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## **Influence of Equipment/Object Technology Transfer on the Growth of Micro and Small Catering Enterprises in Nairobi County , Kenya**

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### **Abstract**

Technology transfer usually involves some source of technology group which possess specialized technical skills which transfers the technology to a target group of receptors who do not possess those specialized technical skills and who, therefore, cannot create the tool themselves. Micro and Small Enterprises (MSEs) need to be strengthened and developed so that the income they generate can support transition in terms of enterprise growth. Over the years, Catering MSEs have shifted from the old traditional methods of operation through the transfer of technology. Therefore this research was carried out so as to avail information on the influence of technology transfer to the growth of Catering MSE's. The research gathered information on the influence of technology transfer of production skills, knowledge on the growth of MSEs in terms of output, sales volume, profit and assets within the catering sector in the hospitality industry in Nairobi County. The study was conducted using survey method of data collection with both qualitative and quantitative approach. There was a total population of 11,162 licensed Catering MSEs in Nairobi County. A total of 384 respondents were picked through random sampling. Data was collected using a questionnaire with both closed and open ended questions. Interview guide was used in carrying out interviews.

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The data obtained in the study was analyzed using descriptive statistics such as means, frequencies and standard deviation. Inferential statistics used in the study included correlation and multiple regressions in order to determine the relation between the independent and dependent variables. Correlation technique was used in the study to analyze the degree of relationship between the independent and dependent variables while logit regression analysis was used to determine the effect of technology transfer on knowledge. Data was also subjected to factor analysis. The Binomial Logistic Regression was also used to analyze the data. Statistical package for social sciences (SPSS) Version 22 was used to run the data. Data were presented by use of frequency distribution tables, bar graphs and pie charts. The study established that transfer of production skills, equipment, knowledge and processes leads to the growth of micro and small catering enterprises in Nairobi County. Growth was measured in form of profit margin, increase in employees, increase in customers, enlargement in firm size and enhancement in quality of products and services. The study concluded that technology transfer of knowledge had an influence on the growth of micro and small catering enterprises. The study recommendations were: inclusion of more females in micro and small catering enterprises where the government offers incentives to female entrepreneurs through waiver of business license fees, government should initiate special capitation through budgetary allocations to cushion micro and small catering enterprises from collapse due to financial constraints and all firms should be encouraged to adopt the new and latest technology transfer in their businesses.

**Keywords:** Cook- Chill; Cook-Freeze; Vacuum Cooking; MSEs.

## **1. Introduction**

In Kenya, the small business sector has both the potential and the historic task of bringing millions of people from the survivalist level including the informal economy to the mainstream economy. Recognizing the critical role small businesses play in the Kenya economy, the government through Kenya Vision 2030 envisages the strengthening of MSMEs to become the key industries of tomorrow by improving their productivity and innovation [1].

The vast majority of developed and developing countries rely on dynamism, resourcefulness and risk taking of micro and small enterprises to trigger and sustain the process of economic growth [2]. Micro and small enterprises (MSEs) that have invested in new technology have experienced marked growth in terms of customers and profits. Technology transfer has been used to refer to movements of technology from the laboratory to industry, developed to developing countries, or from one application to another domain [3]. The transfer is both visible and invisible depending on the mode. The movement may involve physical assets, know-how, and technical knowledge [4].

### **1.1 Micro and small enterprises**

Ever since the subject of MSEs was first introduced by International Labor Organization (ILO) mission [5]. to Kenya, micro and small Enterprise development has emerged as an important factor in economic growth particularly its potential in reducing the current unemployment crisis [6]. Findings from the 1999 MSEs

Baseline Survey (CBS) [7]. showed that there were a total of 1.3 million enterprises employing some 2.4 million people and contributed over 75 % of all new jobs created in the country. The sector has continued to play an important role in Kenya's economy with a contribution to the Gross Domestic Product (GDP) increasing from 13.8% in 1993 to about 20% in 2007. In addition, the MSEs contributed over 57% of the new jobs created in 2005/2006 (2007) and 79.8% of total employment in 2008[8]. .The impact of MSEs is felt in the greater utilization of local raw materials, employment generation, encouragement of rural development, development of entrepreneurship, mobilization of local savings, linkages with bigger industries, provision of regional balance by spreading investments more evenly, provision of avenue for self-employment and provision of opportunity for training managers and semi-skilled workers[9].

### ***1.2 Micro and small enterprise growth***

Over the years the majority MSEs have grown gradually due to technology transfer of production skills, equipment, knowledge and processes. Evenson and Westphal [10] define enterprise growth as a development process of enterprise from small to big and from weak to strong. Enterprise growth is the development process where enterprises keep the tendencies of balanced and stable growth of total performance level (including output, sales volume, profit and asset gross) or keeps realizing the large enhancement of total performance and the stage spanning of development quality and level.

The increase of quantity is embodied in the extension of enterprise scale such as the increases of sales volume, market share, production value, profit and employee. The growth of quality is embodied in the enhancement of enterprise quality, which includes the technological innovation ability from immature to mature production technology, the optimal efficiency of investment and output, the organizational innovation and **reform [11]**.

### ***1.3 Micro and small catering enterprise growth***

The MSEs in the Catering sector are found within the hospitality industry and provide food, drink and accommodation to the customers. This is an industry that has its own products and markets, technology and production methods where the entrepreneur combines production and sales under one roof. Different ethnic groups in Kenya have their traditional dishes. Fish and "ugali"( Staple food for the Dholuo tribe in Kenya made with maize flour cooked in hot water and eaten with fish and green vegetables) are associated with the Dholuo tribe, "pilau" and "biriani"( Stable foods for the Swahili people found at the coast in Kenya made with rice as the basic ingredient). The difference in the two dishes is the herbs and the spices added,"irio" (Staple food for the Kikuyu ethnic group in Kenya made with maize and beans and mashed with potatoes and green vegetables).and githeri (Stable food for the Kikuyu tribe in Kenya made with maize and beans boiled in hot water), chicken and "ugali" with the Luhyas while "muthokoi" (Stable food for the Akamba tribe in Kenya made with traditionally broken maize) is associated with the Akamba tribe.

It is evident that MSE entrepreneurs have moved from the traditional methods of production and service to modern and better methods of production through technology transfer. Technology transfer has had a positive effect on the growth of MSEs within the catering sector. However; little information on the effect of technology

transfer is available to these entrepreneurs. This study was carried out on MSEs in Nairobi so as to avail the much needed information to the entrepreneurs and the policy makers on the effect of technology transfer of production skills, equipment, knowledge and processes on growth. For an enterprise to grow methods of production must be improved through skill acquisition. Equipment and objects must be improved through technology transfer for maximum output. New and faster equipment must be used for maximum output.

The human resource need to be improved in terms of training for better and more advanced and appropriate skills. The technology embedded in both small and large equipment need to be appropriate for better and faster production. Indigenous technology need to be improved through the transfer of technology for competitive advantage. MSEs have moved from the old traditional methods of production and have transferred technology to the enterprises and it is important that a scientific research be carried out to find out the effect of this and avail the much needed information.

#### ***1.4 Micro and small enterprise growth in kenya***

The significance of Kenya's MSEs activity has continued to grow since the sector was first brought in to the limelight in 1972. In a report by the International labor organization (ILO) [5] on Employment Income and Equity in Kenya, the report underscored the sector's critical role in promoting growth in incomes and employment [5].

#### ***1.5 Technology transfer***

Cohen [12] describes in his book "the transfer process of technology to developing countries" that technology can be categorized into four forms as follows: technology as general theoretical and practical understanding of how to do things (know-how or information); technology as objects (goods or tools); technology as installed techniques of productions (processes). Cohen [12] defines technology as the systematic knowledge of technique. This technique, as the interactions of person/tool/machine/object, defines a way of doing a particular task. Cohen [12] defines technology as a combination of people, materials, cognitive and physical processes, plant, equipment and tools.

#### ***1.6 Technology transfer and micro and small enterprise growth.***

In a report presented by KIRDI [13] for Kenya to industrialize and become competitive, it requires affordable, efficient and clean technologies and efforts to provide technologies to promote MSEs and increase their productivity, promote manufacturing, value addition and promote export oriented industries. According to the Journal of Small Business Management [14] enterprise growth includes two aspects at least. The first aspect is the survival ability of enterprise. In the intensive market competition, the base of sustainable growth for enterprise is the survival ability of enterprise, and the generation of survival ability depends on the new technology, new product and new originality possessed by the enterprise when it is founded, which can make the enterprise to possess future wider space for competition advantage.

The second aspect is the sustainable development ability of an enterprise. After the generation period, the

enterprise survives in the market in virtue of its special survival ability, and whether the enterprise faces favorable circumstance or adversity, it can possess the sustainable development ability to exceed itself and keep developing [14].

