



Analysis of Quality Cycles on Performance of Tea Processing Firms in Kenya

George Muturi Wanjobi ^{a++*}, Henry Yatich ^{a#}
and Jackson Ndolo ^{b#}

^a Mount Kenya University, Kenya.
^b KCA University, Kenya.

Authors' contributions

This work was carried out in collaboration among all authors. Author GMW developed the conceptual framework, carried out the primary research, and drafted the manuscript. Author GMW also contributed to the statistical analysis, interpreting the results, and enhancing the methodology section. Author GMW brought industry insights, facilitated access to the tea processing firms for data collection, and provided critical revisions for the manuscript. Meanwhile, authors HY and JN supervised the entire project, ensuring the research was in line with ethical standards, and provided substantial input to the conclusion and recommendations. Together, their efforts made a comprehensive exploration of the subject matter possible. All authors read and approved the final manuscript.

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ABSTRACT

Aim of Study: The aim of the study was to assess how quality cycles impact the performance of tea processing companies in Kenya. The research was guided by Deming's quality improvement theory. Pragmatism research philosophy was employed in this research.

⁺⁺ PhD Student;

[#] Lecturer;

*Corresponding author: E-mail: gmuturi34@gmail.com;

Study Design: Further, explanatory research design was deemed appropriate for the research.

Methodology: The study population under consideration was 66 operations managers of all the tea producing companies. A census of all the 66 operations managers was conducted. Utilizing structured questionnaires, both quantitative and qualitative data was gathered for analysis. Data analysis was undertaken utilizing SPSS Version 23.0.

Results: The findings revealed that quality cycles had positive and significant relationship with performance of tea processing firms in Kenya where ($\beta = .335$) and $p = .011$). The study concludes that quality cycles are critically important in the production of tea. Tea processing firms need to cultivate culture of team work among their workers by emphasizing virtues of unity and togetherness. The study recommends for periodic diagnostic and maintenance of firm machines and equipment through well trained firm personnel. Thus, training of personnel on the maintenance of tea production equipment is essentially important in ensuring that costs arising from breakdowns are minimized. Organizational dynamic capability moderates the relationship between Kaizen Systems and performance of tea processing firms. Also, tea processing firms should invest in research and development, training, networking capability and innovation since it affects performance positively.

Keywords: Quality cycles; tea processing; tea production; performance.

1. INTRODUCTION

Tea is the leading beverage taken by people worldwide after water. Tea takes a significant portion in the economy of most tea producing countries. The performance of tea producing companies aligns to their sustainability [1]. It is evidenced that improvement in the performance of tea processing firms increases their ability to operate efficiently, pay for suppliers, meet operational cost and enhance their sales revenue [2]. However, it is the cost of producing tea, price of tea, quality of tea and others determine the performance of tea in any given producing country worldwide. Thus, to stimulate the performance of tea firms, new ways of production, processing and distribution might be required. These processes shall go a long way in minimizing cost of tea production by improving efficiency and enhancing quality of tea. Production, processing and distribution processes may require the use of technologies and other innovations and one of the innovations is the use of Kaizen Systems in tea production.

Kaizen Systems originated from Japan and entailed tasks and processes that result to enhancement of a product in order to improve its quality standards. Kaizen depicts constant upgrading of products and services, and value of manufacture through innovation processes founded on cooperative working situations. Kaizen aims at improving performance of a firm through improved standards activities [3]. Kaizen systems aim to improve individual operations and processes by eliminating waste and improving their quality standards [4]. The Kaizen approach has been inculcated in firms across the globe as

a tenet to foster firm performance through improved production. It is characterized by quality cycles, teamwork, personal discipline and total productive maintenance systems [4,5]. KAIZEN stipulates that employees partake in contributing their aptitude, capability, understanding, teachings and unsolicited contributions to their organizations [6].

