is essential in every organization. Change is important if a company wants to remain competitive and successful. The birth of modern technologies, customers' competitors are some of the push factors for change to occur in an organization. Customers' needs and expectations are ever changing, forcing organizations to search for better ways to meet the needs of their customers.

Imai (1986) introduced *kaizen* to the international audience and asserted that *kaizen* is an umbrella concept for a large number of Japanese business practices that focuses on the way people approach work. It shows how management and workers can change their mindset together to improve their productivity. While there are many strategies for management success, *kaizen* is different since it helps focus in a very basic way on how people conduct their work (Imai, 1986;1997). Organizations today have increasingly become aware of the importance of Change Management practices. This awareness in a system is a critical dimension in the performance of organizations The real life experiences substantiate the assumption that no matter how sophisticated and modern the business activities of the organization may become, it will be extremely difficult to sustain its growth and effectiveness unless there are strategies that complement its operations through change management tool. Kaizen is one of these tools by reducing waste i.e. any production activity that utilizes resources but does not add any value for the customer. Since these wastes add to the cost of products, they either reduce the profit the manufacturer makes or inflate the price that the customer needs to pay. Therefore, eliminating waste presents a great opportunity for businesses to cut costs and improve efficiency. When speaking about waste include: transportation, inventory, motion, waiting, over processing, overproduction, and defects. Elimination of these kinds of waste can help companies reduce costs, increase employee engagement and customer happiness, and increase profits. The continuous improvement philosophy of Kaizen attempt to decrease as much waste as possible and increase Teamwork Employee morale grows, because it engenders a sense of value

and purposefulness, encourages scrutiny of processes so that mistakes and waste can be reduced, inspection needs are lessened, because errors are reduced. increases as employees think beyond the specific issues of their department, Systems are in place to ensure improvements are encouraged both short and long term.

This study will focus Kaizen practice on waste minimization in Mugher cement factory. The factory is one of the pioneers in cement production sector in Ethiopia . It is a state owned enterprise established with a purpose of producing and supplying cement and carrying out related activities that are important for the attainment of its objective. Initially the factory was established in 1999 through amalgamation of two formerly independent factories: i.e. Mugher Cement Factory and Addis Ababa Cement Factory. The Factory has three plants in different location i.e Mugher, Addis Ababa and Tateke. Nowadays many cement factories operate in cement market in the country this makes the market become more competitive from time to time the factory to stay in the market must implement different change management tool to alleviate the challenge and minimize the burden of competition Among the change management tool KAIZEN are the main one. So in this research the researcher try to investigate the kaizen contribution on waste minimization practice in Mugher cement factory especial emphasis on inventory, motion, defect and waiting wastes

1.2 Statement of the problem

There are many challenges that occur during implementation of change management tool like Kaizen. Some of the main problem form literatures are: Kaizen seen as a short term project, overemphasis on tying kaizen to KPIs, management pays lip service to kaizen, sufficient training on Kaizen isn't provided, management does not support kaizen initiatives etc. Bulsuk (2011).

When we come to Mugher cement factory, based on production area observation, supervision and quarters report about current Kaizen implementation in the factory show that the problems are: lack of leadership commitment on decision making in Kaizen practice, lack of recorded and sufficient updated data about kaizen based on standard procedure and gap on waste minimization practices are the major problems in the factory. Thus, it needs to be researched to know employees perception about the effect of implementing Kaizen on waste minimization in MCF. Thus, by doing so, the research will assess the actual state of Kaizen on waste elimination.

1.3 Research Questions

The research questions that the study addresses are:

1. How strong are 5s' of Kaizen (sorting, set-in-order, shining, standardizing, Sustaining) implemented in Mughar cement factory (MCF)?
2. To what extent kaizen improve inventory waste minimization in MCF?
3. To what extent kaizen improve motion waste minimization in MCF?
4. To what extent kaizen improve waiting waste minimization in MCF?
5. To what extent kaizen improve defect waste minimization in MCF?

1.4 Research objective

The main objective of this study is to investigate the effect of kaizen on perceived waste minimization in Mugher cement factory

1.5 Research specific objective

- Identify the overall implementation level of kaizen
- Examine kaizen on inventory waste minimization
- Assess kaizen on motion waste minimization
- Examine kaizen on waiting waste minimization
- Assess kaizen on defect waste minimization

1.6 Significance of the study

The change management concept is seen as a critical foundation in a strategy execution process and besides helping organizations to articulate strategy in actionable terms, using change management tools such as kaizen. It provides ways of continuous improvement road map for strategy execution and for aligning executives and employees in the work environment.

From this study it is expected to update the existing body of knowledge on kaizen to the factory which may have interest in waste minimization. It is hoped that the study yield information which is useful for future proper planning and decision making in factory to improve waste management and meet their objective of increasing the status of cement market . The findings and recommendations of the study also be useful to the management and directors of chemical industry corporation as well as factory. This assist them not to rely on simple personal experience or subjective expert judgment or tradition fashion in their management tasks but base their methods, decision and

actions on concrete knowledge of issues of their strategy implementation supported by the findings. The researcher hopes that the study form a basis for further research on how to implement kaizen tool enhance the waste management of the factory. This lead to add up ideas for better and more efficient management.

1.7 Scope of the study

In response to newly emerging cement market competition, Mughare cement factory try to implement different reform program, which proposes long-term goals for the cement sector, and the means to attain them through a series of phases like BPR, Kaizen and BSC. In terms of content this research focus on effect of Kaizen on waste minimization such as inventory, motion, waiting and defect wastes. Intermis of geographical scope The research conducted specifically on factory's main branch Mughar plant, Addis Ababa plant(around "Gotera") and Tateke plant Intermis of time this research emphasis on year from 2016 up to now because kaizen practice level one and level two are concurrently implemented within this year.

1.8 Limitation of study

Although many types of waste exist this study focus on four selected wastes which may have significant contribution for waste minimization in the factory during observation and kaizen report i.e. inventory , motion , waiting and defects of waste.

1.9 Definition of terms

- **Change:** it is to make the form, nature, content, future course, etc., of (something) different from what it is or from what it would be if left alone
- **Change management:** is the process, tools and techniques to manage the people side of change to achieve the required business outcome. Change management incorporates the organizational tools that can be utilized to help individuals make successful personal transitions resulting in the adoption and realization of change
- **Kaizen:** It is a compound word indicates a process of continuous improvement involving two concepts: Kai (change) and Zen (for the better) (Palmer, 2001).

1.10 Organization of the study

The study is organized in the following ways. The first chapter is about introduction in which discussion is made on background of the study, statement of the problem, objectives of the study, research methods used, scope and limitations, and significance of the study. In the second chapter, theoretical literatures which cover issues related to change management, kaizen and waste minimization are reviewed. Under this topic a detailed coverage on the concept of the proposed study is given. In the third chapter, data presentation, discussion and analysis will be done. The last chapter will be, chapter four, provides conclusions and recommendations on the basis of the analysis made in the preceding chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Change management

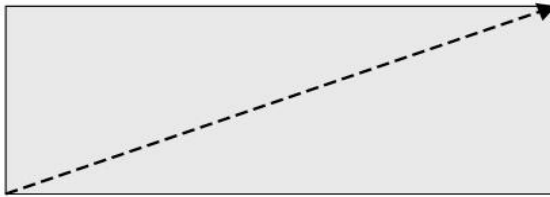
Change Management is the term that is used to refer the change or transitioning people, groups, companies and projects from one state to another. When this term is applied to businesses and projects, it may refer to a process of transitioning the scope of the project in such a way that it can meet changing requirements and objectives. What happens is that after a certain point in time some changes may need to be introduced as far as functioning, operations, marketing, finance or the other aspects of a business are concerned so as to improve its chances of reaching its goals. Change management involves the application of structured methods and a pre-planned framework so as to steer business from its current state to a desired state. One of the powerful change management tool is kaizen.

The main benefit or advantage of the application of change management is that it helps to increase the chances of a business staying on its budget or schedule that in turn leads to higher ROI and realization of benefits. Amidst the high competition and fast paced world, it is important for every organization to move ahead by constantly bringing about useful and structured changes and adapting to new technology and methodologies to meet customer demand.

2.2 Types of Change

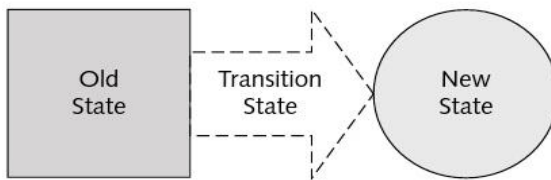
In 1986, (Ackerman, 1986) introduced one particular schema that categorized organizational change into three categories: developmental change, transitional change, or transformational change. These categories describe change based on the expected outcome or end state of a change and the process through which the change occurs. (Lozano,2012) referred to the differences between Ackerman-Anderson's categories as the various "pathways" organizations may take towards organizational change Figure 1 provides a graphical depiction of Ackerman's three different types of change.

Developmental Change



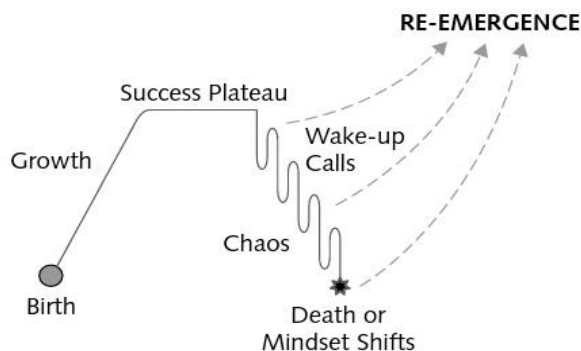
Improvement of what is;
new state is a prescribed
enhancement of the old state.

Transitional Change



Design and implementation of a
desired new state that solves an
old state problem; requires
management of the transition
process to dismantle the old state
while putting in place the new
state; managed timetable.

Transformational Change



Market requirements force
fundamental changes in strategy,
operations, and worldview:
(1) New state is unknown—it
emerges from visioning, trial and
error discovery, and learnings.
(2) New state requires fundamen-
tal shift in mindset, organizing
principles, behavior, and/or
culture, as well as organizational
changes, all designed to support
new business directions. Critical
mass of organization must operate
from new mindset and behavior
for transformation to succeed and
new business model or direction
to be sustained.

Source: Ackerman, (1986)

Figure 2.1: types of change

As we can see in the above diagram. Kaizen by its nature is a continuous improvement by this nature kaizen categorized in developmental change management type

2.3. Overview of Kaizen

Kaizen is a Japanese word that has become common in many western companies. The word indicates a process of continuous improvement of the standard way of work (Chen et al., 2000). It is a compound word involving two concepts: Kai (change) and Zen (for the better) (Palmer, 2001).

The term comes from Gemba Kaizen meaning ‘Continuous Improvement’ (CI). Continuous Improvement is one of the core strategies for excellence in production, and is considered vital in today’s competitive environment (Dean and Robinson, 1991). It calls for endless effort for improvement involving everyone in the organization (Malik and YeZhuang, 2006).

From the end of the Second World War, Japan through its culturally embedded, innovative management system has succeeded in rebuilding its economy and is now emulated by the community of nations (Waheed et al., 2010). For example, in the 1980s, the manufacturing industry in Japan showed significant growth through the adoption of the kaizen process of management strategies. Its key objective has been to embed the process into the work culture to achieve a never-ending drive toward increasing productivity efficiency, and quality improvement. Today, the kaizen management system is spreading throughout the world. It has become a goal for many manufacturing companies to build a culture of continuous commitment to improvement.