### ***1.7 Equipment/ object technology***

The import of capital goods and machinery is among the major modes of technology transfer for building industrial infrastructure and strengthening the recipient country's technological capability. This channel of technology transfer which is used by many LDCs particularly the East Asian Newly Industrialized Countries (NICs) assisted these countries in accessing the advanced technologies embodied in the machinery and equipment. However, the success of this method of technology transfer in the development of the recipient country's local technological capability relies on the level of industrial development together with the degree of technical and managerial expertise and its absorptive capacity [9]

According to the World Applied Science Journal 12 [15], those individuals or new establishments who are interested in endeavoring into the catering businesses need to consider to at least getting some of the useful technological equipment or machineries in their plants. However, as it involves high cost, thorough or careful planning should be undertaken by the owner or a responsible manager before any technological equipment can be purchased. This can be done through a rigorous investigation and cross referencing with those companies who already use such equipment [15]

Liddle [16] notes that some of catering commissary establishments thought that the tools and technology in the restaurant industry is limited to basic appliances and tools without realizing some complex equipment used. Grimes [17] claims that some advanced features have integrated on the kitchen appliances such as timers and digital temperature gauges, timers or inaccurate temperature dials. Liddle [16] reported that many restaurants and food service operations have rapidly adopted the point-of-sale technologies or POS system to increase the overall convenience of the dining experience and technologies improving the restaurant operation as well as increased the repeat business.

The Technology Atlas Team [18] identifies Object-embodied technology which can be called "Techno-ware" and consists of tools, equipment, machines, vehicles, and physical facilities as one of the components of technology. The increases in customers demand and volumes of production have led many commissary food establishments in Kenya to adopt technology.

Blast chillers, freezers, steam jacketed kettle tilting skillets are among examples of equipment that involve technological advancement in the sector to provide healthy meal options to the customers. Means of technology transfer include acquisition of capital equipment and machinery through trade, licensing (and/or franchising or distribution) agreements through which skills, ideas and technical information are transferred and through the movement of experts and skilled labor [16]. According to David et al., [19], production and service equipment in these enterprises include large equipment such as ranges, steamers, boiling pans, fish fryers, sinks and tables, mechanical equipment such as peelers, mincers, mixers, refrigerators dishwashers, utensils and small equipment

such as pots, pans, whisks bowls and spoons.

Benner and Veloso [20] contended that the implementation of technology in commissary food service establishments is closely associated with the increased in productivity, quality, safety as well as hygiene and cleanliness. Rodgers [21] further noted that the application of technological cooking equipment and preparation techniques have tremendously increased the food production

A loaf of bread that has been portioned with the use of mechanical equipment gives more portions than one that has been portioned manually. Ikiara et al., [22] defines technology as the integration of the physical objects or artifacts, the process of making the objects and the meaning associated with the physical objects.

The latest definition given by Mascus [23] has broadened the concept of technology where technology is defined as 'the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, and means of finance, marketing methods or any of its combination.

From the systems perspective Afriyie [24] defines technology as encompassing the basic knowledge sub-system; the technical support system (software); and the capital-embodied technology (hardware). Studies done by the researchers have offered various definitions and concepts of technology from different disciplines, contexts and perspectives. These are physical objects which maybe tools, machines and consumer products, A developing country can implement embodied technological change (ETC) through the importation of "mature" machineries (including second-hand capital goods from more industrialized countries[25] . On the other hand, a late starter DC can enjoy the "last comer" benefit of jumping directly on a relatively new technology [26].

According to a Food Standards Agency Publication [27], cooking equipment provides the backbone of any busy catering operation. It is the key to catering success and quality. It controls the most critical steps in the food production process. Technology transfer in the catering sector has made it possible to have high technology refrigerators, equipment that are environment conscious in terms of energy conservation, combination ovens, more decorative units, greater economy of water , better ventilation and more mechanized automated use of combination machines [27].

Today the trend is towards self-diagnostic equipment and automated service. In order to maximize the use of equipment and to maintain high levels of output and viability food production systems such as cook-chill, cook-freeze and sous- vide have been introduced in certain areas of catering. The production systems come in the form of centralized production using the skilled staff available to cook in bulk and then to distribute to finishing kitchens, which are smaller in size, employing semi-skilled and unskilled labor [27].

A growing range of kitchen equipment from cookers and refrigerated storage to large ware housing systems come with onboard computer control and several products can additionally be specified with extra hardware and software to permit continuous monitoring of the main equipment functions. Some appliances can also be specified with a two way interactive link, enabling programme subject to frequent change (such as recipes) to be downloaded to the appliance from the computer directly via cable or wireless hook up, or via modern

connection to the internet. The temperature monitoring of all refrigerators and freezers within the establishment can be linked to a computer system. Several temperature readings are sent to the computer each day and it can record temperature highs and lows, and any unusual trends. Any temperatures outside the specified limits will be highlighted [28].

Catering enterprises have moved from traditional production using traditional production equipment to more technology packed methods. Traditional pots have now been replaced by pressurized cookers; firewood has been replaced by gas and steam and electric cookers that are faster and more efficient. Technology embodied in objects and equipment has made it possible to serve more customers over long periods of time by using micro waves and food warmers to maintain food temperatures.

### **3. Research methodology**

#### ***3.1 Introduction***

The purpose of this study was to investigate the influence of technology transfer on the growth of catering MSEs in Nairobi, Kenya. The study was carried out in Nairobi County- Kenya. This section outlines the research design, the target population for the study, sample, sampling frame, and the research instruments that were used. The section also describes how pilot testing validity and reliability and data analysis were carried out.

#### ***3.2 Research design***

According to Kothari [29] the research design constitutes the blueprint for the collection, measurement and analysis of data. In other words, it is a master plan specifying the methods and procedures for collecting and analyzing the needed information. It ensures that the study would be relevant to the problem and that it uses economical procedures in collection and analysis of data. The descriptive research design was used for this study among the catering MSEs in Catering in Nairobi County, Kenya to establish the influence of technology transfer on their growth. The researcher carried out survey method of data collection from a sampled population. The researcher gathered information and the respondent's opinions, experiences and feelings on the influence of technology transfer on the enterprises where they work. More often than not the data was in qualitative form which was coded into categories for analysis. In this study, a combination of qualitative and quantitative approaches of doing research was used as recommended by Creswell [30]. It was therefore a mixed research design.

The subject of analysis was micro and small catering enterprises in Nairobi County, Kenya. The study was designed to collect both quantitative and qualitative data from entrepreneurs who own, finance and manage micro and small catering enterprises. This enabled the researcher establish whether the postulated determinants (equipment) technology transfer had influenced their growth.

A Quantitative research approach is a systematic investigation of scientific mathematical properties and their relationships [31]. This research approach involved the testing of the hypothesis that technology transfer

influences the growth of MSEs within the catering sector. The measurements were quantitative and later analyzed using statistical techniques. According to Mugenda and Mugenda [32] quantitative approach focuses on designs, techniques and measures and produce numerical discrete data or quantifiable data. The research employed a mixed model approach whereby it combined both qualitative and quantitative data collection approaches. It was necessary to use this approach as it increased the statistical reliability of the results [29]. This model approach also made it possible for the researcher to infer to the micro and small catering enterprises.

A Qualitative approach refers to the in-depth investigation and is more descriptive than numerical was also used in this study [33] Qualitative approach on the other hand involved the interpretation of phenomena without depending on numerical measurements or statistical methods. It was mainly concerned with observing, listening and interpretation of phenomena. The use of both qualitative and quantitative data approaches reinforces each other [34]. Interviews were conducted on one-to-one basis which allowed for interaction with the respondents during data collection and made it possible for clarification of any unclear issues. The qualitative data collected using questionnaires, interviews so that the analysis and reporting was narrative. In this study, qualitative data was quantified by converting it into numerical codes and then analyzed statistically. Therefore the descriptive study describes the phenomena as it is [33]. This design was the most suitable for this study because the determinants were studied in the field without manipulation.

### ***3.3 Target population***

The population for this investigation was small scale entrepreneurs in the catering sector within the hospitality industry Nairobi County. The Nairobi Central Business District is defined by the Nairobi Central Business District Association (NCBDA) which is a registered society under the Societies Act (Cap 108) and was formed in May 1997 as a rectangular shape, around the Uhuru Highway, Haille Selassie Avenue, Moi Avenue and University Way. According to the Daily Nation of 25th March, 2013, Kenya has shown tremendous economic growth over the past ten years which has increased in industries in Nairobi Central Business District. As a result the labor force population has gone up. Catering MSEs which provide food and drinks to the labor force have also increased in number over the past ten years.