In Spain, many agricultural farms have adopted the culture of continuous improvement. There exists the notion that constant progress necessitates the initiative, involvement and readiness to learn from all stakeholders [1]. Administration, through their guidance and human resource management strategies, establish a working environment in which employees can freely contribute their potential towards this mutual endeavor. Hence, necessary training is accorded to all workers pre-involvement in Kaizen teams, thus guaranteeing them of requisite skills required to execute newly attained job practices [1].

Kenya is the 3rd largest supplier of tea producing 10% (303,308 tonnes) of world tea produce and also the third biggest exporter of tea estimated at 18.2% world total aggregate of tea exported as in 2017 (Tea Research Institute, 2018). Kenya earned, 125.25 billion KES from tea exports in 2015, an increase of 23% from 101.11 billion KES recorded in 2014 [7]. Earnings from the domestic market stood at K.sh 14.6 billion (representing 7% of the total production), taking the total industry earnings to 139.85 billion KES (Kenya Tea Development Authority [KTDA report], 2017). However, there has been a decline in the quality of Kenya's tea. For some

time now, the quality of Kenya's tea has been steadily declining. According to KTDA report (2016) poor quality has been attributed to poor processing and production methods, distribution challenges and low plucking standards.

The Kenyan Vision 2030 blue print aims at sustaining economic growth of 10.0% across time. The economic development blue print is based on 3 aspects: the economic, the social, and the political. Agriculture forms part of the Kenya's 2030 blue print and the Big Four agenda that include sufficiency of food as one of the pillar. In the agricultural sector, tea production is a popular agricultural activity contributing 4% of the country's GDP in 2017 (Kenya National Bureau of Statistics report [8]). The 2015 Sustainable Development Goals (SDGs) calls for the eradication of hunger by adopting sustainable farming activities.

The ISO 9001:2015 standard allows Kenya Tea Packers (KETEPA) to continuously produce tea products of high quality meeting statutory and regulatory standards set in the international market. According to [9], close monitoring is required for the production of quality tea. However, despite subscribing to these quality accreditation bodies, the quality of tea produced has continued to deteriorate. Poor quality of tea hinders its overall performance, since tea of low quality fetches low value in the global markets [6]).

The tea sector in Kenya is a significant contributor of Gross Domestic Product (GDP) adding an estimated 12% of the agricultural sector production to GDP. Kenya earned KES 125.25 billion from tea exports in 2015, an increase of 23% from KES 101.11 billion recorded in 2014 [10]. Earnings from the domestic market stood at K.sh 14.6 billion (representing 7% of the total production), taking the total industry earnings to KES 139.85 billion (KTDA report, 2019). Moreover, tea crop in Kenya is one of the crops that have maintained constant upward growth in most years earning the country foreign earnings.

Globally, firms are experiencing an exponential turbulent headwind environment. Learning from derivatives introduced by The Scientific Management such as TQM and Quality Control Circles, The Japanese theory of Kaizen has permeated many institutions all over the world [1]. Joint forces have been adopted across all cadres of establishments to foster notions and

ventures to establish a flexible learning organization that can endure unpredictable situations [7]. Though an abundance of fruitful projects and developments have been reported and embraced in establishments, majority of the joint forces are often temporary thus they split shortly after conceptualization to execution phases [11]. However, in some establishments, not all joint forces are disbanded; they may proceed to other projects developed by the organization [12]. Regardless of this burgeoning of teams to promote organizational progress, they are not adequately educated on major challenges they might encounter in internal processes and outcomes of a Kaizen system [10].

In Kenya, tea industry can generate up to USD 8.54 billion annually to the economy [5]. However, this is not the case in Kenya as tea quality continues to decline in the tea processing firms fetching small prices at the global markets hindering their potential performance. In 2003, using a sample of 100 cups to taste and analyze the tea quality in those cups, there were 70 outstanding cups [8]. In 2008, out of 100 sample cups tested, 55 outstanding cups met the quality standard laid. In 2015 out of the same quantity of 100 sample cups, only 45 outstanding quality cups were established. This is a clear indication that the quality of tea in the country is declining [5].