Many non-Japanese companies are initiating a kaizen management strategy without adequately taking into consideration its own cultural roots. Thus, they face many barriers while they are chasing this dream. As stated by Brunet and New (2003), it has not been clear previously how firms in other cultures can maintain the momentum for kaizen activities, nor how the concepts of target setting, control and incentives for participants fit into their overall management system. The Toyota Total Production System (TPS) sees problems as opportunities to improve, seeking root causes by asking what, why, and who questions. Companies from other cultures visualize problems as discrepancies between the current situation and the standardized ideal that can only be solved by management. In addition, while the Toyota TPS, sees that qualities are customer driven, other cultures view that whatever they supply to the market can be sold, thinking they have produced to the needs of consumers (see for example, Ohno, T. and Bodek, N, 1988; EPA, November 200; and Ahmed,S; Hasan,M; Fen,Y, 2005). Despite these glaring and challenging problems, in order to stay competitive in an increasingly global market place and with an increase in customer demands, a number of foreign companies are forced to rethink their manufacturing and management approach to lower costs of production, minimize waste, improve productivity, boost quality, and achieve sustainability. Thus, if top management of kaizen companies in other cultures has the desire to thrive for a healthy long term, before starting on a kaizen transition, management needs to be passionately committed to undertaking an assessment of its own internal and external conditions. In addition, when transferred to other cultures, companies need to use dedicated cross functional teams

to improve a targeted manufacturing work area (Melnyk et al., 1998, Kirby and Greene, 2003, and Heizer & Render, 2010). Therefore, since well established kaizen strategies help companies to control cost, minimize workers motion, focus on zero defects and, more fundamentally, improve workers' skills by creating a cooperative atmosphere where everyone becomes fully aware of the key goals, each step of the kaizen process needs to be mapped out and measured to ensure economic value to its customers. As stated by Glover et al (2008) since kaizen teams apply structured process tools and human creativity with a goal of substantially improving the performance of the work area, process or product, the team workshop needs to be purposely designed to make jobs easier by taking them apart, studying them, and making improvements, creating a culture of continual improvement with well-designed outreach programs to everyone in the organization (Thessaloniki (2006). Unlike the conventional approach which emphasizes individual work and mainly watches to see if the worker meets the performance objective of an industry, the kaizen techniques of production challenge the status quo and help workers internalize the work, with creativity and emphasis on institutionalizing the productivity process. For example, the conventional method of Total Quality Management (TQM) of production techniques is challenged because after a workshop staff were sent back to their regular duties and told to improve the quality of their work process. No one typically thought their process was broken so there wasn't much incentive to change anything (EPA, November 2007). In short, while the conventional approach emphasizes each worker's performance, in kaizen everyone is encouraged to contribute to job improvement. Being process-oriented, kaizen activities are based on the assumption that a company's overall competitiveness will improve in the long run if individual variations are reduced. Therefore, before structuring the entire company to kaizen quality/productivity improvement practices, it needs to refine its methodology by —brain storming that is, gathering a group of employees who will contribute spontaneously to list ideas to find a creative solution for a specific problem. Alex Faickney Osborn (1953) proposed that teams could double their creative output with brainstorming which works by focusing on a problem, and then coming up with as many solutions as possible and by pushing the ideas as far as possible. A brainstorming team is composed of at least 12 members with a wide a range of disciplines and experiences. The team is chosen from the top management level, middle managers, and frontline workers from the target work area and includes outside experts to give their own objective initiatives. Then, the brainstorming team analyzes the vision (the future aspirations of the firm) until it clearly understands the mission statement that articulates the firm's reason for being, its basic purpose, and where it is going. Also,

during the brainstorming sessions, all participants are to listen to and respect the ideas and viewpoints expressed by all the participants. In short, in a brainstorming session the ground rules need to include:

- 1) Keeping an open mind to change;
- 2) Maintaining a positive attitude;
- 3) Never leaving in silent disagreement;
- 4) Creating a blameless environment;
- 5) Practicing mutual respect everyday;
- 6) Treating others as you want to be treated;
- 7) One-person – one voice, regardless of position or rank; and
- 8) Understanding that there is no such thing as a dumb question (EPA, November 2007).

With a good understanding and internalized vision of the mission of the enterprise, the brainstorming team analyzes the current situation and identifies problems using the SWOT analyses of the Strengths, what it is good at doing, or a characteristic that gives an important capability; Weaknesses,

what a company lacks or does poorly in comparison to others; Opportunities, the external trends waiting to be taken advantage of; and Threats, the external movements which may cause a problem or have a negative impact on the firm's business. In short, the purpose of the pre-kaizen stage is to provide a clue to problem-awareness. In the problem awareness stage, each company is taught that while undertaking a SWOT analysis, the causes of high priority problems and needs are easily located within the objectives of the organization. As stated by GRIPS, the pre-kaizen awareness stage is supposed to create consciousness and foster positive attitudes and to promote teamwork and recognition for company's problems and individuals. In addition to strong commitment and endorsement by high-level government and private officials, pre-kaizen awareness can cause a remarkable mind set change to take place through formal training of students at vocational schools, tertiary institutions, worker's unions, academia and the public at large. Some community support programs may provide donations, sponsorship and prizes to a wide range of community groups, schools and clubs that require a proactive, ongoing, community-engagement strategy. Furthermore, regular forums to share knowledge and ideas between the company and the broader community can be maintained through dissemination of publications and postings about productivity that may provide the company with a benchmark as it improves its productivity, skills and techniques when

compared with similar companies (GRIPS, 2011). Through a participatory program, a company can find solutions that are in line with the shared mission and goals of all team members. With the kaizen cross-functional teamwork approach, workers are not only empowered to challenge the status quo but also can gather the most conspicuous internal and external factors that could be become part of the work ethics necessary for productivity. The awareness and consciousness created among the employees of a company can be translated into specific action at the workplace. In addition to generating support for the changes made during the transition, involving target area employees in the kaizen event is an investment in employee training and also introduces employees to specific tools and techniques of lean process improvement to sustain effectively the event-based changes, as well as to continue to generate future improvements (Bradley and Willett, 2004). As outlined before, the most compelling reasons for the formation of empowering work teams are that it:

- 1) allows an organization to take advantage of the diverse backgrounds, and interests of team members,
- 2) Results in a motivated and entrepreneurial workforce,
- 3) Can be made to work well with teams, since everyone can participate on a team, and
- 4) Creates a well-defined, planning process for giving responsibility to a group of people who know how to do their job well at their level (Thessaloniki(2006).

Once the root causes of problems in the process or value stream are identified during the pre kaizen process, the team uses the following four pillars of kaizen activities to implement greater operational efficiency (the cost) and effectiveness (the extent to which customers' requirements are meet). According to M. Imai, (1980's) a expert in these management philosophies and practices, the three pillars of

Kaizen are summarized as follows:

- A. House keeping
- B. Waste elimination
- C. Standardization

and as he states , the management and employees must work together to fulfill the requirements for each category.

A) Housekeeping Activities: The beginning of the kaizen housekeeping journey of management starts by displaying a level of orderliness and clarity of the work area using the following Five Steps (5S). As stated by Imai, 5S is a set of techniques that provide a standard approach to good

housekeeping and fosters an increase in quality and productivity (Imai, 1997 as quoted in Juhari et al (2011). If an organization wants to ensure continued competitiveness and achieve market growth, it needs to start with the following 5S system:

- **sorting** or gathering the spare materials needed by the company, selling what is not needed to a scrap dealer or putting them into trash;
- **setting or straightening**, keeping visible the remaining materials or parts to provide a pleasing appearance;
- **shining** and spreading the clean products;
- **standardizing** and consistently implementing the new process; and
- **Sustaining** improvement using the Six Sigma targets for quality improvements, variation, and safety.

Taking a customer service attitude kaizen attempts to present value stream mapping (VSM) to deliver the desired outcomes, services or products to customers, and improve staff morale and ascertain the transparency of the process. Though a number of manufacturing firms try to carry out the 5S System, an ongoing process, the lack of sustained motivation is one of the factors that hinder the successful implementation of the 5S System. Therefore, to effectively apply the 5S System, Juhari, Abidin, and Omar (2011) suggest that communication for 5S, training for 5S, reward and recognition for 5S and top management support for 5S are vital factors that influence employees' motivation in the implementation of the 5S System. Given this, they suggest that management needs to pay attention and formulate effective strategies to motivate their employees on a consistent basis..

B) Waste Elimination: Muda or elimination of non-value adding activities includes removing unnecessary wastes caused by people and machine. Muda or waste can accumulate because a company may have more than necessary equipment, materials or people for quantity production. The way to eliminate waste in any company is therefore to make employees aware in advance which steps add value to the product, and which steps do not. Generally, the seven types of deadly wastes (muda) as identified by the Toyota Production System (TPS) that accumulate in a company's production system are caused by:

- 1) Overproduction,
- 2) Waiting,
- 3) Transportation,

- 4) Inventory,
- 5) Over processing,
- 6) Motion, and
- 7) Production of defective parts.

In addition, in the sugar plantation and production process, extra wastage is accumulated as a result of the infiltration of excessive nutrients into ground water or surface waters that naturally contribute to greenhouse-gas emissions (Lean in Government Series, November 2007).

- 1) **Over production waste** occurs when a company produces too soon or too much product in order to be on the safe side in case of a machine's failure and/or employee absenteeism. As a result, trying to produce more than needed products creates misuse of raw materials, wasteful inputs of manpower, utilities, an increased burden on interest payments, added transportation, additional space needed to store excess inventory and administrative costs (See, Thawani, 2003 and Thessaloniki, 2006). As stated by Mezgebe, Asgedom, and Desta (2013) any company can minimize overproduction by trying to be consistent in understanding the heartbeat of the consumer, making demand assessments for the particular product even if the product has been commercialized for a long period of time. Demand is dynamic and tuning the production scheme accordingly is important, so continuous communication with customers is one way of reducing overproduction.
- 2) **Waiting Waste:** This occurs when the hands of the operator are idle, or when an operator's work is put on hold because of a lack of parts, waiting for the next piece to arrive. It can also happen when another worker slows up the line, anything that lengthens the lead time of the product from start to finish. As narrated by Thessaloniki, (2006) —Lead time begins when the company pays for its raw materials and supplies, and ends when the company receives payment from customers for products sold. Since lead time represents the turnover of money, a shorter lead time means better use of resources, more flexibility in meeting customer needs, and of course contributes to the lowering of operation costs.
- 3) **Transportation waste:** This is a non-essential part of operations. A company might use trucks, forklifts, or conveyors as a means of transportation. Unnecessary transport of damaged materials (muda) contributes to waste because transportation does not add value to the finished product. As stated by Thawani (2003) one way of minimizing waste is by incorporating the act of any process into the main line.

- 4) **Inventory waste:** An excess of final product, semi-finished product, raw materials and spare parts kept in inventory contributes to Muda of inventory. They do not add value. Instead, they add to the cost of operations by occupying space, requiring additional equipment and facilities such as warehouses and forklifts. As the products stored deteriorate over time they could eventually become obsolete. Excess items staying in inventory gather dust and their quality deteriorates over time. They are even at risk of damage through fire or disaster. As suggested by Thessaloniki (2006) Just-in-time (JIT) production systems help to solve the Muda of inventory.
- 5) **Over-processing waste:** This type of Muda uses more resources, utilities, and materials, or uses the wrong set of tools, procedures or systems. Producing more quantity ahead of schedule creates waste because in manufacturing a longer line requires more workers, more work in- process and a longer lead-time to produce outputs. As suggested by Thessaloniki (2006), many unneeded workers are likely to make a greater number of mistakes which leads to quality problems. More workers also mean that a longer lead-time will increase cost of operations. As Suggested by Thawani, (2003) elimination of Muda in processing can frequently be avoided by combining operations/steps.
- 6) **Motion waste:** Excessive movements by workers like walking, lifting, or carrying heavy objects, searching for lost items create waste. In short, Muda of motion is unproductive because it involves movements by workers not directly related to the job. such as poor workplace organization, resulting in poor ergonomics, for example excessive bending or stretching (Mezgebe, Asgedom, and Desta, 2013). Thus, —Workers should avoid walking, lifting, or carrying heavy objects that require great physical exertion because it is difficult, risky, and represents non-value added activities. (Thessaloniki 2006). Rearranging the workplace would eliminate unnecessary human movement and eliminate the requirement of having another operator to do his/her work more efficiently.
- 7) **Production of Defective Parts waste:** Muda of repairs/rejects interrupts production. It contributes to a great waste of resources and effort. In addition, rejects increase inspection work, require expensive rework or additional time to repair (Thessaloniki, 2006). The production of defective parts can cause dissatisfied consumers to complain about their defective product but also might create a skeptical attitude about other products the company may be producing in the future. In order to eliminate non-value added defective products, companies

could retrain and redirect staff-time to higher priority activities related to their core mission. A brief review of the types and descriptions of wastes are given in the following table.