The study target population included Medium Restaurant with bar/Membership club, Small Restaurant with bar/Membership club. These two categories are basically the same as both of them serve all types of meals which include lunches and dinners to their customers. The only variation is the size and therefore the number of customers served which also determine the number of employees.

In Mega eating houses, Snack Bar, Tea House "Hotel", Medium eating House, Snack Bar Tea House "Hotel", Small eating House, Snack bar, Tea House. These three categories are basically the same as they offer a limited choice of popular foods and snacks at a reasonable price with little or no waiting time. The foods or snacks can be consumed on the premises or purchased over the counter and taken away to be eaten elsewhere. Tea and coffee are available for customers as accompaniments. The only variation is the size and therefore the number of customers served which also determines the number of employees.



The sixth category is “Other Catering and Accommodation” in Nairobi Central Business District. This category includes catering concerns that undertake freelance catering as a business. Outside catering for functions, Schools and hospitals and any other enterprise are in this category. All the items in the field of enquiry constitute the “universe” or population [28].

### ***3.4 Sampling frame***

There was a total of eleven thousand, one hundred and sixty two (11,162) licensed micro and small catering enterprises in Nairobi in 2014/2015. According to Mugenda & Mugenda [35]. Stratified random sampling helps the researcher achieve the desired representation of various sub –groups in the population. The total population embraced six categories of different sizes therefore the frame was organized by the six categories into separate strata. The researcher chose this method so as to have existing sub-groups fairly and randomly represented within the sample. The method also ensured that every group in each category was proportionally represented.

**Table 3.1:** total licensed micro and small catering enterprises in nairobi.

Code	Strata	Total
543	Medium Restaurant with bar/Membership club	1,234
546	Small Restaurant with bar/Membership club	1,327
549	Mega eating house, Snack Bar, Tea House “Hotel”	667
552	Medium eating House, Snack Bar Tea House “Hotel”	1,445
555	Small eating House, Snack bar, Tea House	5,673
595	Other Catering and Accommodation	776
Total		11,162

Source: Nairobi County (August, 2014).

### ***3.5 Sampling technique and sample size***

#### ***3.5.1 Sampling technique***

Enterprise owners from the stratum samples provided the information for the study. Stratified simple Random sampling method was used in the selection of the samples. Since all probability samples must provide a known nonzero probability of selection for each population element, the stratified simple random sampling is considered a special case in which each population element has a proportional and equal chance of selection; it

ensures that every population representative has an equal chance of being represented [32].

The researcher used simple random sampling which had no complexities involved. All you need is a relatively small, clearly defined population. According to Kombo and Tramp [34] a researcher may simply obtain a list of the whole population and then use a sequence of numbers from random numbers table (or draws of a hat, flips of a coin), selects 10% or 20% or some portion of names on that list, making sure he/she is not drawing from any letter of the alphabet more heavily than others. The researcher obtained stratum sample sizes by first obtaining a full list of all the members of the population for each of the six strata. The researcher did this to ensure that data is obtained from enterprises that have embraced Technology Transfer in their day to day operations.

Purposive Sampling was also used for this study. According to Maina [35] the purposive sampling technique allows the researcher to use cases that have the required information with respect to the objectives of the study. The researcher on this basis identified Catering MSEs that had embraced technology transfer in their operations. One enterprise was picked from each of the six strata through purposeful sampling. Managers were then given questionnaires to complete.

### 3.5.2 Sample size

According to Mugenda and Mugenda [32] when the population size is more than 10,000 the sample size n is calculated as follows:

$$n = \frac{z^2 pq}{d^2}$$

n= desired sample size

z=standard normal deviate at the required confidence level.

p= the proportion in the target population estimated to have the characteristics being measured.

q = 1-p

d=level of statistical significance set

$$n = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384$$

The total sample size calculated from the total population will therefore be Three hundred and eighty four catering MSEs.

Formula for calculating the stratum sample size.

$$ns = n \times ps \quad ns = 384 \times \frac{x}{11162}$$

Where ns= Stratum sample size

n=size sample

$$ps = \frac{\text{Total number of MSEs in stratum}}{\text{Total MSEs in the target group}}$$

Total sample for the whole population was 384

**Table 3.2:** Total licensed catering MSEs Stratum and sample sizes in Nairobi.

Code	Stratum	Population	Sample size
543:	Medium Restaurant with bar/Membership club	1,234	43
546:	Small Restaurant with bar/Membership club	1,327	46
549:	Mega eating house, Snack Bar, Tea House “Hotel”	667	23
552:	Medium eating House, Snack Bar Tea House “Hotel”	1,445	50
555:	Small eating House, Snack bar, Tea House	5,673	195
595:	Other Catering and Accommodation	776	27
	Total	11,162	384

The stratum sample sizes have been rounded to obtain whole figures.

### 3.6 Data collection instruments

Secondary and primary data were required for this research. Secondary data was obtained from online, print-outs, journals, websites, books, articles and through communication with experts through the mobile phone technology. Primary data was obtained from owners of MSEs through self-administered survey method of data collection. The following instruments were used as testing devices.

Questionnaires were the main instrument of data collection. According to Mugenda and Mugenda, [32], questionnaires are used to obtain important information about the population. Each question in the questionnaire was developed to address a specific objective, research question or objective of the study. Questionnaires were prepared for use in the sampled catering enterprises.

The questions for the interview were both structured and unstructured. Structured questions with a list of all possible alternatives from which respondents selected the answers that best described their situations were used. They were then administered for completion by enterprise owners. Questionnaires detailing all the variables of the study with open spaces for comments were used for the study. In order to yield qualitative data, open ended questions were also used.

An interview guide was used in this study as it was flexible and enabled the researcher to collect large amounts of information that would otherwise not have been available. According to Mugenda and Mugenda [32] a study can use both structured interview guides and unstructured interview guides. According to Maina [36] a trained interviewer can hold the respondents attention and can also clarify a few issues during the interview. An interview schedule ensured that standard data was obtained from all the Catering MSEs within the sample. All the Catering MSEs owners/managers who were the respondents of this study were booked by telephone for interview appointments in advance. Interviews were conducted in person at an agreed time where an appropriate venue within the micro and small catering enterprise was identified and used for the interview.

A training session was organized on 20th April, 2015 for the assistants on data collection before they proceeded to the field on 2<sup>nd</sup> May, 2015. The research instruments were then pre-tested and adjusted accordingly. The data collection exercise commenced on 8<sup>th</sup> May, 2015 until 30<sup>th</sup> July, 2015. The researcher followed up the assistants closely during this period for feedback and co-ordination to ensure that the exercise went on as planned. Twenty respondents from the population completed the questionnaires for the purpose of pilot testing. The data collected each day was stored appropriately awaiting analysis.

### 3.6.1 Margin of error

According to Mugenda and Mugenda [32] the margin of error is the statistical concept which expresses the discrepancy between the characteristics of the population and the characteristics of the sample, although the sample is drawn from that population. The Confidence level for this study was 95 percent (0.95). According to Saunders *et al.*, [33] if any sample is selected 100 times at least 95 percent of the samples would represent the characteristics of the population. The margin of error for the study was therefore 5 percent (0.05). The standard normal deviate at 95 percent is 1.96 (Z value) as shown in Table 3.2.

**Table 3.3:** Levels of confidence associated with values

Level of confidence	Z value
90% certain	1.65
95% certain	1.96
99% certain	2.57

Source: [33]

### **3.7 Pilot test**

Pilot testing was done on the research tools in order to take note of any ambiguity so as to refine the research instruments. The researcher administered a set of structured and unstructured questionnaires through pilot study so as to appraise the questionnaire appropriateness and to be able to estimate the time required for the study. Fleiss [37] asserts that it is imperative that instruments for data collection be as accurate as possible. This enabled the researcher to refine, redesign and re-write the questionnaire where it was necessary with the help of peers who have in-depth knowledge in statistics. The interview guide was adjusted to ensure that all the required information was captured.

#### **3.7.1 Reliability**

This is a measure of the degree to which a research instrument yields consistent results after repeated measurements are taken of the same subjects under similar conditions [38]. In this study, reliability of the research instrument was tested using the split half design. Mugenda and Mugenda [32] observe that this design requires a single testing and has the advantage of eliminating chance error due to differing conditions. The following was done as outlined by Mugenda and Mugenda [32]. Items from the domain of indicators that measure a given variable, for instance higher income, are sampled. The instrument is then administered to the pilot group. The split half model then splits the scale into two parts into which the responses are assigned randomly and the correlation between the two parts is examined. This yields Cronbach Coefficient Alpha for each half. The average is taken to measure reliability of the instrument [39].