In 2019, tea farmers in Chinga Tea Factory, Kangaita Tea Factory and Michimikuru Tea Factory had their annual bonus payments dropped by more than Sh10 per kilo compared to what they earned in 2018 [8]. Slowness in implementing technological innovation in the tea sector including fermentation technological innovations, pruning technological, weighing technological and information systems is undermined the profitability of tea producing industries in Kenya, particularly the small sized tea firms including Kapkatet Tea Company, Mudete tea Factory Company and Kathangariri tea Factory Company [6].

However, the current performances of tea processing firms have been on decline in Kenya, owing to reduced quality and low production. Exportation of Kenyan tea to major global markets reduced significantly by 30 percent in 2018 compared to the preceding years of 2017 and 2016 [8]. Quality of tea is a critical determinant of tea prices in the international market, where quality tea attracts good prices

compared to low quality tea [13]. There is need to employ Kaizen systems in enhancing the efficiency of tea production and competitiveness of Kenya's tea produce globally. A necessity to undertake an equivalent research is required focusing on Kaizen systems and performance of tea producing companies in the Kenyan situation. Due to the knowledge gaps regarding impact of Kaizen Systems on performance tea producing companies, there is need to analyze quality cycles and performance of Kenyan tea producing firms.

The study was anchored on Deming's Quality Improvement Theory. Deming's Quality Improvement Theory was proposed by Deming in 1982. Deming's theorem of Total Quality Management settles upon 14 items of factual information in an organization, following The Plan, Do, Check and Act. Quality is identical to expected outcomes of task tries to the aggregated costs [14]. Deming's game plan of noteworthy data involves the System Appreciation an understanding of the process of monitoring quality [15]. By observing the several types of information related to an association, at that point, quality can be suggested as a subject [16-18].

Quality is achieved by fine-tuning processes with knowledge. The fourteen points of Deming's total quality management theory include: reliability of purpose, adoption of the new theory, discontinuing reliance on mass checks, failure to reward businesses, constant production, and improved service quality [18]. It also involves introducing a cutting-edge on job training, employing advanced leadership, eradicating fear among employees, reviewing departmental barriers, abolishing quantity-based work goals, eliminating quotas, enhancing craftsmanship, and making sure the leading management framework sustains the previous thirteen points [19]. By observing and implementing these aspects of Deming's Theory, quality tea production will be attained. Likewise, efficiency in the production of tea will be realized, expanding total output. Deming's Quality Improvement Theory guides these objectives; to determine the influence of teamwork, personal discipline, quality cycles, and whole productive maintenance systems on tea-producing firms' performance.

Quality cycles entail assembling activities that make up a process projected to achieve performance improvement [15]. Primarily,

activities in production industries involve the simplification of production procedures. The idea of quality cycles is a cornerstone of the Deming philosophy of quality management processes by aligning organizations towards their goals. Quality should not be portrayed as a programme with a definite end-point, but as a continuous process [19]. Kaizen is a frame of mind, sharing knowledge and improved product design embedded in the principles and values of an organization. It should be lived rather than imposed or tolerated.

Quality cycles in an organization's overall performance should be a permanent objective. Some of the key benefits include; performance improvement through organizational dynamic capabilities, alignment of all organizational activities, and flexibility to adopt opportunities [17]. Implementation of constant progress principle often results to a consistent organization-wide approach thus enhancing organization's performance and provide personnel with necessary skills and adequate training [20]. Also helps an organization in making constant improvement of merchandises, systems and processes on individual goals, creating objectives, and establishing measures to monitor growth while acknowledging progresses.

Service quality and product improvement involves planning, product design, production & service innovations, assessment & action, and resource procurement. Outcome is the feedback mechanism for assessing compliance of external and internal fulfillment. The underlying principle of quality cycles entails identifying and resolving work-related challenges using a variety of problem-solving tools [21]. It aims at using improvements and solutions made as new "benchmarks" in other firms. Henceforth, all improvements should be standardized to ensure efficiency. Quality cycles generate process-oriented thinking since all practices must be improved to obtain better results [11]. According to Harrington (1995) quality cycles is a major driving force that fosters growth and better quality of products.