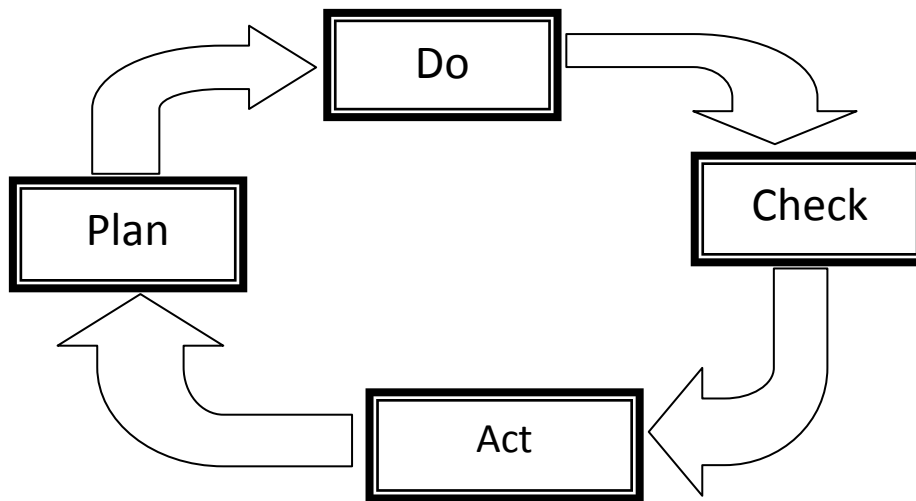
No.	Waste	Description
1	Overproduction	Producing too much or too soon, resulting from poor flow of information
2	Defects	Frequent errors, product quality problems, or poor delivery performance
3	Unnecessary inventory	Excessive inventory because of delay of information or products, resulting in the need for extra Storage
4	Inappropriate processing	Going about a work process using the wrong set of tools, procedures or systems, when a simpler approach may be more effective
5	Excessive transportation	Excessive movement of people, information or goods, resulting in wasted time, effort and cost
6	Waiting	Long periods of inactivity for people, information or goods
7	Unnecessary motion	Poor workplace organization, resulting in poor ergonomics, for example excessive bending or stretching, or searching for frequently lost items

Table 2.1: waste description summery

C) Standardization

Standards are set by management, but they must be able to change when the environment changes. Companies can achieve dramatic improvement as reviewing the standards periodically, collecting and analyzing data on defects, and encouraging teams to conduct problem-solving activities. Once the standards are in place and are being followed then if there are deviations, the workers know that there is a problem. Then employees will review the standards and either correct the deviation or advise management on changing and improving the standard. It is a never-ending process and is better explained and presented by the **PDCA cycle** (plan-do-check-act), known as PDCA cycle . Watson (1986) says that the origin of Plan-Do-Check-Act (PDCA) cycle or Deming cycle can be traced back to the eminent statistics expert Shewart in the 1920s. Shewart introduced the concept of PDCA. The Total Quality Management (TQM) guru Deming modified the Shewart cycle as: Plan, Do, Study and Act. The Deming cycle is acontinuous quality improvement model consisting of a logical sequence of these four repetitive steps for Continuous Improvement (CI) and learning. The

PDCA cycle is also known as Deming Cycle, the Deming wheel of CI spiral. In 'Plan phase', the objective is to plan for change predict the results. In 'do phase', the plan is executed by taking small steps in controlled circumstances. In 'study/check phase' the results are studied. Finally in 'act phase', the organization takes action to improve the process. The model is as follows:-



Source: Watson (1986)

Figure 2.2: PDCA cycle

Generally, kaizen is a low-cost approach to productivity improvement because it does not require huge capital investment, expensive technology, or costly research and development since it seeks to use existing equipment and human resources in a more efficient and less wasteful, and the key goal of kaizen is to generate the internal capability of the targeted firm (Imai, 1986; 1997). Thus, kaizen is particularly suited for enterprises in low-income countries which face financial access Problems (Ohno et al., 2009).

The golden rules of Workplace Management (Gemba kaizen) is group effort for continuous incremental improvement that can be standardized by requiring each worker go to work place first (like a detective) when problems arise;

- investigate or check the object carefully (e.g. a customer complaint or defective item produced/pile loads of inventory);
- take temporary counter-measures promptly;
- find the root cause of the problem (e.g. if excess inventory check the purchasing system or the production management); and

- Develop/amend an existing procedure/system to prevent its recurrence.

Thus, the adoption of a zero defect mindset in the employees of an organization is vital for spontaneously and automatically improving the operations of the firm. Standards are set by management and engineers. Companies with employee suggestions can bring about improvement as they are called to review the set standards periodically, collecting information and analyzing defects, and encouraging teams to conduct problem-solving activities to optimize performance, comfort, and safety to meet the company's goals. As stated by Thessaloniki (2006) the standardization of improvement activities may include the following key features if employees:

- 1) Represent the best, easiest, and safest way to do the job;
- 2) offer the best way to preserve know-how and expertise;
- 3) Provide a way to measure performance;
- 4) provide a basis for both maintenance and improvement;
- 5) provide objectives and a basis for employee training and motivation;
- 6) Create a basis for auditing or diagnosis; and
- 7) Provide a means for preventing recurrence of errors and minimizing variability.

Thus, the benefits of standardization could be

- a) Help the company optimize operations, save cost and improve profits,
- b) Enhance customer satisfaction and increase sales,
- c) Increase market share, and
- d) Reduce negative impacts on the environment.

Masaki Emai (1980's) defined kaizen in his famous book KY'ZEN : The key to Japan's competitive success as “ The overriding concept behind good management. The unifying thread running through the philosophy, the systems and the problem solving tools developed in Japan. Japanese kaizen is Philosophy or practices that focus upon continuous improvement, and business management. Kaizen has the following major core values as follows:

- process oriented way of thinking
- continuous improvement
- improvement by all levels of management and workers always participatory
- Quantitative approach to defining problem, generating solution and confirming results.

2.4 Principles/Features of Kaizen

Kaizen as a methodology promotes process-oriented thinking because processes must be improved before improved results are obtained. Moreover *kaizen* is people-oriented, being directed at people's efforts and assumes that improvement in people's attitudes and efforts are more likely to produce improved results in the long run than mere result-oriented thinking (Imai,1986). Even though most writers have emphasized different features of *kaizen* there is almost a unanimous agreement on the following key features:

Kaizen is continuous in nature: which signifies the embedded nature of the practice and its never ending journey towards quality efficiency and effectiveness in all activities. Yeo *et al.* (1995) describes the viewpoints of various traditional quality management experts on the concept of 'zero defects' and 'do it better each time' that these strategies are the important ways to improve quality continuously. 'Zero defects' represents continuous improvement over quality by detection of defects. A phrase 'do it better each time' strategy is associated with constant, conscious and committed efforts to reduce process variation. They conclude that continuous improvement is the most important way to manage business through these strategies. Although many firms have achieved process improvement through implementation of continuous improvement programmes, the initial improvement is easily eroded back to the pre-improvement level (Bateman and David, 2002). *Kaizen* is however longer than process improvement in terms of time frame of activity. Ohno (1988) argues that improvement through *kaizen* is both eternal and infinite, implying that improvement processes are implemented continuously.

It is incremental in nature: Cheser (1998) explains that *kaizen* is based on making small changes on a regular basis thus reducing waste and continuously improving productivity, safety, and effectiveness. *Kaizen* is participative and thus entailing the involvement of the workforce. Deniels (1995) argues that the way to achieving fundamental improvement on the shop floor is by enabling operators to establish their own measures, to align business strategies and use them to drive their *kaizen* activities. He further argues that operators are the experts and once they realize that they are the ones to solve their problems, then they only need some direction from top management. Wickens (1990) emphasizes the contribution of teamwork, flexibility and quality to the concept of *kaizen*. He emphasizes that teamwork and commitment do not come from involving the representatives of employees, but from direct contact and communication between the individual and his boss. Liker (2004) noted that the concept of *kaizen* is a kind of corporate culture that supports continual organizational learning.

The successful implementation of *kaizen* requires management support emphasizing the need for leadership and top management support in *kaizen* activities. Imai (1986) asserts that *kaizen* is a continuous improvement process involving everyone, managers and workers alike. Broadly defined, *kaizen* is a strategy to include concepts, systems and tools within the bigger picture of leadership involving people culture, all driven by the customer. Aoki (2008) found out that the actions of managers on the shop floor are always watched by workers and that these actions are able to give workers the legitimacy to engage in *kaizen* activities. He asserts that managers must show a lot of self-discipline if they want the workers to show the same self-discipline.

Effective measurement of *kaizen* performance is important for successful implementation of *kaizen*. Doolen et al. (2008) describes the variables that are used to measure the impact of *kaizen* activities on human resource. These variables include attitude toward *kaizen* events, skills gained from event participation, understanding the need for *kaizen*, impact of these events on employee, impact of these events on the work area, and the overall impression of the relative success of these events.

Effective regular training is necessary for effective implementation of *kaizen* in any organization. In TPM (a *kaizen* practice) implementation, various authors have stressed the contribution of training towards performance improvement (Ahmed et al., 2005; Ireland and Dale, 2006; Sharma et al., 2006; Tsarouhas, 2007). Therefore, understanding maintenance as a strategic decision can eliminate any potential of equipment deterioration, failures, breakdowns and stoppages. In order to enable employee participation, training and education should be provided sufficiently through proper and well-structured programs. The elements of training are very important in any organization and thus training plays an important role in minimizing the negative effect of system complexity on manufacturing system performance (Guimaraes et al., 1999).

2.5 Kaizen cycle for continuous improvement:

- **Get employees involved:** Seek the involvement of employees, including gathering their help in identifying issues and problems. Doing so creates buy-in for change. Often, this is organized as specific groups of individuals charged with gathering and relaying information from a wider group of employees.
- **Find problems:** Using widespread feedback from all employees, gather a list of problems and potential opportunities. Create a shortlist if there are many issues.
- **Create a solution:** Encourage employees to offer creative solutions, with all manner of ideas encouraged. Pick a winning solution or solutions from the ideas presented.

- **Test the solution:** Implement the winning solution chosen above, with everyone participating in the rollout. Create pilot programs or take other small steps to test out the solution.
- **Analyze the results:** At various intervals, check progress, with specific plans for who will be the point of contact and how best to keep ground-level workers engaged. Determine how successful the change has been.
- **Standardize:** If results are positive, adopt the solution throughout the organization.
- **Repeat:** These seven steps should be repeated on an ongoing basis, with new solutions tested where appropriate or new lists of problems tackled.

2.6 Kaizen in Ethiopia

The Japanese manufacturing philosophy kaizen, even though it is originated in Japan it propagates throughout the world. Asian, America and European continents already implement the philosophy and became successful. After the successful kaizen dissemination in different Asian countries some African countries like Ghana, Libya and Egypt also tried to adapt the philosophy. In spite of the fact that kaizen success in different countries the late Prime Minister Ato Meles Zenawi requested, the Government of Japan, and Japan International Cooperation Agency (JICA) to introduce KAIZEN to Ethiopia. As a response KAIZEN Guidance was examined through conducting the pilot project that was implemented in the 30 selected companies within a framework of a project entitled ‘the Study on Quality and Productivity Improvement in Ethiopia’ during the period from October 2009 to May 2011. The project was implemented under the bilateral agreement between Ministry of Industry (MoI; the former Ministry of Trade and Industry) representing the Government of Ethiopia and Japan International Cooperation Agency (JICA) representing the Government of Japan. Then selected 30 companies (list of companies are attached to annex) from industry sector were categorized into the five sub-sectors; namely,

- Basic metal and engineering sub-sector;
- Agro processing sub-sector;
- Chemical sub-sector;
- Leather sub-sector; and
- Textile sub-sector.

The study shows the possibility of implementing the Japanese kaizen philosophy effectively. (Ethiopian Ministry of Trade, 2011).