#### **3.7.2 Validity**

This refers to the extent to which the research design and the data that it yields allows the researcher to draw accurate conclusions [40]. To ensure internal validity, especially when qualitative approaches are used, triangulation of the methods of data collection is recommended [40]. In this study triangulation method of data collection methods (questionnaires and interview schedules) were used.

Principal component factor analysis was used prior to undertaking multiple regression analysis in order to establish the few independent variables with the strongest effect on enterprise growth from among the X1-X5 variables. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of Sphericity was carried out before factor analysis. Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. An identity matrix is that in which all of the diagonal elements are 1 and all of diagonal elements are 0. For the KMO, usually a value of 0.6 is a suggested minimum [41]. On the other hand if The Null Hypothesis that the Correlation matrix is an identity matrix was accepted, the sample data was not good for factor analysis.

#### **3.7.3 Common method bias**

According to Creswell [30] Common Method Bias refers to the degree to which correlations are altered (inflated) due to a methods effect. In this study, bias may occur if the respondents are required to respond to the

questionnaires simultaneously. The researcher designed different questionnaires for the dependent and independent variables of the study. These were administered at different times. The researcher ensured prolonged engagement with the respondents within the Catering MSEs to check for any misinformation that may stem from the researcher or instrumentation and made decisions about what is salient and relevant to the study. The research instruments were also varied so as to minimize the Common Method Bias in the study.

### ***3.8 Data collection procedure and analysis***

#### ***3.8.1 Data collection procedure***

The document analysis checklist was used to collect secondary data from micro and small catering enterprises, while questionnaires were used for collecting primary data. Secondary data constitute information from already written sources. The researcher read several documents and recorded the data from them on the Document Analysis Checklist to assist in review of related literature and also to enrich and/or verifying the primary data during the compiling of the report. Primary data was gathered from respondents of various MSEs in the field after obtaining the Research Permit from National Commission for Science, Technology and Innovation. The researcher also developed the work plan and pre-tested the instruments through a pilot study (pilot run) was carried out in one firm in each of the six categories). It was also necessary to prepare enough copies of the instruments (questionnaires) ready for distribution.

The researcher visited the sampled 384 micro and small catering enterprises in Nairobi County and administered the questionnaires to the enterprise owners, after establishing a rapport with each of them and explaining the purpose of the study and assuring them that the information they gave was confidential. This ensured a high response rate from the respondents. Data for this research was obtained from the 280 enterprise owners. Enough time was allowed to fill the questionnaires and after one week, they were collected. Cooper [31] asserts that one of the ways to maximize questionnaires response as well as the return rate is by sending a preliminary notification about the questionnaires, and writing passionate requests for cooperation by the respondents.

The researcher obtained an introductory and authorization letter to carry out the research from the university (JKUAT). To this end the researcher made passionate appeals for respondents to cooperate by filling the questionnaires and then alerting the researcher for collection. In some cases the researcher had to travel to the establishments more than once to pick the questionnaires from respondents who begged for more time to complete the questionnaires or needed another appointment for the interview.

Once all the questionnaires were picked, the researcher was guided by the following order in processing and analyzing the data as presented by Creswell [30]. Sorting and arranging the data into different types depending on sources of information after which the researcher read through all the data to obtain a general sense of all the information obtained. A Codebook was then developed for data coding based on the research variables.

According to Mugenda and Mugenda [32] data must be converted to numerical codes representing attributes or measurements of the variables for analysis. One numerical code was assigned to each independent variable and each dependent variable. Enterprise growth was measured in terms size, age since inception, turnover, profit

margins, output, quality, customer base and efficiency in relation to technology transfer of production skills, equipment knowledge and processes. The researcher used the code book to transfer the numerical numbers representing the responses from the questionnaires.

### **3.8.2 Data processing and analysis**

The nominal and ordinal data were collected using questionnaires and quantified from the qualitative data and was subjected to quantitative analysis applying descriptive and inferential statistics in line with the four research objectives. Descriptive statistics was used to describe the population characteristics numerically and hence more precisely in accordance with Saunders *et al.*, [33]. The Inferential statistical analysis of the results were done to determine whether or not there is a statistical relationship established between growth (the dependent variable) and the independent variables on the basis of the research questions. Quantitative data obtained from the questionnaire was analyzed using statistical package for social scientists (SPSS) software package version 22. Qualitatively, thematic analysis, categories and patterns were used in interpretation of data. Graphs, charts and tables were used to present descriptive data analysis results. Descriptive statistics such as measures of central tendency was used to describe levels of dispersion. The relationship between independent variable(s) Technology Transfer and the Dependent variable (Enterprise growth) as per the findings of this study was determined based on hypothesis testing and regression analysis.

Correlation analysis was done to establish the relationship between the variables. Correlation analysis measures the extent of interdependence where two variables are lineally related [42]. If variables are correlated then a change in one variable is accompanied by a proportionate change in another variable. If variables are independent  $r = 0$ , if dependent then  $r = 1$ . If the value of R is close to 1 then it shows a strong correlation between the variables. If the value of R is close to 0 then it shows the association is weak [42].

Analysis of Variance (ANOVA) was used in this study as it allows for test of significant difference in two or more groups. The test was also used in the study to measure variations within the groups.

The study used the Logistic (or Logit) regression to establish the effects of the independent variables to enterprise growth. According to Mugenda [32] this method of analysis is a statistical procedure where the dependent variable is measured at the nominal or ordinal levels with only two response categories such as yes or no. The equation being  $\text{Log}\left(\frac{p}{1-p}\right)$ . In this study, the researcher used the above equation as the logistic transformation of the probability P, written as Logit (P) short for logistic unit. The counted proportion P only lied between 1 and 0 to predict how the technology transfer of production skills, equipment, knowledge and processes have affected the growth of catering MSEs in Kenya.

The logit of a number p between 0 and 1 is given by the formula:

$$\text{logit}(p) = \log\left(\frac{p}{1-p}\right) = \log(p) - \log(1-p) = -\log\left(\frac{1}{p} - 1\right).$$

$$\text{Logit (Growth)} = \beta_0 + \beta_1 \text{Production skills} + \beta_2 \text{Equipment} + \beta_3 \text{Knowledge} + \beta_4 \text{Process}$$

Where,  $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$  are model parameters

According to Mugenda [32] qualitative research generates voluminous amounts of data that can sometimes be overwhelming to the researcher. The data therefore needed to be carefully organized and analyzed to answer the research questions. The chi-square test was used to determine whether an independent variable is a factor influencing the dependent variable or not [32]. This test was used for each of the independent variable over the dependent variable. The model was fitted on the basis of the explanatory variables determined by inferential statistics. Qualitative analytic reasoning process was used to interpret and structure the meanings that could be derived from the data.

### ***3.9 Summary of the methods of testing the hypothesis***

The logit regression model was used in predicting P, which was determined by the independent variables.

The general hypothesis to be tested was;

Ho: Technology transfer has no statistical significant influence on enterprise growth) .

Vs

Hi: Technology transfer has a statistically significant influence on enterprise growth.

If the P value associated with the above test is  $< 0.05$ , the Ho was accepted. The Xi was considered to have significance on Y. If the P value associated with this test was above .05, the Ho was rejected.

### ***3.10 Measurement of the independent variables***

The influence of the five independent variables was measured against the production and service output, production and service quality, efficiency of production and service, employee satisfaction, customer volume, enterprise profits and the size of the enterprise.

### ***3.11 Measuring of the dependent variable***

When researching factors affecting growth it was necessary to first define how firm growth and growth would be measured. Various indicators are used to measure growth and there doesn't seem to be any general measurement. Measuring sales growth and relative employment growth during a specific time period are the most common indicators used. Indicators such as assets, market share, profits and output are also commonly used, however not as commonly as sales and employment. Output and market share vary greatly within industries and is therefore hard to compare, total assets also depends on the industry's capital intensity and changes over time and profits is not that relevant unless measuring size over a long period of time. Therefore sales and employment are the two most important indicators measuring firm's size and growth. Employment



numbers is also a measure that is easily accessible, since it is an important figure for governments. Sales figures are on the other hand affected by inflation and exchange rates and it is difficult to compare sales figures between industries. That is why it is important to use multiple growth indicators to study firm growth [43].

According to Evenson and Westphal [10] enterprise growth is the development process where enterprises keep the tendencies of balanced and stable growth of total performance level (including output, sales volume, profit and asset gross) or keeps realizing the large enhancement of total performance and the stage spanning of development quality and level. In this study growth was measured against the total performance in the speed of output where more units are produced and more customers are served within a given time with quality products and services. The increase in the number of customers that were served over a given time was used as a growth indicator. The researcher looked at the increase of the number of customers served in each year since the inception of the enterprise. The increase in net profits over each year was an indicator of enterprise growth over the same period. Employee satisfaction and turnover over the same period was also used as a growth indicator. An enterprise that is able to retain the same employees over a given period is a clear indicator of improved working conditions and positive growth over the same period. Opening up of new micro and small catering outlets over the same given period indicated growth.