Nath A and Dutta AK [22] conducted a study on productivity improvement of black tea production. Data was collected from 10 tea estates in different locations of upper Assam. This information was regressed using software to generate the correlation model between total and partial productivity. The correlation model contributes to mindset changes among the

management in issues such as organizational productivity. Productivity improvement of tea is critical in the tea sector. The study did not mention any aspects Kaizen in improving quality of tea produced.

Sekaran U, Bougie R [23] Did a research studying total failure mode and impacts in the tea zone. The study explored the TFMEA in the tea sector. TFMEA is without any mind boggling calculations and methods and consequently it encourages uneducated workers of the tea business to take an interest in the undertaking of accomplishing consistent quality improvement in tea producing. The paper finished up by calling attention to that real-time contextual analyses are required to be done for surveying the common sense of actualizing TFMEA program in the tea business.

Suárez-Barraza MF and Lingham T [24] did a study to see to what extent operations management practices are being undertaken focusing Kenya's tea industry. The targeted firms in this study were the 65 KTDA firms. Primary data on the project implementation was collected using a questionnaire. It was revealed that continuous improvement positively influences performance of tea processing firms. There are many other aspects that influence the quality of tea and subsequently tea performance. The aspects including teamwork, personal discipline and total productive maintenance are not included in the study.

A study on the money related impacts from ceaseless improvement adjustments [25]. The impacts from upgrades in an assembling setting are frequently clear and quantifiable, and can by and large be meant financial addition. A writing study was performed to make a comprehension of the idea of ceaseless improvement and how it is rehearsed in little to medium measured help ventures (SMSEs). The measurable examination indicated that there exist an association between constant improvement and budgetary execution. The investigation demonstrated that consistent improvement and budgetary execution were connected. Electrical contracting firms that had effectively executed the idea of persistent improvement had profited monetarily from such adjustments.

A study on the effect of constant enhancement for new item improvement inside SMEs in the Western Cape, South Africa by [26]. Organizations for the most part grasp Continuous

Improvement (CI) in their quality improvement forms. Information were selected from 40 SMEs through survey and meetings. Continuous improvement plays facilitates new product development.

A study by [27] did a study on the appraisal of consistent enhancement technique in SMEs of Northern India. Ceaseless improvement (CI) is an administration approach concentrated on accomplishing significant upgrades in a procedure through little gradual enhancements. Ceaseless enhancement technique was utilized by little to medium undertakings (SMEs) in assembling division to enhance the exhibition of their assembling framework forms. The outcomes demonstrated that the assembling undertakings are profoundly centered around client relationship for doing persistent improvement and CI approach assumes an indispensable job in improving the nature of the item.

In another study by [28] on the impacts of ceaseless improvement and advancement the executives practice a mail study was considered appropriate to research the connection between constant improvement/development the executive approaches and SME execution in Australia. Multi-thing technique was created and utilized to gauge key parts of ceaseless enhancement and advancement the executives and tried inside CIAIM system in the assembling segment. The accompanying outcomes were acquired utilizing multivariate investigation strategies: The Continuous Improvement and Innovation Management (CIAIM) system mechanism is a substantial and dependable structure for estimating and foreseeing the connection between nonstop improvement/development the board activity and SME execution. Conspicuous noteworthy indicators of greater SME execution were seen as the selection of a consistent enhancement and advancement the board procedure.

2. MATERIALS AND METHODS

Pragmatism study paradigm was adopted in this research. Pragmatism was adopted due to its inclination of allowing the researcher utilize more than one research method or technique simultaneously (Collis, J. & Hussey, R. (2014). The paradigm employs structured approaches to study population so as to ensure that the population is as representative as possible [29].