2.7 Challenges to implementation of Kaizen

Many studies note that, in both Japan and abroad, especially in the cases of American and European companies, leadership is the single most important factor for successful implementation of *kaizen* (Imai, 1986; Kaplinsky, 1995). This implies that it is possible to apply *kaizen* in countries with different socio-cultural contexts but that application must be conducted under proper leadership and with adjustments that reflect the uniqueness of the targeted society. Shah and Ward (2003) argues that larger firms enjoy larger financial and human resources as well as economies of scale hence have better conditions for implementation of new techniques in their firms as compared to small or medium sized firms. On transferability of *kaizen* across cultures, there are views that question the general applicability of *kaizen* to developing countries. They argue that most developing countries face the problem of weak human resources. Continuous improvement requires a seamless extension of training and skills development to the entire workforce. However, in a country with low literacy, it is difficult for firms to implement such a training system for the entire workforce (Kaplinsky, 1995). Ebrahimpour and Schonberger (1984) argue that a lower skilled workforce represents the only obstacle to successful JIT implementation in developing countries and that this could be Overcome through employee training.

Short-terminism, the lack of upward mobility, and inattention to details of the workers in general may also add to difficulties in implementation of *kaizen*. Furthermore, in societies where the hierarchical structure is deeply rooted, it may not be easy to introduce a participatory mechanism in which all workers are encouraged to contribute actively to process and product improvements. Gapp et al. (2008) showed empirically that an environment of worker participation is required if the benefits of 5S are to be reaped. In addition, managers' misconceptions about continuous improvement are common sources of difficulty in *kaizen* implementation, since they often expect instant results, whereas in reality it takes time before the benefits of *kaizen* become visible (Karsten and Pennink, 2007). In such circumstances, even if managers know the concept and tools, translating these ideas into practices and internalizing *kaizen* as a company-wide movement remains a very complex task. Aoki (2008) found out that lack of organizational capabilities that facilitate an incremental organization-wide innovation greatly hindered implementation of *kaizen* in Chinese firms. These capabilities include capabilities that facilitate cross-functional communication, that which encourages worker's self initiative and those that discipline workers (shop- floor based) so that they conform to *kaizen* standards. Researchers who recognize the effectiveness of Japanese work practices state that Japanese companies have developed capabilities that make their workers or

Work teams learn and improve their work processes independently (Kenney and Florida, 1993; Koike,1994). On-the-job training (OJT) plays a critical role in creating such capabilities. Employees in Japanese companies experience various kinds of jobs through the OJT, which helps to reduce social distance between different categories of the workforce (Lam, 2000). In this perspective, it is organizational capabilities which facilitate communication among diverse people that allow Japanese companies implement incremental organization-wide innovation successfully. This affirms the view that successful implementation of *kaizen* is largely influenced by an organization's ability to develop these capabilities (Aoki, 2008).

2.8 Conceptual framework

The conceptual frame work stated some point about dependent and independent variables conceptually. In such cases, the researcher may have to “synthesize” the existing views in the literature concerning a given situation – both theatrical and form empirical findings .The synthesis may be called a model or conceptual framework ,which essentially represents an integrated way of looking at the problem (Liehr and Smith 1999) . In this regard the elements that was aligned kaizen practice independent variables are 5's, kaizen awareness, management commitment, strong kaizen team, working culture and dependant variables waste minimization (inventory ,motion, waiting and defect wastes) the graphical relationship of the independent variable kaizen on dependent variables waste minimization are represented as the conceptual framework of this study as follows.

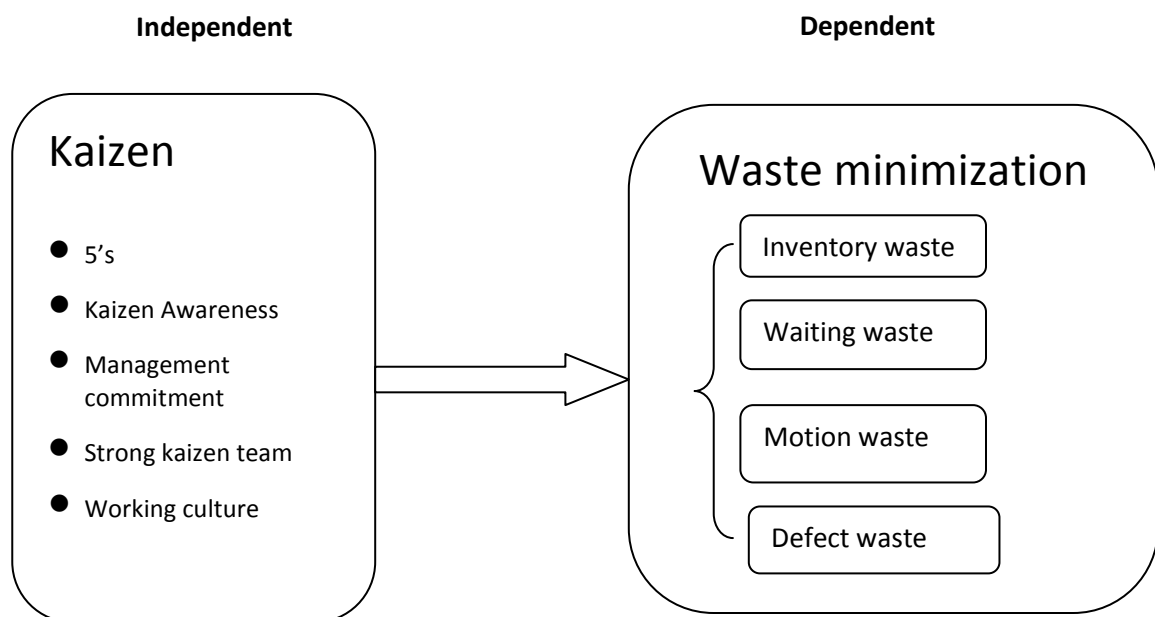


Figure 2.3: conceptual frame work

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

The research was employed quantitative approach to examine the effect of kaizen practice on waste minimization of MCF (Mugher cement factory). This chapter consists of methods that was used in a research includes the research design and methodology, research approach, population and sample data source and types, data collection procedure and ethical consideration were employed included under this section.

3.2 Description of the Study Area

The business world is becoming very competitive with the emergence of modern technologies. New methods of carrying out businesses to provide customers with a better quality of products or services. The cement industry in Ethiopia is experiencing a boom on account of overall growth in the economy. The demand for cement, being a derived one, depends mainly on the industrial activities, real estate business, construction activities and investment in the infrastructure sector.

Mughar cement is one of pioneer producer of quality cement in the country. Cement is one of the core industries which plays a vital role in the growth and expansion of a nation. The industry occupies an important place in the country economy because of its strong linkages to other sectors such as construction, transportation, coal and power. The factory is engaged in the production of several varieties of cement such as - Ordinary Portland Cement; Portland Pozzolana Cement; Pozzolana Cement, Portland Limestone Cement, Low Heat of Hydration Cement[based on customer order], Valved paper sacks, Gypsum, Pure Limestone, and Silica Sand.

Currently, the top players-Dangota, Derba, Mosobo, and Mughar collectively control more than half of the cement market in the country. There are more than 10 players in the industry across the country.so Customers' satisfaction is the focal point for every business which means business owners must use all possible means to make their customers satisfied. Satisfied customers may become loyal customers thereby increasing the profit margin of the company. It is for this reason kaizen is essential in every organization. Change is important if a company wants to remain competitive and successful. The birth of modern technologies, customers' competitors are some of the push factors for change to occur in an organization. Customers' needs, and expectations are ever changing, forcing organizations to search for better ways to meet the needs of their customers so

effective implementation of kaizen is mandatory that is why the focus of the study is how well change management tool i.e. kaizen implemented effectively to enhance waste minimization

3.3. Research Design

According to (Heron, 1998 as cited In Newman, 2013) a research design refers to a plan for collecting and utilizing data so that desired information can be obtained with sufficient precision. Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group (Kothari, 1990). Backlund and suikki (2005) explain that with descriptive research design, the researcher aims to determine the aspects of the problem which are crucial for a systematic analysis. With descriptive research design, the researcher has an opportunity to have a clear view of the problem from other related source and narrows the research around these important items. In this case, the researcher adopts a technique that leads to exact or almost detailed facts when carrying out the study. Therefore the study adopted descriptive and explanatory research design.

3.4. Research approach

Best and Kahn (2006) says research can be qualitative, if it describes events and persons scientifically without the use of numerical data while quantitative research consist of research in which data can be analyzed in terms of numbers. Mixed approach is an approach, which combines both qualitative and quantitative ones. Thus, the study applied mixed approach that is quantitative and qualitative approaches as research methodology. Mixed approach helps to make effect of kaizen on waste minimization and to gain a better understanding by obtaining data from different sources, such as interviews , questionnaire and document which helps to capture diverse ideas about the same issue and assist in cross-checking the results, and consequently helps to increase the validity, reliability of the findings and comforts data analysis. To his end primary data source were integrated to be able to provide adequate discussion and to get current information about what has already been discovered. Thus the study used the quantitative approach to make use of purposive sampling and thus the results can be made more dependable and reliable. On the other hand to look at the humanistic aspect of Kaizen and to have a rich understanding of people's attitudes of Kaizen challenge, qualitative approaches were used. In an attempt to complement and validate one research method with the other in order to compare results in different context, research triangulated via using primary data source specifically, questionnaire and interviews. Respondents involved in the study were from directorate director, team leader, and senior experts.

3.5. Population and sample

Population is the complete set of units of analysis that is under investigation, while element is the unit from which the necessary data is collected (Davis, 2000).

For this regard, the researcher used purposive with simple random sampling to select the respondents. This design allows the population to have an equal chance of being selected in the sample. The sample size was 100 respondents out of a target population of 133. These were selected to ensure that the sampling size had characteristic representation of the population using the formulae developed by Mugenda and Mugenda (2003). The formula to find the sample size is:

$$n = \frac{N}{1 + (N * e^2)}$$

Where;

N= population size

e= Tolerance at desired level of confidence, take 0.05 at 95% confidence level

n= sample size.

How the formula is used is shown below

$$n = \frac{133}{(1 + (133 * 0.05 * 0.05))}$$

$$n = \underline{100}$$

The respondent selection is from permanent employees and leaders, i.e. purposively selected all department head , team leader and random sampling for senior export from three plants that is 60 sample from factory's main plant , 20 sample from Ade Berga , 20 sample from Tatek and Gotera plant this is because to gain enough and appropriate information about actual status of kaizen and its outcome.

3.6. Data sources and Type

Both primary and secondary sources of data will be used in order to collect appropriate data. Primary data collected from questionnaires and interview. The secondary data will be collect from different unpublished documents like kaizen and supervision report of the factory.

3.7. Data Collection Procedure

In order to obtain relevant and adequate information the researcher used questionnaire and, interview as instruments of data collection. The questionnaire consists of both open and closed ended question designed and distributed to the employee to assess the effect of kaizen on factory waste minimization. Both structured and un-structured interviews will be conducted. Because using only one type of interview might lead to less rich data or information. Un-structured interviewing method will be used in this case study because this method involves direct interaction between the researcher and a respondent and hence, it gives chance to move the conversation in any direction of interest that may come and also used to ask questions which were not included in the structured interview in case new questions raised as ideas emerge through the process. Generally, interview will be held with one top level managers or Two directorate of the factory and three team leaders at different levels believing that they have deep and relevant information about the issues and it will be conducted with face to in order to minimize information loss.

3.8. Ethical consideration

The principle of respect for persons states that participants' thoughts and decisions must be honored. All participants provided their consent via the informed consent process. In order to ensure the application of this principle, a form was provided to the participants who outlined, for the participants' clarification, the study's purpose, potential benefits of participating in the study, as well as statements about confidentiality.

Participants who intended to participate were asked to read the form and were told that by participating they were providing informed consent. The study was designed to minimize all potential risks to the participants. The information provided by the participants remained anonymous. All collected data were absent of identifiable markers and were stored on the researcher's personal computer. The researcher was the only person with access to the data. The computer files were password protected.

3.9 Data Analysis

To analyze the data collected from the questionnaires, the researcher used version 20 SPSS. SPSS is a system for statistical analysis and helps to display findings by creating charts and tables. It is one of the most widely used computer software packages for analysis of quantitative data for social scientists (Bryman & Bell, 2007).

In order to achieve the findings and results for the study, the author used descriptive analysis to summarize the data. These methods will be numerical and/or graphical. Graphical methods are known for recognizing patterns in the data, while the numerical methods of analysis are acknowledged for giving precise measures. In the analysis descriptive statistics, correlation analysis and linear regression analysis was performed.