#### **4. Research findings and discussion**

##### ***4.1 Sample characteristics***

##### ***4.2: Questionnaire return rate***

Of the sampled 384 firm owners, 280 managed to fill and give back the questionnaires thus yielding a response rate of 73.49%. According to Saunders *et al.*, [33], 30%-50% for delivery and collection is acceptable in descriptive research. This information is presented in Table 4.1.

The study was conducted from six strata in which Small Eating House, Snack bar, Tea House had the largest representation (n=51, 51.1%) in the study. It can also be depicted that questionnaires from Mega eating house, Snack Bar, Tea House "Hotel" had the largest return rate (7.9%) as compared to the expected 6% while those from Medium Eating Houses, Snack Bar Tea House "Hotel" had the lowest return rate (11.4%) as compared to the expected (13%). The overall return rate was 73.49%.

The response for this study was thus considered adequate for data analysis to proceed. This was consistent with researchers among them Babbie [44] who observed that in descriptive research, a response rate of above 50% is adequate for analysis. In addition to the responses from firm owners, key informant interviews were conducted. The response rate from the key informants was also encouraging. The importance of responses from key informants was the in-depth understanding of the topic under consideration.

##### ***4.2.1: Firm owners sample characteristics***

In order to gather contextual information from the firm owners who were selected for the current study, data

concerning gender, age, level of education and length of service were collected. Descriptive statistics on this gender information are presented in Table 4.2.

**Table 4.1:** Questionnaire Return Rate

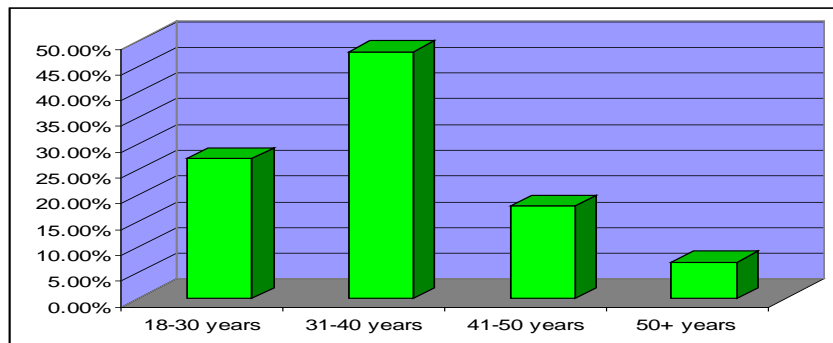
Subgroups	Questionnaire issued	%	Questionnaire returned	%
Medium Restaurant with bar/Membership club	43	11	27	9.6
Small Restaurant with bar/Membership club	46	12	32	11.4
Mega eating house, Snack Bar, Tea House “Hotel”	23	6	22	7.9
Medium eating House, Snack Bar Tea House “Hotel”	50	13	32	11.4
Small eating House, Snack bar, Tea House	195	51	143	51.1
Other Catering and Accommodation	27	7	24	8.6
<b>Total</b>	<b>384</b>	<b>100</b>	<b>280</b>	<b>100</b>

**Table 4.2:** Gender of Study Sample

Gender	Frequency	Percent
Male	157	56.1
Female	123	43.9
<b>Total</b>	<b>280</b>	<b>100.0</b>

Gender information indicates that there were more male owners (n=157, 56.1%) than there were females (n=123, 43.9) of micro and small catering enterprises. This indicates that female participation in micro and small catering enterprises is lower than that of males despite their important contributions in the Country’s economy.

Descriptive results as presented in Figure 4.1 indicate that the current age of firm owners ranged from 18 years to 50 years with a mean of 35.1(STD=1.716). It can be noted from the Table that firm owners with 31-40 years of age were the majority (n=134, 47.9%) followed by 18-30 years of age (n=76, 27.1%).



**Figure 4.1:** Age in Years of Firm Owners

Firm owners with age bracket between 41-50 years were represented by 17.9% of respondents. Only 20 firm owners (7.1%) were above 50 years. The findings suggest that age is a factor in the ownership of micro and small catering enterprises with medium aged firm owners showing keen interests. In addition ,comparison in the means of ages of both females and males owners using one way ANOVA did not show significant results at .05 levels ( $F=2.038, d=1, p=.155$ ). These results show that any gender may engage in micro and small catering enterprises at equal chances and at any age.

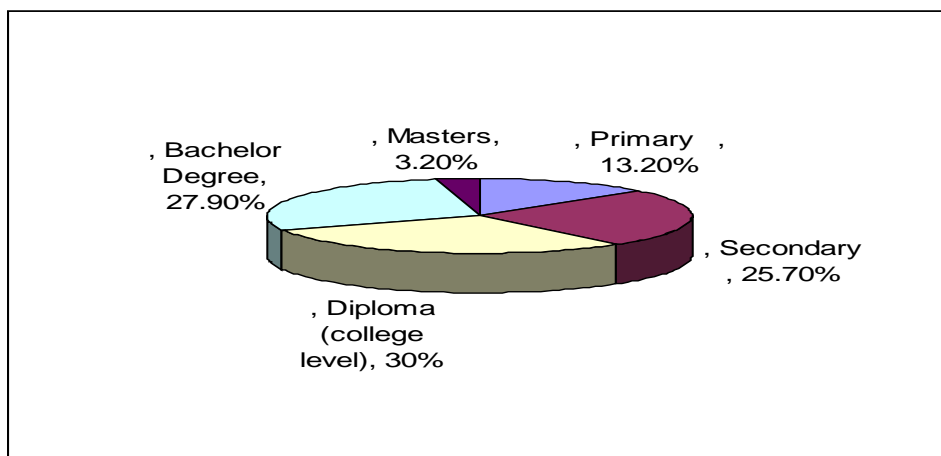
One of the indicators of survival of any business is the duration of existence. The study thus asked the firm owners to indicate the length of service and operation of their firms in Nairobi County. Results of the findings are presented in Table 4.3.

**Table 4.3:** Length of Service of Firm Owners

Length of Service	Frequency	Percent
1-4 years	113	40.4
5-10 years	91	32.5
10+ years	76	27.1
<b>Total</b>	<b>280</b>	<b>100.0</b>

Results presented in Table 4.3 show that majority of businesses (n=113, 40.45%) had operated between 1-4 years. Those that operated in duration of between 5 and 10 years were 91 respondents (32.5 %). Only 76(27.1%) had operated for over ten years. This implies that most of the micro and small business owners were not new entrants and had been in business for between one and ten years.

Regarding the level of education, majority of firm owners (n=84, 30.0%) had attained a diploma level of education. This level was followed by owners with university education having a bachelor’s degree (n=78, 27.9%). The owners with masters degree are (n=9, 3.2%) and owners with primary level of education were also few (n=37, n=13.2). This information is presented in Figure 4.2.



**Figure 4.2:** level of Education of Firm Owners

Chi-square test of independent between gender and level of education did not reveal any significant results ( $\chi^2 = .745$ ,  $df=4$ ,  $p = .946$ ). These results imply that firm owners spread proportionally across gender and levels of education. Both females and males achieved equivalent levels of education.

**4.2.2: Form of business and business type cross tabulation**

As part of the sample characteristics, the sample size was distributed between the two types of micro and small catering enterprises and forms of business. A cross tabulation between micro and small catering enterprises and forms of business is shown in Table 4.4.

Of the 280 respondents, Medium Restaurant with bar/Membership club comprised of 27 MSEs; seven micro and 20 small enterprises. Small Restaurant with bar/Membership club had 32 MSEs; all micro enterprises. Mega eating house, Snack Bar, Tea House “Hotel” comprised of one micro and 21 small enterprise while Medium eating House, Snack Bar Tea House “Hotel” consisted of 22 micro and 10 small enterprises. Finally, Small Eating House, Snack bar, Tea House comprised of 141 micro and two small enterprises.