2.1 Research Design

The study employed explanatory research design. In this study, the design establishes the cause and effect linkage between performance of tea, and quality cycles. Explanatory research design is appropriate when establishing the relationship between variables. The study population was 66 tea producing companies in Kenya comprising 17 large size tea firms, 21 medium size tea firms and 28 small size medium firms.

2.2 Population

Kenya Tea Development Agency groups tea firms into three categories (large, medium and small) based on annual sales revenue of each of the tea firm. The units of observation were one operation manager from each of the tea processing firm. As a result, the study's target population was 66 operations managers. Operations managers oversee daily operations of the tea firm and thus resourceful in understanding the function of Kaizen systems in catalyzing performance of tea producing firms. The study conducted a census of all the 66 operations managers of tea producing firms that were included in the study. Operations managers' one from each of the tea processing firm filled a questionnaire. Census is more suitable in a small population hence allows a researcher to include the entire population. The tea processing companies' operations managers served as the observation unit. The research included a census of all 66 operations managers. As a result, the study included all 66 tea processing companies. Because the target population is small and thus manageable, a census of all operations managers was conducted.

The study employed structured questionnaires in collecting data. Structured questionnaires were created according to the purposes of the study. Questionnaires are suitable and efficient for vast geographical areas [30]. Structured questionnaires are suitable in measuring opinions and perceptions of persons under study. The questions in the survey were on a 5-point Likert scale. The Likert scale has been designed based on how questions are reframed in the questionnaire. Data analysis is an approach of subjecting collected data to mathematical inquiry so as to help interpret and understand the study. The quantitative data was gathered using the Likert scale questionnaire. The quantitative data

assembled from the questionnaire were analyzed using SPSS Version 23.0. Secondary data from KTDA financial reports on the performance of tea processing firms were analyzed using Microsoft excel application and presented using trend graphs.

The statistics that needed to be created included both descriptive and inferential results. The specific descriptive outcome comprised the averages and SD. Inferential included the Pearson Correlations to check the association between variables and regression approaches. The ANOVA test was employed to check the satisfactoriness of the model. The coefficients of the equation assessed the link between quality cycle and the performance of tea companies. The level of confidence to be used in this study was 95%. The particular multiple regressions equation is;

$$Y = \beta_0 + \beta X + \epsilon$$

Where;

Y = Performance of tea processing firms as the dependent variable

X = Quality cycles

ϵ = refers to the error term

In the model, β_0 = the constant value while the coefficient β_i is the slope of the coefficients showing effect of independent variable X on the dependent variable (Y). The error (ϵ) term shows the unexplained factors in the model.

3. RESULTS AND DISCUSSION

Sixty six (66) questionnaires were dispensed and 60 of them were found acceptable yielding a response rate of 90.1%. When the response rate is above 50%, it is considered as satisfactory [25,26]. Most of the tea processing firms (48.3%) were aged 31-45 years. It was also established that 25.0% of the firms were aged 46 years and above while 20.0% were aged 16-30 years. Only 6.7% of the firms were aged 15 years and below. The age of the firm may define firms' capabilities in terms of resources and innovation capacity in the efficient production of tea. This is supported by the assertion by [24] that there is an adverse as well as the convex connection between firm age and success gauged by return on properties, return on equity, or gross profit margin, recommending that more youthful companies begin to see a decline in their success from the get-go but they may come to be profitable once more at aging.

Majority 56.7% of the tea processing firms acquired the Kaizen system 3-5 years ago. It was also established that 23.3% of the tea processing firms acquired Kaizen 2 years ago while 11.7% acquired the Kaizen 6-9 years ago. Only 8.3% of the tea processing firms acquired Kaizen 10 years ago. The results imply that Kaizen process is a relatively new concept in tea production in Kenya. The Kaizen system aims to reduce waste by eliminating overproduction, improving quality, becoming more efficient, reducing idle time, and eliminating unnecessary activities. As a result, the higher the efficiency and performance, the longer the company uses the system. All of these factors add up to cost savings and the potential for profit [23].