The analysis will consist of graphs, tables and charts to outline the responses will be received which will be examined and discussed. This procedure is to make it easier for the reader to compare and understand the findings.

3.9.1 Reliability & validity Test of the Instrument

Before dispatching the questionnaire to gather information its validity and reliability was checked. To this close ended questionnaire is given to reform facilitator expert to check the content validity. when we comes to reliability Cronbach's alpha is used .

Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. In other words, the reliability of any given measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach's alpha is one way of measuring the strength of that consistency

A total of 100 questionnaires were distributed to the respondents the participant was purposively selected from each factory's plant based on their higher position i.e. selected senior expert and all team leader and department head based on their analytical ability. Returned 84 questioner papers. To determine the reliability of the questionnaires, the coefficients of Cranach's alpha (1951) were takes into account .the values of Cranach's Alpha range from 0 (completely unreliable) to 1 (perfectly reliable).An alpha value of 0.5 to 0.6 is consider acceptable but 0.7 or higher is highly preferred (hair et al. 2010) so Cranach Alpha is 0.788 which is highly reliable as shown in the following table. Cronbach's Coefficient Alpha test was employed by SPSS version20. Thus, the SPSS output is summarized in the following table:

No	Variables of the study	No of Respondent	No of items	Overall Cranach Alpha	Remark
1	Kaizen implementation	84	10	0.788	Highly preferable
2	Inventory waste	84	5	0.836	Highly preferable
3	Motion waste	84	3	0.935	Highly preferable
4	Waiting waste	84	5	0.905	Highly preferable
5	Defect waste	84	4	0.854	Highly preferable

Table 3.1: Cronbach's Alpha Test Resulted from SPSS

According to Bryman and Bell (2003) the Cronbach's alpha result of 0.7 and above implies acceptable level of internal reliability. Therefore, the result indicated that the questionnaires of the study were internally consistent above 0.7

3.9.2 Descriptive analysis:

It is used to summarize the demographic characteristics of the respondent and to know the level of employee perception of kaizen implementation on waste minimization in the factory, for each item analyzed by comparing the “mean” and “standard deviation” score of each variable. According to Norasmah & Sabariah, (2007) and; Norasmah & Salmah, (2011) the mean score below 2.00 was considered as low, the mean score from 2.01 up to 3.00 was considered as Moderately low and mean score between 3.01-4.00 was considered as Moderately High and the mean score from 4.01-5.00 was considered as High as illustrated below.

Table 3.2 Interpretation of mean scores

Mean Score	Description
1.00-2.00	Low
2.01-3.00	Moderately low
3.01-4.00	Moderately High
4.01-5.00	High

(Sources: Norasmah & Sabariah, 2007; Norasmah & Salmah, 2011)

3.9.3 Correlation Analysis:

It is to show the strength of the association between the variables involved. Inter-correlations coefficients (r) were calculated by using the Pearson's Product Moment. According to Cohen (1998 as cited by Warokka and Gallato, 2012), the correlation coefficient (r) ranging from 0.10 to 0.29 may be regarded as indicating a low degree of correlation, r ranging from 0.30 to 0.49

may be considered as a moderate degree of correlation, r ranging from 0.50 to 0.69 consider as a Substantial association and r ranging from 0.69 to 1 may be regarded as a high degree of correlation. Field (2006) also state that the out put of correlation matrix can be the correlation coefficient that lies between -1 and +1 with in this frame work, a correlation coefficient of +1 indicates a perfect positive relationship, and a correlation coefficient of -1 indicates a perfect negative relationship; whereas a coefficient of 0 indicates no liner relationship. While, for correlations purposes, the descriptors developed by Davis (1971, as cited by Alwadaei, 2010) the interpretation of strength of correlation coefficient is shown in table 3.3

Value of coefficient	Relation between variables
0.70 - 1.00	Very strong association
0.50 - 0.69	Substantial association
0.30 - 0.49	Moderate association
0.10 - 0.29	Low association
0.01 - 0.09	Negligible association

Table3.3 Interpretation of strength of correlation coefficient
Source: Davis (1971, as cited by Alwadaei, 2010)

3.9.4 Simple Regression Analysis:

Regression is the determination of a statistical relationship between two or more variables. In simple regression, we have only two variables, independent and dependent variable. Since the correlation result provides only the direction and significance of relationship between variables, simple regression analysis done to examine the contribution of kaizen implementation system to waste minimization practice and to assess the extent of relationship between independent and dependent variable of the study.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1. Introduction

The process of data analysis involved several stages namely data clean up and explanation completed questionnaires were edited for completeness and consistency. The data was then coded and checked for any error and omission (Kothari 2004).

This chapter presented and analyzed the data collected to seek appropriate answer for the basic questions raised in the statement of the problem. Interview was conducted with concerned leader of the factory, and questionnaires were distributed to collect data from employee and management bodies.

The information gathered from the employees and management bodies has two basic divisions. While the first part asked general facts about employees and management, the next part point out the specific response related with the title under study. I use Likert scale with 5 points i.e. strongly agree(5), agree (4), neutral(3), disagree(2), strongly disagree(1)

4.2. Result and discussion

A total of 100 questionnaires were distributed for the mugher main plant (adda berga) and two branch plants i.e. Addis Ababa and Tateke plants. 40 questionnaires were allotted for main plant and for each two branch plant with the distribution quota of 30 questioners for all directory, team leader and purposively selected senior experts, who are more involve in kaizene. Out of 100 (as it can be seen from table 4.1 below) 84 were filled and returned. This indicated that 84 % of the questionnaire is returned and the non return rate is 16%. This can be seen in the following table.

A) Closed end questions

The following tables show that the analysis for all closed end questions in the following details.
These are:-

Table 4.1: factory's branch plants

		Frequency	Percent
Valid	Addis Ababa plant	23	27.4
	Tatek plant	24	28.6
	Mugher main plant	37	44.0
	Total	84	100.0

Source: Primary data generated for the study from questionnaire

The above table reveals that the majority of work force is found in Mugher main plant and Addis Ababa and Tatek plant have almost similar work force.

4.2.1 Profile of respondents

The selected respondents work experience, qualification and other related information are summarized in the following table .

Table 4.2: Respondents Profile

	Profile	Description	Frequency	Percent
Valid	Gender	Male	76	90.5
		Female	8	9.5
		Total	84	100.0
	age	20-30	15	17.9
		31-40	26	31.0
		41-50	31	36.9
		51-60	12	14.3
		Total	84	100.0
	position level	senior expert	58	69.0
		team leader	20	23.8
		Director	6	7.1
		Total	84	100.0
	education level	Diploma	22	26.2
		bachelor degree	50	59.5
		masters or above	12	14.3
		Total	84	100

Source: Primary data generated for the study from questionnaire

The above Table reveal that 8 (9.5 %) respondents are females whereas 76 (90.5 %) of the respondent are male. This indicates that few women in high level posts in the factory. According to the factory document the number of males in the organization is more than females.

When we see the age of respondent 85.1% of the them ranges between 20 to 50 years of age showing that, the factory key posts are held by active age group.

Job position level of the respondent in this study were randomly selected senior experts, team leaders and directors are represented by 58 (69%), 20 (23.8%), 6(7.1%) respectively.

50(59.5%) of respondents had attained bachelor's degree as their highest level of education 12 (14.3%) of them had attained masters' level of education and the rest 22(26.2%) had attained diploma level of education. This information shows that the respondents have enough knowledge to contribute positively to this study.

the above table shows that the period of the respondents worked at the factory reveal that 20 (23.8%) of the respondents in this study had worked for a period between 11 to 15 years followed by those who had worked for a period 16-20 years as represented at 16(19%) the finding imply that the majority of the respondents in the study had worked for a period long enough to enable them to aware of the issues sought by the study 60(60.8%) of respondents are above 10 years of work experience .Thus, the respondents are mature enough to articulate the issues under study

4.2.2. Respondents Responses towards the extent of kaizen implementation level

5S is typically the first step towards eliminating waste from manufacturing processes and eventually leads to improving bottom line results. In this regard that show the status of kaizen implementation practice in the factory is evaluate in the following tables:

Table 4.3: kaizen status

		Frequency	Percent
There is no significant knowledge gap within kaizen team member	strongly disagree	1	1.2
	Disagree	18	21.4
	Uncertain	12	14.3
	Agree	47	56.0
	strongly agree	6	7.1
	Total	84	100

		Frequency	Percent
Among 5's ,sorting kaizen practice is implemented very well in factory	strongly disagree	2	2.4
	Disagree	16	19.5
	Uncertain	12	14.6
	Agree	42	51.2
	strongly agree	10	12.2
	Total	82	100
Among 5's ,set-in-order)kaizen practice is implemented very well in factory	strongly disagree	3	3.6
	Disagree	15	18.1
	Uncertain	13	15.7
	Agree	41	49.4
	strongly agree	11	13.3
	Total	83	100
Among 5's ,shining kaizen practice is implemented very well in factory	strongly disagree	3	3.6
	Disagree	20	23.8
	Uncertain	16	19.0
	Agree	39	46.4
	strongly agree	6	7.1
	Total	84	100
Among 5's ,standardizing kaizen practice is implemented very well in factory	strongly disagree	1	1.2
	Disagree	21	25.0
	Uncertain	22	26.2
	Agree	31	36.9
	strongly agree	9	10.7
	Total	84	100
Among 5's ,sustaining)kaizen practice is implemented very well in factory	strongly disagree	5	6.0
	Disagree	22	26.2
	Uncertain	21	25.0
	Agree	32	38.1
	strongly agree	4	4.8
	Total	84	100
Problem solving and innovation culture becomes stronger ever before due to kaizen	strongly disagree	5	6.1
	Disagree	17	20.7
	Uncertain	16	19.5
	Agree	42	51.2
	strongly agree	2	2.4
	Total	82	100
The factory working	Strongly disagree	2	2.4

		Frequency	Percent
culture has enable sustain Kaizen implementation	Disagree	20	24.4
	Uncertain	19	23.2
	Agree	36	43.9
	Strongly agree	5	6.1
	Total	82	100
There are many strong kaizen team in MCF.	strongly disagree	2	2.4
	Disagree	16	19.3
	Uncertain	20	24.1
	Agree	35	42.2
	strongly agree	10	12.0
	Total	83	100
strong leader ship commitment and support for kaizen in MCF	strongly disagree	9	10.7
	Disagree	23	27.4
	Uncertain	16	19.0
	Agree	34	40.5
	strongly agree	2	2.4
	Total	84	100

Source: Primary data generated for the study from questionnaire

Kaizen awareness is the crucial part for Staff in the implementation of the new system. In this regard the above table depict that understanding of kaizen 47(56%) of the respondents are agree and 6 (7.1%) of respondents are strongly agree this shows that the overall majority i.e. 53(63.1%) of the respondents this shows that there is no a significant knowledge gap within kaizen team member

The points mentioned in the above table about sorting (Remove anything that you do not need.)Kaizen practice level in factory the respondents response is 42 (51.2%) are agree and 10 (12.2%) of respondents are strongly agree this shows that the overall majority i.e. 52(63.4%) of the respondents find it that sorting kaizen practice is implemented very well in factory . The management and selected team leaders' response during the interview is also in line with the above summary.

The table above deals with the question about set-in-order (Creating a specific location for everything) kaizen practice level in factory. In return 41 (49.4%) of the respondents are agree and 11 (13.3%) of respondents are strongly agree this shows that the overall majority i.e 52(62.7%) of the respondents find it that set-in-order kaizen practice is implemented very well in factory . The

management and selected team leaders' response during the interview is also in line with the above summary.

The points mentioned in the above table about shining (Clean the work area) kaizen practice in factory. In return 39 (46.4%) of the respondents are agree and 6 (7.1%) of respondents are strongly agree this shows that a total of 45 (53.5%) of the respondents find it that shining kaizen practice is implemented very well in factory The management and selected team leaders' response during the interview is also in line with the above summary.

The table above deals with the question about standardizing (Standardize the best practice within the workplace) kaizen practice in factory. In return 31 (36.9%) of the respondents are agree and 9 (10.7%) of respondents are strongly agree this shows that a total of 40 (47.6%) of the respondents find it that **standardizing** kaizen practice is implemented very well in factory On other hand 22(26.2%), 21(25%) and 1 (1.2%) respectively are uncertain, disagree and strongly disagree collectively 44(52.4%).This imply that there is some gap in standardizing kaizen practice in the factory The management and selected team leaders' response during the interview is also in line with the above summary.