**Table 4.4:** Form of Business and Business Type Cross Tabulation

	Business Type		Total
	Micro Enterprises	Small Enterprises	
<b>Form of Business</b>			
Medium Restaurant with bar/Membership club	7 (2.5%)	20(7.14%)	<b>27(9.64)</b>
Small Restaurant with bar/Membership club	32(11.43)	0(0%)	<b>32(11.4%)</b>
Mega eating house, Snack Bar, Tea House “Hotel”	1(0.36%)	21(7.5%)	<b>22(7.8%)</b>
Medium eating House, Snack Bar Tea House “Hotel”	22(7.85%)	10(3.57%)	<b>32(11.4%)</b>
Small eating House, Snack bar, Tea House	141(50.36%)	2(0.71%)	<b>143(51.1%)</b>
Other Catering and Accommodation	24(8.57%)	0(0%)	<b>24(8.57%)</b>
<b>Total</b>	<b>227(81.1%)</b>	<b>53(18.9%)</b>	<b>280(100%)</b>

Chi-square test of independence between business type and forms of business shows a significant association at  $p=0.05$  level of significance between the variables ( $\chi^2= 182.339$ ,  $DF=5$ ,  $p=.000$ ). This shows that there were disproportionately more firms in micro enterprises than in small enterprises. However, this seems to be more in Small eating House, Snack bar and Tea House than any other form of business. From Table 4.4, it can be noted that out of 227 micro enterprises , 141 (50.36%) were from Small eating House, Snack bar and Tea House and only one(0.36%) were from Mega eating house, Snack Bar, Tea House “Hotel. It can also be seen that there were only a total of 53(18.9%) small enterprises in the selected sample. The findings imply that majority of catering firms owners preferred micro enterprises partly because it was easier to operate given the small initial

capital involved.

**4.2.3 Capital base of micro and small catering enterprises**

The characteristic of micro and small catering enterprises was further captured by use of capital base. Information presented in Table 4.7 shows that majority of MSEs (n=242, 86.4%) that were selected for the current study operated under a capital base of equal or less than Kshs 500000.

Of the the 280 respondents, 31 (11.1%) of MSEs operated on a capital base that ranged between Kshs 500001-1500000 and only 2.5% (n=7) of MSEs had a capital greater than Ksh1500000. The study also noted that those MSEs in the Kshs ≤ 500000 were in the micro enterprises. Chi-square test of independence between capital base and the types of business indicated significant results at p=0.05 level ( $\chi^2 = 233.953, p = .000$ ) .The results show that the types of enterprises were unevenly distributed depending on the capital base of businesses.

**Table 4.5:** Form of Business and Capital Base Cross Tabulation

Form of Business	Capital Base(kshs)			Total
	≤ 500000	500001-1500000	>1500000	
Medium Restaurant with bar/Membership club	11	16	0	27
Small Restaurant with bar/Membership club	32	0	0	32
Mega eating house, Snack Bar, Tea House “Hotel”	1	15	6	22
Medium eating House, Snack Bar Tea House “Hotel”	32	0	0	32
Small eating House, Snack bar, Tea House	142	0	1	143
Other Catering and Accommodation	24	0	0	24
<b>Total</b>	<b>242</b>	<b>31</b>	<b>7</b>	<b>280</b>

**4.3 Descriptive statistics**

The general objective of this study was to find out the influence of technology transfer on the growth of micro and small catering enterprises in Nairobi County. The study analyzed descriptive statistics involving Equipment/Object Technology transfer, Size growth, Age, growth, turn over growth, projected margin profits, output rates, quality and customer base of the enterprise.

**4.3.1 The role of equipment /object technology transfer on growth of micro and small catering enterprises**

One of the reasons firm owners adopted technology transfer through equipment was to ensure that food is

produced and served on time in catering businesses (n=259,92.4%). Other roles of technology transfer in equipment and objects are as follows: equipment ensured production and service methods are fast (n=257, 91.8%), equipment ensured food production and services are fast (n=259, 92.5%), equipment enhanced efficiency in production/service methods (n=255, 91.4%), equipment increased customer satisfaction (n=257, 91.8%), equipment enhanced service quality (n=257,92.1%), equipment enhanced quality of food and drinks(n=259,92.5%), equipment improved overall performance (n=259, 92.1%), equipment increased workers output (n=256, 91.1%), equipment caused growth of output (n=251, 89.6%), equipment enabled better production methods(n=250,89.3%) and equipment has enabled growth in terms of customers/day(n=243,86.8%). Chi-square test of independence did not reveal any statistical association at .05 level ( $\chi^2 =33.395$ , DF=45, p =.899). The results imply that the role of new equipment was not significantly influenced by the forms of businesses in micro and small catering enterprises.

**Table 4.6:** The Role of Equipment /Object Technology Transfer

Statements	Frequencies (%) N=280	
	Yes	No
Acquired new modern equipment for operations	91.4	8.6
Equipment ensured food is produced and served on time	92.4	7.6
Equipment ensured production and service methods are fast	91.8	8.2
Equipment ensured food production and services is fast	92.5	7.5
Equipment enhanced efficiency in production/service methods	91.4	8.6
Equipment increased customer satisfaction	91.8	8.2
Equipment enhanced service quality	92.1	7.9
Equipment enhanced quality of food and drinks	92.5	7.5
Equipment improved overall performance	92.1	7.9
Equipment increased workers output	91.1	8.9
Equipment caused growth of output	89.6	8.4
Equipment enabled better production methods	89.3	10.7
Equipment has enabled growth in terms of customers/day	86.8	13.2
<b>Average</b>	<b>91</b>	<b>9.0</b>

**4.3.2 Effect of new production equipment in micro and small catering enterprises**

The effect of the new production equipment was measured through dichotomous type questions where respondents were asked to indicate whether or not new production equipment had any positive effect on a number of attributes as shown in Table 4.11. On average, 91.5% of respondents stated that the new production equipment had a positive effect on production techniques in micro and small catering enterprises. Only 8.5% of business owners had divergent views.

The majority of respondents (89.6%) said that the new equipment were useful in enhancing the quality of products. Accordingly, a majority of respondents also stated that new production equipment had a positive effect

on the following ways: the new equipment were essential for improving the quality of services to customers (92.9%), increasing profit margin (92.4%), and increasing customers per day (90.9%). This information is presented in Table 4.11.

Other positive effects of new production equipment that were included in the study were: increasing speed of production (89.4%), enhancing efficiency of employees (93.2%), improving satisfaction of employees (91.9%), increasing the rate of output per hour (92.9%) and improving overall performance (90.2%).

The respondents who were interviewed supported the above views and in addition noted that paradigm shift from the old to modern and new equipment added new blood to an ailing sector which is affected by poor quality goods and services and also stiff competitions among the business players. Chi-square test of independence between forms of business and effects of new equipment was significant at .05 levels ( $\chi^2 = 30.103$ ,  $DF=40$ ,  $p = .025$ ). The results show that small enterprises may have adopted better equipment than small enterprises and this may have had better and positive effects on production in catering. These results are supported by Rodgers [21] who further noted that the application of technological cooking equipment and preparation techniques tremendously increased the food production. According to him, catering establishments have moved from the old methods of production to faster and efficient processes

**Table 4.7:** Positive Effect of New Production Equipment

positive effect of New production technique on :	Frequencies (%) N=280	
	Yes	No
Quality of products	89.6	10.4
Quality of service to customers	92.9	7.1
Profit establishment	92.4	7.6
Customers per day	90.9	9.1
Speed of production	89.4	10.6
Efficiency of employees	93.2	6.8
Satisfaction of employees	91.9	8.1
Rate of output per hour	92.9	7.1
Overall performance	90.2	9.8
<b>Average</b>	<b>91.5</b>	<b>8.5</b>

**4.4 The equipment/objects embodied technology transfers and the growth of micro and small catering enterprises in nairobi, kenya**

The second objective was to determine how equipment/objects embodied technology transfers have influenced the growth of micro and small catering enterprises in Kenya. The respondents were asked to indicate the role of technology transfer in equipment and objects and how this influences the growth of catering enterprises in Nairobi, Kenya. The responses were measured on a dichotomous scale ‘yes’ and ‘no’ with yes= 1 and no= 0. Descriptive statistics were calculated earlier and the results are presented in Table 4.10.

**4.4.1 Factor analysis of equipment and objects technology transfer**

The equipment and objects technology transfer in micro and small catering enterprises was measured using four components. Twenty four items of dichotomous type questions were used for the four component variables namely; Effective Equipment (component 1), Employees Satisfaction (component 2), Customers Care (component 3) and Role of Equipment (component 4).

The Cronbach Coefficient ( $\alpha = .971$ ) on the twenty four items showed internal consistency and above the threshold of .60. Factor analysis applied with principle component and rotation Method: Varimax with Kaiser Normalization was used to validate the target variables. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was beyond the minimum value of .5 (KMO=.859) indicating that the sample size was adequate for factor analysis. The Bartlett’s Test of Sphericity was statistically significant at .001 level ( $\chi^2=12131.763$ , DF=276,  $p=.000$ ) showing that the original variables are sufficiently correlated.

From Table 4.25, four components with Eigen values greater than one was extracted accounting for 86.6% of the total variance which is greater than the threshold of 50%. Items loading above .50 for every component were grouped to form the four factors. The structure matrix of the four factors with their loadings is presented in Table 4.26.