3.1 Results of Descriptive Analysis

Quality cycles are critical component of Kaizen system in tea production. The study investigated how quality cycles influence the competitiveness of tea produce. Table 1 shows the descriptive summary statistics of quality cycles.

Majority of respondents agreed that there is continuous knowledge sharing among employees to improve quality of tea produce as shown by mean of 3.6 and SD1.1. It was agreed that creativity in tea blending is encouraged in the firm as shown by mean of 3.7 and SD 1.2. Respondents agreed that tea product design is continuously improved to meet customer's desires as shown by mean of 3.8 and SD 1.0.

Further, most respondents agreed that tea products are systematically implemented to the standards as shown by mean of 3.7 and SD 1.1. Likewise, it was established that process design

is continuously improved in order to enhance quality of tea products as indicated by mean of 3.8 and SD 1.1. Further, most tea processing firms agreed that there is periodic tea product assessment to check and monitor quality of tea produced as indicated by mean of 3.8 SD 1.0. Majority of respondents also agreed that benchmarking is done to compare quality of tea products among firms as implied by mean of 3.7 and SD 1.2. Regarding process-oriented thinking is conducted enhance process efficiency in producing tea products, majority of respondents agreed as shown by mean of 3.7 SD 1.0.

Quality of tea is a critical determinant of tea prices in the international market, where quality tea attracts good prices compared to low quality tea. Quality cycles in Kaizen systems gears toward enhancing the efficiency of tea production and competitiveness of Kenya's tea in terms of quality. Quality cycle's emphasis for precise tea plucking to ensure that quality tea is harvested for final processing. In addition, quality cycles during tea production advocates for keen observance of conditions in which tea is planted, the kind of input used, transportation, processing and subsequent packaging to ensure that tea quality is maintained for enhanced market competitiveness. A declining quality of tea results to low returns to producers and other industry players. The results agree [22] who conducted a study on productivity improvement of black tea production and indicted that quality factor is critical in the production of tea. Likewise, [27] in a study to see to what extent operations management practices are being undertaken focusing Kenya's tea industry revealed that continuous improvement positively influences performance of tea processing firms.

Table 1. Descriptive Summary Statistics on Quality cycles

Quality cycles	N	Min	Max	Mean	SD
There is continuous knowledge sharing among employees to improve quality of tea produce	60	1	5	3.6	1.1
Creativity in tea blending is encouraged in the firm	60	1	5	3.7	1.2
Tea product design is continuously improved to meet customers desires	60	1	5	3.8	1.0
Tea products are systematically implemented to the standards	60	1	5	3.7	1.1
Process design is continuously improved in order to enhance quality of tea products	60	1	5	3.8	1.1
There is periodic tea product assessment to check and monitor quality of tea produced	60	1	5	3.8	1.0
Benchmarking is done to compare quality of tea products among firms	60	1	5	3.7	1.2
Process-oriented thinking is conducted enhance process efficiency in producing tea products	60	1	5	3.7	1.0

1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree
Source: Researcher (2021)

Table 2. Descriptive Summary Statistics on Performance of Tea Processing Firms

Performance indicators	N	Min	Max	Mean	SD
Profitability of the company	60	1	5	3.8	1.1
Annual sales volume of tea sold by the company	60	1	5	3.7	1.1
Tea market prices at the auction market	60	1	5	3.9	0.9
Quality of tea produced in this company	60	1	5	3.7	1.2
The turnaround time in processing raw tea	60	1	5	3.7	1.2

1: Greatly declined; 2: declining; 3: stagnated; 4: Improved; 5: Greatly improved.
 Source: Researcher (2021)

The study investigated the performance of tea processing firms after the introduction of Kaizen system. Key performance measures were profitability, Annual sale volume of tea, tea market prices at the auction market, quality of tea produced in this company and the turnaround time in processing raw tea. Table 2 shows the descriptive summary statistics of performance of tea processing firms.