The points mentioned in the above table about sustaining (Never slip back into the old ways)kaizen practice in factory. In return 32 (38.1%) of the respondents are agree and 4 (4.8%) of respondents are strongly agree this shows that a total of 36 (42.9%) of the respondents agree that kaizen is sustaining in the factory. On other hand 21(25%), 22(26.2%) and 5 (6%) respectively are uncertain, disagree and strongly disagree collectively 48(57.1%).This imply that there is some gap in sustaining kaizen practice in the factory The management and selected team leaders' response during the interview is also in line with the above summary

As can be seen on the above table about Problem solving and innovation culture in the factory. In return 42 (51.2%) of the respondents are agree and 2 (2.4%) of respondents are strongly agree this shows that the overall majority i.e. 44(53.6%) of the respondents find it that Problem solving and innovation culture are becomes stronger ever before due to kaizen in factory.

The points mentioned in the above table about factory working culture has enable sustain Kaizen implementation in the factory. In return 36(43.9%) of the respondents are agree and 5 (6.1%) of respondents are strongly agree this shows that 41(50%) of the respondents find it that factory working culture has enable sustain Kaizen implementation in factory.

The question connected with factory kaizen team has enable sustain Kaizen implementation in the factory. In return 35 (42.2%) of the respondents are agree and 10 (12%) of respondents are strongly agree this imply that 65(54.2%) of the respondents perceived there are many strong kaizen team in factory

In the table above deals with the question about leader ship commitment and support for kaizen in MCF. The respondent reply 34(40.5%) of the respondents are agree and 2(2.4%) of respondents are strongly agree this shows that total of 36(42.9%) of the respondents agree that there is a leader ship commitment for kaizen in MCF factory. On other hand 16(19%), 23(27.4%) and 9 (10.7%) respectively are uncertain, disagree and strongly disagree collectively 48(57.1%).This imply that there is some gap in leader ship commitment and support for kaizen in the factory

4.2.3 Respondents. Responses towards kaizen effect on waste minimization practices

The following tables are explaining respondents' perception of kaizen on waste minimization.

Table 4.4: Inventory waste

		Frequency	Percent
Factory's kaizen activity minimize over production of inventory	strongly disagree	2	2.4
	Disagree	7	8.3
	Uncertain	25	29.8
	Agree	38	45.2
	strongly agree	12	14.3
	Total	84	100
Factory's kaizen activity improves inventory Layout	strongly disagree	1	1.2
	Disagree	9	11.0
	Uncertain	17	20.7
	Agree	45	54.9
	strongly agree	10	12.2
	Total	82	100
Factory's kaizen activity help proper handling of office supply inventory	strongly disagree	2	2.4
	Disagree	6	7.3
	Uncertain	18	22.0
	Agree	44	53.7
	strongly agree	12	14.6
	Total	82	100
Factory's kaizen activity handle excess raw material	strongly disagree	2	2.4
	Disagree	21	25.3
	Uncertain	21	25.3
	Agree	30	36.1

		Frequency	Percent
	strongly agree	9	10.8
	Total	83	100
Factory's kaizen activity handle maintenance and repair inventory	strongly disagree	4	4.9
	Disagree	11	13.4
	Uncertain	20	24.4
	Agree	36	43.9
	strongly agree	11	13.4
	Total	82	100

Source: Primary data generated for the study from questionnaire

As can be seen on the above table connected with the question which seeks to find out the employee perception about Factory's kaizen activity minimize over production of inventory. In return 38 (45.2%) of the respondents are agree and 12 (14.3%) of respondents are strongly agree this imply that 50(59.5%) of the respondents perceived Factory's kaizen activity minimize over production of inventory

The employee perception about Factory's kaizen activity improves the Layout of inventory. In return 45 (54.9%) of the respondents are agree and 10 (12.2 %) of respondents are strongly agree this imply that the majority i.e. 55 (67.1%) of the respondents perceived Factory's kaizen activity improves inventory Layout .

Employee's perception about Factory's kaizen activity help proper handling of office supply inventory. In return 44 (53.7%) of the respondents are agree and 12 (14.6 %) of respondents are strongly agree this imply that the majority i.e. 55 (68.3%) of the respondents perceived factory's kaizen activity help proper handling of office supply inventory

The respondents perception about factory's kaizen activity handle excess raw material. In return 30 (36.1%) of the respondents are agree and 9 (10.8 %) of respondents are strongly agree this imply that 39 (46.9%) of the respondents perceived factory's kaizen activity handle excess raw material

Employee's perception about factory's kaizen activity handle maintenance and repair inventory. In return 36 (43.9%) of the respondents are agree and 11 (13.4 %) of respondents are strongly agree this imply that the majority i.e. 47 (57.3%) of the respondents perceived factory's kaizen activity handle maintenance and repair inventory.

Table 4.5: Motion waste

		Frequency	Percent
Factory's kaizen activity minimize unnecessary movement of people	strongly disagree	4	4.8
	Disagree	18	21.7
	Uncertain	16	19.3
	Agree	33	39.8
	strongly agree	12	14.5
	Total	83	100.0
Factory's kaizen activity minimize unnecessary movement of equipment	strongly disagree	2	2.4
	Disagree	16	19.3
	Uncertain	18	21.7
	Agree	34	41.0
	strongly agree	13	15.7
	Total	83	100.0
Factory's kaizen activity minimize unnecessary movement of machine	strongly disagree	2	2.4
	Disagree	11	13.3
	Uncertain	16	19.3
	Agree	40	48.2
	strongly agree	14	16.9
	Total	83	100.0

Source: Primary data generated for the study from questionnaire

The table above depict the question which seeks to find out the employee perception about factory's kaizen activity minimize unnecessary movement of people. In return 33 (39.8%) of the respondents are agree and 12 (14.5 %) of respondents are strongly agree this imply that the majority i.e. 45 (54.3%) of the respondents perceived factory's kaizen activity minimize unnecessary movement of people

The employee perception about factory's kaizen activity minimize unnecessary movement of equipment. In return 34 (41%) of the respondents are agree and 13 (15.7 %) of respondents are strongly agree this imply that the majority i.e. 47 (56.7%) of the respondents perceived factory's kaizen activity minimize unnecessary movement of equipment.

The respondent perception about factory's kaizen activity minimize unnecessary movement of machine. In return 40 (48.2%) of the respondents are agree and 14 (16.9%) of respondents are

strongly agree this imply that the majority i.e. 54 (65.1%) of the respondents perceived factory's kaizen activity minimize unnecessary movement of machine

Table 4.6: Waiting waste

		Frequency	Percent
Factory's kaizen activity minimize waiting due to component shortage on a production line	strongly disagree	4	4.9
	Disagree	20	24.7
	Uncertain	19	23.5
	Agree	35	43.2
	strongly agree	3	3.7
	Total	81	100.0
Factory's kaizen activity minimize waiting due to machine down time	strongly disagree	3	3.6
	Disagree	24	28.6
	Uncertain	13	15.5
	Agree	36	42.9
	strongly agree	8	9.5
	Total	84	100.0
Factory's kaizen activity minimize waiting due to delivery product/service	strongly disagree	3	3.6
	Disagree	21	25.0
	Uncertain	14	16.7
	Agree	40	47.6
	strongly agree	6	7.1
	Total	84	100.0
Factory's kaizen activity minimize waiting due to in-process waiting	strongly disagree	22	26.2
	Disagree	17	20.2
	Uncertain	37	44.0
	Agree	8	9.5
	strongly agree	84	100.0
	Total	22	26.2
Factory's kaizen activity minimize waiting due to decision making	strongly disagree	7	8.3
	Disagree	22	26.2
	Uncertain	17	20.2
	Agree	32	38.1
	strongly agree	6	7.1
	Total	84	100.0

Source: Primary data generated for the study from questionnaire

The table above deals with the question which seeks to find out the employee perception about factory's kaizen activity minimizes waiting due to component shortage on a production line. In return 35 (41.7%) of the respondents are agree and 3 (3.6%) of respondents are strongly agree this

imply that 38 (46.9%) of the respondents perceived factory's kaizen activity minimize waiting due to component shortage on a production line. On the other hand 19(23.5%), 20(24.7%) and 4(4.9%) respectively are uncertain, disagree and strongly disagree collectively 43(53.1%). This shows that there is some gap in factory's kaizen activity minimize waiting due to component shortage on a production line

The employee perception about factory's kaizen activity minimize waiting due to machine down time. In return 36 (42.9%) of the respondents are agree and 8(9.5%) of respondents are strongly agree this imply that the majority i.e. 44 (52.4%) of the respondents perceived factory's kaizen activity minimize waiting due to machine down time.

The employee perception about factory's kaizen activity minimize waiting due to delivery product/service. In return 40 (47.6%) of the respondents are agree and 6(7.1%) of respondents are strongly agree this imply that the majority i.e. 44 (54.7%) of the respondents perceived factory's kaizen activity minimize waiting due to delivery product/service.

The respondents perception about factory's kaizen activity minimizes waiting due to in-process waiting. In return 37 (44%) of the respondents are agree and 8(9.5%) of respondents are strongly agree this imply that the majority i.e. 45 (53.5%) of the respondents perceived factory's kaizen activity minimize waiting due to in-process waiting.

Employee's perception about Factory's kaizen activity minimize waiting due to decision making. In return 32(38.1%) of the respondents are agree and 6(7.1%) of respondents are strongly agree this imply that 45 (45.2 %) of the respondents perceived Factory's kaizen activity minimize waiting due to decision making. On the other hand 17(20.2%), 22(26.2%) and 7(8.3%) respectively are uncertain, disagree and strongly disagree collectively 43(54.7%). This shows that there is some gap in Factory's kaizen activity on minimize waiting due to decision making

Table 4.7: Defect waste

		Frequency	Percent
Factory's kaizen activity minimize defect waste caused by rework or correction	strongly disagree	2	2.4
	Disagree	17	20.5
	Uncertain	11	13.3
	Agree	45	54.2
	strongly agree	8	9.6
	Total	83	100.0
Factory's kaizen activity	strongly disagree	1	1.2

		Frequency	Percent
minimize defect caused by scrap	Disagree	15	18.3
	Uncertain	13	15.9
	Agree	47	57.3
	strongly agree	6	7.3
	Total	82	100.0
Factory's kaizen activity minimize defect caused by quality	strongly disagree		
	Disagree	14	16.9
	Uncertain	17	20.5
	Agree	43	51.8
	strongly agree	9	10.8
	Total	83	100.0
Factory's kaizen activity minimize inspection and check up caused by defect	strongly disagree		
	Disagree	17	20.5
	Uncertain	19	22.9
	Agree	43	51.8
	strongly agree	4	4.8
	Total	83	100.0

Source: Primary data generated for the study from questionnaire

The points mentioned in the above table connected with the question which seeks to find out the employee perception about factory's kaizen activity minimize defect waste caused by rework or correction. In return 45 (54.2%) of the respondents are agree and 8(9.6%) of respondents are strongly agree this imply that the majority i.e. 53 (63.8 %) of the respondents perceived factory's kaizen activity minimize defect waste caused by rework or correction.

The employee perception about factory's kaizen activity minimize defect caused by scrap. In return 47 (57.3%) of the respondents are agree and 6(7.3%) of respondents are strongly agree this imply that the majority i.e. 53 (64.6%) of the respondents perceived factory's kaizen activity minimize defect caused by scrap

Employee's perception about factory's kaizen activity minimize defect caused by quality. In return 43 (51.8%) of the respondents are agree and 9(10.8%) of respondents are strongly agree this imply that the majority i.e. 52 (62.6%) of the respondents perceived factory's kaizen activity minimize defect caused by quality.

Employee's perception about factory's kaizen activity minimizes inspection and check up caused by defect. In return 43 (51.8%) of the respondents are agree and 4(4.8%) of respondents are

strongly agree this imply that the majority i.e. 47(56.6%) of the respondents perceived factory's kaizen activity minimize inspection and check up caused by defect.