**Table 4.8:** Equipment and Objects Technology Transfer Total Variance Explained.

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	of Cumulative %	Total	% of Variance	of Cumulative %	Total	% of Variance	of Cumulative %
1	14.738	61.407	61.407	14.738	61.407	61.407	9.344	38.933	38.933
2	2.776	11.565	72.972	2.776	11.565	72.972	4.378	18.243	57.175
3	2.306	9.61	82.582	2.306	9.61	82.582	3.774	15.725	72.9
4	1.023	4.262	86.845	1.023	4.262	86.845	3.347	13.944	86.845
5	0.504	2.132	88.944						
6	0.484	2.018	90.962						

Extraction Method: Principal Component Analysis

The first component within equipment and objects technology transfer corresponds to the ‘Effective Equipment’ (see the Table 4.26). Twelve items were loaded into this variable and included statements such as acquisition of new and modern equipment for production and services, new and modern equipment have ensured that food is produced and served on time, equipment ensured production and service methods are fast, new and modern equipment/object has ensured that food production and service is fast, new and modern equipment /object have enhanced efficiency in production and service methods, new and modern equipment/object has increased customer satisfaction, equipment has enhanced service quality, equipment enhanced quality of food and drinks, equipment improved overall performance and equipment increased workers output. The overall mean score is



10.97(STD=3.05) with a majority of owners of catering enterprises (n=263, 94%) saying that new equipment are useful in Micro and Small Enterprises. These results indicate that firm owners recognize the useful effects of modern equipment to enhance production in their businesses. Items used for Effects of Equipment had internal consistency that was above the set limit of .6( $\alpha=.981$ ).

The variable 'Employees Satisfaction' was the second component factor with four items that was loaded within it and had statements such as equipment technology transfer enhances efficiency of employees, satisfaction of employees, increases rate of output per hour and improves overall performance. Reliability test with Cronbach coefficient was above the marker of .6( $\alpha=.971$ ). Descriptive statistics reveal that the overall mean score of Employees Satisfaction is 11.453 (STD=.9812) with majority of owners of the view that employees satisfaction is partly dependent on the type of machines used. These results show that use of New and advanced equipment increase the overall convenience of workers in the catering industry and thus improving the restaurant operation as well as increase the business performances. This opinion was in agreement with Benner and Veloso [20]. who said that the implementation of technology in commissary food service establishments is closely associated with the increase in productivity, quality, safety of employees as well as hygiene and cleanliness of the enterprises. Rodgers [21] further noted that the application of technological cooking equipment and preparation techniques tremendously increased the food production.

**Table 4.9:** Equipment and Objects Technology Transfer Rotated Component Matrix.

Item Description	Components			
	1	2	3	4
Acquired new modern equipment for operations	<b>.872</b>	.142	.251	.195
Equipment ensured food is produced and served on time	<b>.828</b>	.156	.266	.155
Equipment ensured production and service methods are fast	<b>.885</b>	.161	.230	.146
Equipment ensured food production and services is fast	<b>.904</b>	.189	.239	.173
Equipment efficiency in production/service methods	<b>.856</b>	.345	.186	.119
Equipment increased customer satisfaction	<b>.870</b>	.320	.206	.125
Equipment enhanced service quality	<b>.858</b>	.320	.141	.155
Equipment enhanced quality of food and drinks	<b>.857</b>	.369	.132	.164
Equipment improved overall performance	<b>.831</b>	.429	.136	.137
Equipment increased workers output	<b>.796</b>	.423	.110	.117
Equipment caused growth of output	<b>.705</b>	.275	.081	.434
Equipment enabled better production methods	<b>.629</b>	.218	.022	.600
Equipment has enabled growth in terms of customers/day	.441	.067	.014	<b>.835</b>
Modern equipment played a role in growth of organization	.101	.061	.221	<b>.836</b>
Production equipment changed over time	.096	.060	.369	<b>.774</b>
Quality of products	.126	.093	<b>.673</b>	.602
Quality of service to customers	.191	.164	<b>.829</b>	.355
Profit establishment	.271	.252	<b>.853</b>	.150

Customers per day	.294	.503	<b>.713</b>	.114
Speed of production	.291	.512	<b>.740</b>	.087
Efficiency of employees	.358	<b>.843</b>	.304	.049
Satisfaction of employees	.345	<b>.820</b>	.248	.134
Rate of output per hour	.409	<b>.829</b>	.269	.050
Overall performance	.444	<b>.794</b>	.208	.148
<b>Reliability coefficient: Cronbach alpha( overall= .971)</b>	<b>.981</b>	<b>.969</b>	<b>.939</b>	<b>.860</b>

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

The third equipment and objects technology transfer factor was renamed as 'Customer Care'. It comprises of five statements that attempts to explore to what extent equipment technology transfer enhances customer satisfaction. The items that loaded to this variable were the Quality of products and services for the customers, speed of production to ensure no shortages and increased number of customers served per day. Reliability test with Cronbach coefficient on the items was above the marker of .6( $\alpha=.939$ ). The overall mean score is 9.982 (STD=1.824). This score was in regard to the responses of a majority of owners (n=237, 84.6%) who noted that improved equipment and objects were essential components of customer care and welfare. These findings show that the welfare of customers is enhanced by introduction and use of modern and advanced equipment and machines. Liddle[16]. reported that many restaurants and food service operations have rapidly adopted the point-of-sale technologies or POS system to increase the overall convenience of the dining experience and technologies improving the restaurant operation as well increased the repeat business. According to Liddle [21]. Blast chillers, freezers, steam jacketed kettle tilting skillets are examples of equipment that involve technological advancement in the sector to provide healthy meal options to the customers.

The fourth equipment and objects technology transfer factor 'Role of Equipment' was operationalized by using three items such as new equipment enabled better production methods, new equipment has enabled growth in terms of customers/day and modern equipment played a role in growth of organization. Majority of firm owners (n=258, 90%) were of the opinion that micro and small catering enterprises should be equipped with modern equipment to enhance production. This information suggest a large proportion of firm owners believe that the role of equipment was to enhance better production methods and thus increase customers served per day. This view was consistent with Grimes [17] who claims that some advanced features have been integrated on the kitchen appliances such as timers and digital temperature gauges, timers or inaccurate temperature dials to enhance production.

A binomial logistic regression was performed and this predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables that is categorical or continuous.

In this study, logistic regression was used to find out the influence of a number of factors on the likelihood that firm owners would indicate that that Micro and Small Enterprises had experienced certain level of growth. The second null hypothesis stated as follows:

Ho2: There is no significant relationship between technology transfer of equipment/objects and the growth of Micro and Small Enterprises in Nairobi County, Kenya.

One of the reasons firm owners adopted technology transfer through equipment was to ensure that food is produced and served on time in catering businesses (n=259,92.4%). Other roles of technology transfer in equipment and objects are as follows: equipment ensured production and service methods are fast (n=257, 91.8%), equipment ensured food production and services are fast (n=259, 92.5%), equipment enhanced efficiency in production/service methods (n=255, 91.4%), equipment increased customer satisfaction (n=257, 91.8%), equipment enhanced service quality (n=257,92.1%), equipment enhanced quality of food and drinks(n=259,92.5%), equipment improved overall performance (n=259, 92.1%), equipment increased workers output (n=256, 91.1%), equipment caused growth of output (n=251, 89.6%), equipment enabled better production methods(n=250,89.3%) and equipment has enabled growth in terms of customers/day(n=243,86.8%).

A binomial logistic regression was utilized in this study since it is the appropriate technique where the dependent variable is dichotomous or categorical and the independent variables are either categorical or continuous. In this study, the dependent variable (growth levels) was categorical (growth or no growth).

The logistic regression model contained four component factors, namely; Effective Equipment, Employees Satisfaction, Customers Care and Role of Equipment. The logistic regression model was summarized and fitted as:

$$\text{Logit (level of growth)} = -1.555 + .270(\text{Effective Equipment}) + .032(\text{Employees Satisfaction}) + .547 (\text{Customers Care}) + .386(\text{Role of Equipment}).$$

**Table 4.10:** A summary of Variables in the Equation.

Components	B	S.E.	Wald	Df	Sig.	Exp(B)
Effective of Equipment	.270	.136	3.946	1	.047	1.310
Employees Satisfaction	.032	.278	.014	1	.907	1.033
Customers Care	.547	.105	27.055	1	.000	1.729
Role of Equipment	.386	.168	5.280	1	.022	1.471
Constant	-1.555	.675	5.305	1	.021	.211

n=280

$\chi^2 = 87.665$ ;  $df = 4$ ;  $Sig. = .000$ .