Majority of respondents agreed that profitability of the company greatly improved after introduction of Kaizen as shown by mean of 3.8 and SD1.1. It was also indicated that annual sales volume of tea sold by the company greatly improved after introduction of Kaizen as shown by mean of 3.7 and SD 1.1. The tea processing firms also indicated that tea market prices fetched good prices at the auction market as shown by mean of 3.9 and SD 0.9. Further, quality of tea produced in the company greatly improved as shown by mean of 3.7 and SD 1.2. It was also noted that the turnaround time in processing raw tea improved as shown by mean of 3.7 and SD 1.2 after introduction of Kaizen system.

3.2 Correlation Analysis

The study had sought to determine the influence of quality cycles on performance of tea processing firms in Kenya. Table 3 shows correlation matrix.

The results indicated existence of a fairly strong positive and significant association between

quality cycles and performance of tea processing firms in Kenya with (r=.431, P=0.000) at 95% confidence level. The results imply that quality cycles and performance of tea processing firms in Kenya move in the same direction, that is as level of quality cycles increases, performance of tea processing firms in Kenya also increases and vice versa. Quality of tea is a critical determinant of tea prices in the international market, where quality tea attracts good prices compared to low quality tea. Quality cycles in Kaizen systems gears toward enhancing the efficiency of tea production and competitiveness of Kenya’s tea in terms of quality. Quality cycle’s emphasis for precise tea plucking to ensure that quality tea is harvested for final processing.

In addition, quality cycles during tea production advocates for keen observance of conditions in which tea is planted, the kind of input used, transportation, processing and subsequent packaging to ensure that tea quality is maintained for enhanced market competitiveness. The results agree with [28] who conducted a study on productivity improvement of black tea production and indicted that quality factor is critical in the production of tea. Likewise, [26] in a study to see to what extent operations management practices are being undertaken focusing Kenya’s tea industry revealed that continuous improvement positively influences performance of tea processing firms. As indicated by [21], ceaseless improvement involves assortment of exercises that establish a procedure expected to accomplish execution improvement.

Table 3. Multiple correlation matrix

Variables	Performance of tea processing firms	Quality cycles
Performance of tea processing firms	Pearson Correlation 1.000 Sig. (2-tailed)	
Quality cycles	Pearson Correlation .431** Sig. (2-tailed) 0.000	1.000

** Correlation is significant at the 0.01 level (2-tailed).
 * Correlation is significant at the 0.05 level (2-tailed).
 Source: Researcher (2021)

3.3 Regression Analysis

The section presents the regression analysis of the study. Key statistical vales include model summary, analysis of variance tests and regression coefficients.

Results of regression indicated a coefficient of determination R Square of .185, R of .427^a and Adjusted R Square of 0.168 which is significant. The coefficient of determinant (R-squared) of .182 presents 18.5% of the total variation in performance of tea processing firms in Kenya is explained by quality cycles. On the other hand, the Adjusted R Square of .171 shows that quality cycles, in exclusion of constant variable, explains the changes in performance of tea processing firm by 17.1%. The remaining (81.5%) can be attributed to other factors not included in the regression model under investigation. The average deviation of the independent variable from line of the best fit is (.94002). Quality cycles in Kaizen systems gears toward enhancing the efficiency of tea production and competitiveness of Kenya's tea in terms of quality. Quality cycle's emphasis for precise tea plucking to ensure that quality tea is harvested for final processing. In addition, quality cycles during tea production

advocates for keen observance of conditions in which tea is planted, the kind of input used, transportation, processing and subsequent packaging to ensure that tea quality is maintained for enhanced market competitiveness. A declining quality of tea results to low returns to producers and other industry players.