4.2.4. Summary of Descriptive Results

To achieve successful completion of processes by using kaizen, one requires participation from the top most level of management to the base level workers. In this regard implementation level or status of kaizen in Mugher factory can be measure in the following parameter i.e. implementation level of sorting, set-in-order, shining, standardizing and sustaining. In addition to this awareness level of kaizen team members, strong problem solving and innovation culture, strong working culture and kaizen team and strong leader ship commitment are used for measuring the level of kaizen implementation. For analyzing the effect of kaizen implementation on waste minimization in Mugher cement factory, the data has been analyzed descriptively.

The researcher summarize The descriptive results i.e. the mean score of Current status of kaizen implementation practice in the factory show in the following table

Table4.8: Summary of kaizen implementation

Kaizen parameter	N	Mean	SD. deviation	Total kaizen mean
No huge knowledge gap between kaizen team members	84	3.44	0.97	3.2
sorting strongly implemented	82	3.51	1.02	
set in order strongly implemented	83	3.51	1.05	
shining implemented strongly	84	3.26	1.04	
standardizing implemented strongly	84	3.17	1.07	
sustaining implemented strongly	84	2.87	1.06	
strong problem solving and innovation culture	82	3.23	1.01	
strong working culture	82	3.27	0.98	
strong kaizen team	83	3.42	1.01	
strong leader ship commitment	84	2.60	1.11	

From the above descriptive result, this study summary of finding is supported by the studies of Norasmah & Sabaria (2007); Norasmah & Salmah (2011) described their level of measuring mean score. Thus the independent variables i.e kaizen mean score is 3.2 which is between 3.01 – 4.00 which is moderately high. This implies that the majority of respondent perceived that the status of kaizen implementation in mugher cement factory is moderately high. On the other hand kaizen sustaining and management commitment mean value are 2.87, and 2.60 respectively shows that these two kaizen practice status exist in low level. With regard to level of kaizen implementation the standard deviation shows that the majority of respondents perception is around the mean value.

When we come to waste minimization, the first and foremost advantage of implementing kaizen principles in the work processes is that it largely reduces wastage in every process. It involves every person in spotting the wastage. Thus, it includes suggestions from all levels of management and work forces. The factor of constant change makes the management spot the problem, study it carefully, question it, find the root cause, design an alternative and implement it as a part of regular process. This helps in minimizing wastage of resources. In this regard total mean score of Mugher cement factory employee and management perceived waste minimization practice due to kaizen implementation is shown in the following table.

Table 4.9: Summary of waste minimization							
No	Waste type	Mean	Waste Parameter	N	Mean	SD. deviation	Total waste minimization mean
1	Inventory waste	3.6	minimize over production inventory	84	3.40	1.02	3.42
			improve inventory layout	82	3.66	0.87	
			handle office supply inventory	82	3.71	0.89	
			handle of excess raw material	83	3.28	1.04	
			handle maintains and repair inventory	82	3.48	1.04	
2	Motion waste	3.5	Reduce people unnecessary movement	83	3.37	1.12	
			Reduce equipment	83	3.48	1.05	

			unnecessary movement				
			Reduce machine unnecessary movement	83	3.64	0.99	
3	Waiting waste	3.24	Decrease waiting component shortage	81	3.16	1.00	
			Decrease waiting machine downtime	84	3.26	1.08	
			Decrease waiting delivery	84	3.30	1.03	
			Decrease process waiting	84	3.37	0.97	
			Decrease decision making waiting	84	3.10	1.12	
4	Defect waste	3.5	Reduce rework defect	83	3.48	1.00	
			Reduce scrap defect	82	3.51	0.92	
			Reduce quality defect	83	3.57	0.90	
			Reduce inspection defect	83	3.41	0.87	

Source: Primary data generated for the study from questionnaire

The table shows that mean value of waste minimization practice in the factory is 3.42 according to Norasmah & Sabaria (2007); Norasmah & Salmah (2011) described their level of measuring mean score is between 3.01 and 4.00 is belongs to moderately high the mean score of the factory 3.42 this interpret as the majority of respondents perceived that the effect of kaizen implementation on waste minimization practice in a factory moderately high level. With regard to the kaizen effect on waste minimization the standard deviation shows that the majority of respondents perception is around the mean value.

B) open end questions

This is designed to encourage a full, meaningful answer using the subject's own knowledge and/or feelings in this regard, the main point respondents mentioned to the question concerned with practical challenges of kaizen that the factory has encountered are the following:

- Changing the attitude of some workers and senior management was not easy.
- Due to the absence of rewarded and recognized mechanism, motivation of some team members was not as expected.
- Different levels understanding among the group and workers caused challenges.

- Inability to track record of what has been done by the team especially waste minimization practice data
- Some of the workers perceived kaizen as additional task for them and discouraged to work effectively.
- Challenges of kaizen sustainability in the first phase.

When the researcher summarized these responses, it implies that kaizen implementation and its contribution on waste minimization is not attractive as such expected.

c) Summary of Interview questions

Interview questions were developed for a few selected leader and supervisors in order to identify the effect of kaizen implementation on waste minimization practice in the factory.

- ❖ For question Is there any positive performance change notice with the staff in your department after introduction of kaizen strategy give reasons for your answer , the responses were:
 - Employees work culture is changed and work more with the best quality
 - Better improvement of production is observed
 - materials set in proper place
 - Work team spirit is improved

- ❖ Have kaizen system been improved since implementation?

The response for this question was that factory start kaizen level one implementation, during this phase (Ethiopian kaizen institute) EKI has given training to management and workers of the factory. The institute follow up was commendable based on the schedule. Conducting followed up each and every steps of factory move in order to support them effectively and efficiently. EkI evaluate the status of kaizen level one implementation .Based on the result of evaluation EkI reward the factory and begin level two kaizen. This can be considering as improvement.

- ❖ For the question after the introduction of kaizen strategy is there reduction of waste in area such as inventory, over production waiting and defect.

The response for this question is sorting, set in order and shinning kaizen practice are strongly implemented this helps to identify obsolete inventory, scrap and save ware house space. When we come to the modification works for spare parts it is reducing waiting waste due to long purchasing process. As a whole these practice leads to some extent contribute for waste minimization.

- ❖ In response to the question which asks, what would you suggest to make Kaizen Principles and practices remain sustainable in your factory, the following responses given below:
 - They respond that if there is a strong commitment of senior management and if the reward systems are in place, kaizen will sustain in the factory.

- The factory is now implement level two kaizen side by side with level one kaizen. It should be important and need good follow up of Ethiopian kaizen Institute.

When we conclude, most of the respondents of the management and supervisors have agreed that the kaizen implementation in the factory is not as such strong With regard to its sustainability, some respondents suggested that the senior management should be work hard on the staff motivation perspective and make a favorable work conditions in the factory.

4.3. Correlations Analysis

According to Davis (1971, as cited by Alwadaei, 2010) the interpretation of strength of correlation coefficient r ranging from 0.50 to 0.69 consider as a Substantial association The correlation matrix for factors is deployed in table3.3. All the correlation coefficients were positive; with a maximum value of 0.654 minimum value of 0.459. Furthermore they were all significant at the 0.05 level. See the following table:

Correlations between kaizen and waste parameter(minimization)							
		Kaizen	inventory waste	Waiting waste	Motion waste	Defect waste	Total waste minimization
kaizen	Pearson Correlation	1	.549**	.654**	.542**	.544**	.650**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	84	84	84	84	84	84
**. Correlation is significant at the 0.05 level (2-tailed).							

Table 4.10 correlation analysis

As it is shown in the above Table the correlation of kaizen on waste minimization are positively correlated by 0.650. This shows that according to the descriptors developed by Davis (1971, as cited by Alwadaei, 2010) shown on the above table 3.3 the dependant variable i.e. waste minimization and independent variable i.e. kaizen have Substantial association.

4.4. Regression analysis

This is analysis that is almost a continuation of correlation the researcher has been used linear regression. Each independent variable used to predict tendency of dependent variable. The result of the regression analysis between the independent variables kaizen implementation which predicts the factory's waste minimization practice presented as follow:-

4.4.1. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.790 ^a	.624	.563	.49464	.624	10.282	10	62	.000

Table 4.11 : Model Summary

a. Predictors: (Constant), strong leader ship commitment , knowledge gap between kaizen team members, sorting strongly implemented, strong problem solving and innovation culture, standardizing implemented strongly, strong kaizen team, strong working culture, set in order strongly implemented, sustaining implemented strongly, shining implemented strongly

b. Dependent Variable: waste minimization

In the above table the needed measure is the R square (model summary) in which it is the measure of the success of the model. In this case the R square = 0.624 and it can be interpreted as the weighting combination of kaizen implementation explained approximately 62 percent of the variance in factory waste minimization.

4.4.2. ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	25.156	10	2.516	10.282	.000 ^b
Residual	15.169	62	.245		
Total	40.325	72			

Table 4.12 ANOVA of waste minimization and kaizen implementation

a. Dependent Variable: waste minimization

b. Predictors: (Constant), strong leader ship commitment , knowledge gap between kaizen team members, sorting strongly implemented, strong problem solving and innovation culture, standardizing implemented strongly, strong kaizen team, strong working culture, set in order strongly implemented, sustaining implemented strongly, shining implemented strongly

The above table revealed the Sig (ANOVA) and it is the significance of the model. .000 means we reached significance.

4.4.3. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.338	.322		4.149	.000	.693	1.983
sorting strongly implemented	.022	.084	.031	.263	.000	-.191	.147
set in order strongly implemented	.041	.082	.060	.497	.000	-.123	.205
shining implemented strongly	.121	.090	.170	1.342	.000	-.059	.302
standardizing implemented strongly	-.213	.084	-.304	-2.523	.014	-.381	-.044
knowledge gap between kaizen team members	.075	.065	.097	1.147	.054	-.055	.205
sustaining implemented strongly	-.216	.085	-.306	-2.538	.014	-.046	-.386
strong problem solving and innovation culture	.048	.081	.067	.593	.051	-.114	.210
strong working culture	.160	.087	.212	1.848	.035	-.013	.334
strong kaizen team	.025	.087	.034	.285	.000	-.149	.199
strong leader ship commitment	-.253	.078	-.374	-3.226	.002	-.096	-.409

Table 4.13 coefficients

a Dependent Variable: waste minimization

B column show that the coefficient of the predictor variables i.e (constant, sorting, set in order, shining, standardizing, knowledge gap, sustaining, strong problem solving and innovation culture, working culture, strong kaizen team, leader ship commitment). The first variable (constant) represents the constant, also referred to as the Y intercept, In other words, this is the predicted value of waste minimization practice when all other variables are 0.

We can conclude the regression analysis in the following way:-

- The coefficient for sorting is 0.022 So for every unit increase in sorting, a 0.02 unit increase in waste minimization practice is predicted, holding all other variables constant.
- The coefficient for set in order is 0.041 So for every unit increase in set-in-order, a 0.04 unit increase in waste minimization practice is predicted, holding all other variables constant.
- The coefficient for shining is 0.121 So for every unit increase in shining, a 0.12 unit increase in waste minimization practice is predicted, holding all other variables constant.
- The coefficient for problem solving is 0.048 So for every unit increase in problem solving, a 0.05 unit increase in waste minimization practice is predicted, holding all other variables constant.
- The coefficient for strong kaizen team is 0.075 So for every unit increase in strong kaizen team a 0.08 unit increase in waste minimization practice is predicted, holding all other variables constant.
- The coefficient for strong working culture is 0.160 So for every unit increase in strong working culture, a 0.16 unit increase in waste minimization practice is predicted, holding all other variables constant.
- For every unit gap increase in standardizing we expect a -0.21 unit decrease in waste minimization practice, holding all other variables constant.
- For every unit gap increase in sustain kaizen we expect a -0.22 unit decrease in waste minimization practice, holding all other variables constant.
- For every unit gap increase in management commitment we expect a -0.21 unit decrease in waste minimization practice, holding all other variables constant

CHAPTER FIVE

Summary, CONCLUSION AND RECOMMENDATION

5.1. Summary of the research

At the present time, there are numerous initiatives functional in manufacturing industries, which pursue to increase the effectiveness and performance. Kaizen is one of the most implemented initiatives in the industry sector.

The main objective of this research was to identify employees' perception about the effect of Kaizen implementation on waste minimization in Mugher cement factory. The study design was Descriptive research. In this research, both quantitative and qualitative data were used. The target populations of the research were mainly focused on department leaders, team leader, and selected senior expert. Because these people are relatively well educated, experienced and higher position in the factory this makes them to have analytical ability, in addition to this they have enough and organize information to show clear picture about the overall status and outcome of kaizen and its effect on waste minimization in the factory. In this research both primary and secondary data were used as source of information. Based on the research objective, English version questionnaires were prepared. 100 employees and leader was participating using purposive sampling technique. Out of 100 respondents all department head and team leader fill and return questioner and 78.4 percent of senior experts were filled the survey questionnaires. In other word from 100 selected employee/leader 84 respondents fill and return questioners this show that the response rate was 84 percent.

To determine the reliability of the questionnaires, the coefficients of Cronbach's alpha (1951) were taken into account. The values of Cronbach's Alpha range from 0 (completely unreliable) to 1 (perfectly reliable). An alpha value of 0.5 to 0.6 is considered acceptable but 0.7 or higher is highly preferred. So the finding 0.788 shows that all the questionnaires were reliable in addition to this the item or substance of questioner also evaluated by reform facilitator expert and gain acceptance.

The percentage composition of the respondents' response summarized in the following manner:

When we see the overall status of kaizen implementation

- On average 60% of the respondents perceived that among 5's of kaizen sorting, set-in – order and shining are implemented in a good condition in the factory

- 52.4%. of the respondents perceived that the status of kaizen standardizing practices have a gap .The management and selected team leaders' response during the interview is also in line with this.
- 57.1%. of the respondents perceived that sustaining kaizen practice goes back ward This imply that there is a gap in follow up and support roll in management body. The management and selected team leaders' response during the interview is also in line with this.
- 57.1 of the respondents perceived that there is a gap in leader ship commitment for support kaizen in the factory.

The effect of kaizen on waste minimization

- 50.54% of respondents perceived that kaizen implementation improve waiting waste ,
- 58.7% of the respondent perceived that kaizen implementation improve motion waste,
- 61.9% of the respondent perceived that kaizen implementation improve defect waste , and
- 63% of the respondent perceived that kaizen implementation improve inventory waste.

As shown in the above summery although there is a gap in kaizen implementation process respondents perceived that kaizen implementation have positive impact on waste minimization practice around moderately high level. In addition to this interview and secondary document summery result also in line with this summary

mean score of waste minimization survey result reveal that employee perception on effect of kaizen on waste minimization in the factory is 3.42 According to Norasmah & Sabariah,(2007) and; Norasmah & Salmah, (2011) table 3.2 the mean score below 2.00 was considered as low, the mean score from 2.01up to 3.00 was considered as Moderately low and mean score between 3.01-4.00 was considers as Moderately High and the mean score from 4.01-5.00 was considered as High. So in this research the result of mean score shows that effect of kaizen on waste minimization in the factory exist in moderately high level.

Correlation analyze also applied to evaluate the relationships between kaizen effect on waste minimization. All the correlation coefficients were positive; with a maximum value of 0.654 minimum value of 0.459 this show that kaizen practice has positive effect on waste minimization in the factory.

5.2. Conclusions from the study

kaizen is particularly suited for enterprises in low-income countries which face financial access Problems (Ohno et al., 2009).so in mugher cement factory kaizen implementation is a vital strategies because Continuous Improvement is one of the core strategies for excellence in production, in today's competitive environment (Dean and Robinson, 1991). It calls for endless effort for improvement involving everyone in the organization (Malik and YeZhuang, 2006).

This study sought to establish the effect of kaizen implementation on waste minimization in Mugher cement factory. The findings from the study show that there is a positive relationship between *kaizen* implementation and waste minimization. This implies factory that implement *kaizen* are likely to improve their waste minimization practices.

The study also aimed at establishing the extent to which *kaizen* techniques have been implemented by Mugher cement factory. The study findings show that among 5S sorting, set in order and shining have the greatest extent of implementation and standardizing and sustain kaizen practice had the least extent of implementation. Overall most of the practices like awareness creation, working culture and participation of kaizen team were well implemented in the factory that have adopted *kaizen*. In addition to this the challenges that are encountered by Mugher cement factory in implementation of *kaizen*. The findings show that the challenge that hindered *kaizen* implementation was lack of management commitment to follow up and support

To effectively apply the 5S System, Juhari, Abidin, and Omar (2011) suggest that communication for 5S, training for 5S, reward and recognition for 5S and top management support for 5S are vital factors that influence employees' motivation in the implementation of the 5S System. Given this, they suggest that management needs to pay attention and formulate effective strategies to motivate their employees on a consistent basis..

5.3. Recommendations from the research

This research shows that Mugher cement factory shows some extent encouraging result on waste minimization practice due to kaizen implementation. In order to gain more result of kaizen implementation and to achieve best result on waste minimization in the factory, there are action to be taken by the management. Some of the recommendations are:

- kaizen specific training should be given to all employees frequently
- The study recommended that management should be use bottom up approach of management for effective implementation of kaizen on waste minimization practice

- The Ethiopian kaizen institute should conduct continuous follow up and provide outgoing support in order to sustainability implementation process
- To sustain the implementation process management should encourage employees and give some respect what they say or what they done and also management must change their attitudes.
- In order to address the challenges on implementation kaizen different management strategies should be used these strategies include; awarding bonuses, offering performance based rewards, close monitoring through reviews, job rotation and training, provision of proper information, provision of guides to solve challenges,
- There should be the reward and recognition system to the factory and continuous discussion between employees and management so that any misunderstanding should be resolved.

Finally the study recommended that even after introduction of kaizen the factory should keep checking the milestones achieved by the introduction of the system to determine growth and performance of the factory

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Annex 1

QUESTIONNAIRE (መጠይቅ)

Business administrator and information system Master Program

Dear Respondent, I am conducting a research on “the effect of kaizen on perceived waste minimization “case of Mugher cement factory”. The research is conducted in partial fulfillment of the requirement for the degree of Masters of Human Resource management. The survey intended to evaluate the overall effect of kaizen on perceived waste minimization in Mugher cement factory. It will be a great contribution if you may complete all the items covered in the questionnaire. The information you are going to give here is very important for the study; any information you fill in this questionnaire will be kept confidential and used only for this study.

I thank you in advance for sharing your valuable experience and time in completing the questionnaire.

For any inquiry please contact me at:

Address

Berhanemaskel Geber

0912025708

General Instruction

1. No need of writing your name on the sheet
2. Feel free and attempt all questions
3. Put the symbol of (✓) in the box for each question

PART ONE: general information

sex	Mail ☐			Female ☐		
Age	20-30 ☐	31-40 ☐	41-50 ☐	51-60 ☐	61 and above ☐	
Education	Diploma ☐		Bachelor Degree ☐		Masters or above ☐	
Work Position level	Senior Expert ☐		Team leader ☐		Director ☐	
Work experience	Less than 1 year ☐	1-5 years ☐	6-10 years ☐	11-15 years ☐	16-20 year ☐	More than 20 year ☐
Branch of work	Addis Ababa plant ☐		Tatek plant ☐		Mugher main plant ☐	

PART TWO: *kaizen 5's* Implementation (የካይዘን አምስቱ ማዎች ትግበራ)

1. To what extent do you agree about the level of **kaizen activities implementation** in the factory?
Use the scale given below to appropriately answer the questions that follow by ticking (✓)
accordingly. .የ "✓" ምልክት በማድረግ ይግለፁ

NO	Statements on kaizen implementation	Strongly Agree (በጣም እስማማለሁ)	Agree (እስማማለሁ)	Uncertain (እርግጠኛ አይደለሁም)	Disagree (አልስማማም)	Strongly disagree (በጣም አልስማማም)
1.1	There is no a Huge knowledge gap between kaizen team member					
1.2	Among 5's sorting are strongly implemented in the factory					
1.3	Among 5's set-in-order are strongly implemented in the factory					
1.4	Among 5's shining are strongly implemented in the factory					
1.5	Among 5's standardizing are implemented strongly in the factory					
1.6	Among 5's sustaining are implemented strongly in the factory					
1.7	Problem solving and innovation culture becomes strong in the factory due to kaizen					
1.8	Kaizen create strong working culture in the factory					
1.9	There are many strong kaizen team in the factory.					
1.10	The are strong leader ship commitment and support for kaizen in the factory					

PART THREE: kaizen waste minimization (በካይዘን ብክነትን መቀነስ)

1. To what extent improved **inventory waste minimization practice** in the factory? Use the scale given below to appropriately answer the questions that follow by ticking (✓) accordingly.

የ "✓" ምልክት በማድረግ ይግለፁ

NO	Statements on inventory waste minimization	Strongly Agree (በጣም እስማማለሁ)	Agree (እስማማለሁ)	Uncertain (እርግጠኛ አይደለሁም)	Disagree (አልስማማም)	Strongly disagree (በጣም አልስማማም)
1.1	Factory's kaizen activity minimize over production of inventory					
1.2	Factory's kaizen activity improves the Layout of inventory.					
1.3	Factory's kaizen activity help proper handling of office supply inventory					
1.4	Factory's kaizen activity handle excess raw material					
1.5	Factory's kaizen activity handle maintenance and repair inventory					

2. To what extent improved **motion waste minimization practice** in the factory? Use the scale given below to appropriately answer the questions that follow by ticking (✓) accordingly. የ "✓" ምልክት በማድረግ ይግለፁ

NO	Statements on motion waste minimization	Strongly Agree (በጣም እስማማለሁ)	Agree (እስማማለሁ)	Uncertain (እርግጠኛ አይደለሁም)	Disagree (አልስማማም)	Strongly disagree (በጣም አልስማማም)
2.1	Factory's kaizen activity minimize unnecessary movement of people					
2.2	Factory's kaizen activity minimize unnecessary movement of equipment					
2.3	Factory's kaizen activity minimize unnecessary movement of machine					

- 3 To what extent improved **waiting waste minimization practice** in the factory?
Use the scale given below to appropriately answer the questions that follow by ticking (✓)
accordingly. የ "✓" ምልክት በማድረግ ይግለፁ

NO	Statements on waiting waste minimization	Strongly Agree (በጣም እስማማለሁ)	Agree (እስማማለሁ)	Uncertain (እርግጠኛ አይደለሁም)	Disagree (አልስማማም)	Strongly disagree (በጣም አልስማማም)
3.1	Factory's kaizen activity minimize waiting due to component shortage on a production line					
3.2	Factory's kaizen activity minimize waiting due to machine down time					
3.3	Factory's kaizen activity minimize waiting due to delivery product/service					
3.4	Factory's kaizen activity minimize waiting due to in-process waiting					
3.5	Factory's kaizen activity minimize waiting due to decision making					

- 4 To what extent improved **defect waste minimization practice** in the factory?
Use the scale given below to appropriately answer the questions that follow by ticking (✓)
accordingly. የ "✓" ምልክት በማድረግ ይግለፁ

NO	Statements on defect waste minimization	Strongly Agree (በጣም እስማማለሁ)	Agree (እስማማለሁ)	Uncertain (እርግጠኛ አይደለሁም)	Disagree (አልስማማም)	Strongly disagree (በጣም አልስማማም)
4.1	Factory's kaizen activity minimize defect waste caused by rework or correction					
4.2	Factory's kaizen activity minimize defect caused by scrap					
4.3	Factory's kaizen activity minimize defect caused by quality					
4.4	Factory's kaizen activity minimize inspection and check up caused by defect					

PART FOUR:

- Would you like to give more information about any of you responses? Please include the number of the statement you are discussing _____

- Would you please explain the practical challenge you encountered in your specific work unit about kaizen related with waste minimization _____

Annex 2

Interview questions

Addis Ababa University School of commerce Department of Business administration and information system Master Program

The purpose of this interview is to collect primary data from purposively selected respondents in Mugher cement factory. The interview will be conducted with selected director, team leader , and focal persons of reform program

1. When did MCF implementing the kaizen?
2. Why MCF decide to implement kaizen to waste minimization?
3. Is there any positive performance change notice with the staff in your department after introduction of kaizen strategy give reasons for your answer?
4. Have kaizen system been improved since implementation?
5. After the introduction of kaizen strategy ,is there reduction of waste in area such as inventory, over production waiting and defect. ?
6. What would you suggest to make Kaizen Principles and practices remain sustainable in your factory?