The results indicated that the model was statistically considerable in explaining the impact of high quality cycles on performance of tea processing firms in Kenya as suggested by a p-value = 0.000; F (1, 58) =12.934. The determined p-value of.001 which is less than the critical value of 0.05 bring about the rejection of the void theory and also acceptance of the alternative hypothesis that there is no substantial partnership in between top quality cycles as well as performance of tea handling firms. Quality cycles are important in enhancing the competitiveness of Kenyans tea enhancing overall performance of tea sector.

$$\text{Performance of tea processing firms} = 1.905 + .707X_1$$

Where X_1 = Quality cycles

Table 4. Model Fitness: Quality cycles and performance of tea processing firms in Kenya

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.430 ^a	.185	.171	.94035

a. Predictors: (Constant), Quality cycles
Source: Researcher (2021)

Table 5. ANOVA: Quality cycles and performance of tea processing firms in Kenya

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.429	1	11.429	12.934	.000 ^b
	Residual	49.231	58	.884		
	Total	62.679	59			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Quality cycles
Source: Researcher (2021)

Table 6. Regression Coefficient: Quality cycles and performance of tea processing firms in Kenya

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.905	.569		3.351	.001
	Quality cycles	.707	.197	.427	3.596	.001

a. Dependent Variable: Firm performance
Source: Researcher (2021)

The regression coefficient results indicated that quality cycles positively and significantly affects performance of tea processing firms in Kenya ($\beta=.707$, $p=0.001$). The coefficient results denote that a unit change in quality cycles results to an increase in performance of tea processing firms in Kenya by .707 units. Quality of tea is a critical determinant of tea prices in the international market, where quality tea attracts good prices compared to low quality tea. Quality cycles in Kaizen systems gears toward enhancing the efficiency of tea production and competitiveness of Kenya's tea in terms of quality.

3.4 Hypothesis Testing

H₀: There is no significant relationship between quality cycles and performance of tea processing firms in Kenya.

The hypothesis was tested using multiple linear regressions. The decision to either approve or reject the null hypothesis was based upon the t statistics value. If the calculated t value is greater than the vital t stats value of 1.96 after that H₀ is rejected however if it is less than 1.96 after that H₀ is not turned down. As a result, the null hypothesis was that there is no substantial partnership between high-quality cycles and the performance of tea handling firms in Kenya. Results suggested the t statistical value was $2.308 > 1.96$. The null hypothesis was as a result rejected. The study took on the alternative hypothesis that there is a statistically substantial positive partnership between top quality cycles as well as the performance of tea handling companies in Kenya.

4. CONCLUSION

Based on the findings, the study concludes that quality cycles are critically important in the production of tea. The optimal production and competitiveness of the tea crop depends on the aspect of quality. Quality of tea is a critical determinant of tea prices in the international market, where quality tea attracts good prices compared to low quality tea. Quality cycles generate process-oriented thinking since all practices must be improved to obtain better results and is a major driving force that fosters growth and better quality of products. Quality cycles thus are geared towards minimizing cost of tea production by improving efficiency and enhancing quality of tea. Quality cycle's emphasis for precise tea plucking to ensure that quality tea is harvested for final processing. A

declining quality of tea results to low returns to producers and other industry players.

The study found that quality cycles influence the quality of tea and hence its competitiveness in the market. There is need for introduction of useful standards in the tea industry is necessary. Standards should be jointly agreed between factories/farmers and be locally appropriate covering issues of tea quality and productivity. These tea quality standards need to be reviewed periodically to ensure that they are consistent with the market level of quality standards. In addition, the tea processing firms should continuously train quality standards personnel to ensure that they are acquainted with market desires. Moreover, tea processing firms should work in coordination with quality standards bodies including Kenya Bureau of Standards, food Safety management systems among others to enhance production of quality tea.

The policy implication of these scenarios toward Kenya Tea Development Agency, Ministry of Education Through technical training and vocational institutes, Ministry of Science and technology and workers union in the tea sector need to formulate continuous educational and training programmes to ensure that workers are trained on Kaizen use. The Kenyan Government also needs to offer incentives for tea industries to be able to acquire technological equipment at affordable costs by creating subsidies on equipment and machine targeting tea production. Technological innovation is aimed at improving the tea quality leading to better prices.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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