Cox and Snell R square (.269); Nagelkerke R square (.496)

Overall percentage correct prediction (90.4%)

The general model having all predictors variables was significant at .05 levels ( $\chi^2 = 87.665$ ;  $df = 4$ ;  $Sig. = .000$ ,  $n=280$ ) indicating that the logistic regression model was able to select business owners who realized firm growth and those who did not report any growth in Nairobi County, Kenya. The explained variation in the dependent (levels in growth) variable based on the above model ranges from 26.9% to 49.6 % (Cox and Snell R square =.269; Nagelkerke R square =.496) and correctly classified 90.4.9% of cases.

The Wald test was also used to determine statistical significance for each of the predictor variables. From these results, it is noted that Effective Equipment ( $p = .047$ ), Customers Care ( $p = .000$ ) and Role of Equipment ( $p = .022$ ) added significantly to the model/prediction, but Employees Satisfaction ( $p = .907$ ) did not add significantly to the model. The table shows that the odds of achieving positive growth ('yes' category) are 1.729 times greater for firms with enhanced customer care than those without. The results also show that the odds of achieving high growth are 1.310 times for firms with Effective Equipment than those without. These results show that Micro and Small Enterprises, whose owners had introduced modern and effective equipment, were using equipment that enhanced customer care and used equipment that enhanced employees satisfaction as a result of technology transfer of equipment all achieved positive growths. According to David et al., [19] production and service equipment in these enterprises include large equipment such as ranges, steamers, boiling pans, fish fryers, sinks and tables, mechanical equipment such as peelers, mincers, mixers, refrigerators dishwashers, utensils and small equipment such as pots, pans, whisks bowls and spoons.

The null hypothesis  $H_{02}$  that there is no significant relationship between technology transfer of equipment/objects and the growth of Micro and Small Enterprises in Nairobi County, Kenya was rejected in favor of the alternative.

The above findings concur with Liddle [16] who noted that some of catering commissary establishments thought that the tools and technology in the restaurant industry is limited to basic appliances and tools without realizing some complex equipment used. Moreover, the means of technology transfer include acquisition of capital equipment and machinery through trade, licensing (and/or franchising or distribution) agreements through which skills, ideas and technical information are transferred and through the movement of experts and skilled labor Ikiara et al., [22].

#### ***4.7 Hypothesis testing for the null and alternative hypotheses***

The postulated hypothesis for the study was tested to either be rejected or accepted:

**H<sub>0</sub>:** There is no significant relationship between technology transfer of equipment and the growth of micro and small catering enterprises in Nairobi County, Kenya.

**H<sub>a</sub>:** There is significant relationship between technology transfer of equipment and the growth of micro and small catering enterprises in Nairobi County, Kenya.

**4.8 Summary**

Data analysis in this study was carried out using both descriptive and inferential statistics. The statistical package for social sciences (SPSS) Version 22 was used to run the data. Descriptive statistics for the study included means, standard deviations, frequencies and percentages. Inferential statistics used in the study included correlation and multiple regressions in order to determine the relation between the independent and dependent variables. Correlation technique was used in the study to analyze the degree of relationship between the independent and dependent variables while logit regression analysis was used to determine the effect of technology transfer on skills, equipment/objects, knowledge and processes. Data was also subjected to factor analysis. The Binomial Logistic Regression was also used to analyze the data. The study established that transfer equipment, leads to the growth of micro and small enterprises catering in Nairobi County, Kenya. Growth was measured in form of profit margin, increase in employees, increase in customers, enlargement in firm size and enhancement in quality of products and services.

**Table 4.11:** Table showing the results of the Hypotheses Testing

Hypothesis	Coefficient	Conclusion
	p-Values	
i.H <sub>0</sub> : There is no significant relationship between technology transfer of equipment and the growth of micro and small catering enterprises in Nairobi County, Kenya.	P=.000  <=0.05	Accept <b>H<sub>0</sub></b> :  Reject <b>H<sub>a</sub></b>
H <sub>a</sub> : There is significant relationship between technology transfer of equipment and the growth of micro and small catering enterprises in Nairobi County, Kenya		

Since the study objective was concerned with the relationship between the independent and the dependent variable. Regression and ANOVA analysis were used to determine the relationship between them. The results of the two show that there is a strong relationship between the independent variable of the study and growth. The null hypotheses of the study was there for rejected based on these results. Micro and small catering enterprises that had embraced technology transfer of equipment, had showed a marked growth in terms of profit margins, increase in the number of employees, increase in customers, enlargement of firm size and improvement in the quality of both products and services.

## **5. Summary, Conclusions and Recommendations**

### ***5.1 Introduction***

This chapter contains a summary of the findings, conclusions and recommendations of the study. The general objective of this study was to find out the influence of technology transfer on the growth of micro and small catering enterprises in Nairobi County, Kenya.

Questionnaires and interview guides were the main instrument used in the collection of data. The dependent variable was the growth of micro and small catering enterprises. The summary, conclusions and recommendations of the study are based on the specific objective of the study.

Descriptive research design was adopted for this study. The subject for the study was catering MSEs in Nairobi County, Kenya to establish the influence of technology transfer on their growth. The researcher carried out survey method of data collection from a population of 11,162 respondents. The population sample comprised 384 enterprise owners who were selected by stratified random sampling. The researcher gathered information and the respondent's opinions, experiences and feelings on the influence of technology transfer on the enterprises where they work.

The study showed that the independent variable influenced the growth of micro and small catering enterprises in Nairobi County, Kenya. Measurement enterprise size, age of enterprise since inception, customer turnover, profit margins, product output and quality, customer base and efficiency as the operational variable for enterprise performance showed that micro and small catering enterprise that had adopted technology transfer of equipment had showed marked growth over the past six years.

### ***5.2 Summary of findings***

The purpose of this study was to investigate the influence of technology transfer on the growth of MSEs in catering in Kenya. This study focused on providing information on the influence of technology transfer on the growth of MSEs in Nairobi County. It specifically aimed at finding how object embodied technology transfer had influenced the growth of micro small catering enterprises in the catering sector within the hospitality industry in Nairobi County, Kenya.

The study sampled 384 firm owners, however, only 280 managed to fill and return the questionnaires thus yielding a response rate of 73.49%. The study collected background information concerning the growth of micro and small enterprises. The data that were included in this section comprised of data on gender, age, level of education and length of service. Chi-square test of independence and one way ANOVA was used to test whether the sample characteristics had any statistical influence on growth of micro and small enterprises.

First, gender characteristics revealed that males were slightly more than females indicating that females' participation in micro and small catering enterprises was lower than that of males. However, this did not statistically influence the growth of micro and small catering enterprises.

Secondly, although age was believed to be a factor in the ownership of micro and small catering enterprises, comparison in the means of ages of both females and males owners using one way ANOVA did not show significant results. Findings of the study showed that majority of firm owners (40.45%) had a length of stay of between one and four years. Finally, all firm owners had attained a certain level of education: certificate (13.2%), diploma (30.0%), bachelor's degree (27.9%) and master's degree (3.2%). These levels of education were useful in technology transfer in micro and small catering enterprises.

### ***5.3 Determining the influence of equipment/objects embodied technology transfer on the growth of micro and small catering enterprises in Nairobi county, Kenya***

The second objective was to determine how equipment/objects embodied technology transfers have influenced the growth of micro and small catering enterprises in Nairobi County, Kenya. To test this variable, Twenty four items of dichotomous type questions were used and analysis carried out using descriptive statistics, factor analysis and logistic regression to establish whether technology transfer on equipment/objects influenced growth of micro and small catering enterprises.

On average, majority of business owners (91%) stated that their businesses had adopted technology transfer through acquisition of new and modern equipment and objects. Consequently, the introduction of such new and modern equipment had an influence on the growth of micro and small catering enterprises. When asked whether they have acquired new and modern equipment, majority of firm owners (91.4%) said yes and cited the major reason for the acquisition of technology transfer as for production and service operations in micro and small catering enterprises.

One of the reasons firm owners adopted technology transfer through equipment was to ensure that food is produced and served on time in catering businesses (92.4%). However (6%) respondents felt that technology transfer in equipment and objects effect on enterprise growth was as follows: equipment ensured production and service methods are fast ( 8.2%), equipment ensured food production and services are fast ( 7.5%), equipment enhanced efficiency in production/service methods ( 8.4%), equipment increased customer satisfaction ( 8.2%), equipment enhanced service quality (7.9%), equipment enhanced quality of food and drinks(7.5%), equipment improved overall performance (7.9%), equipment increased workers output ( 91.1%), equipment caused growth of output ( 10.4%), equipment enabled better production methods(10,7%) and equipment has enabled growth in terms of customers/day(13.2%).The study found out that technology transfer of equipment/objects was a major component in the growth of micro and small catering enterprises in Nairobi County, Kenya.

### ***5.3 Conclusion***

The study examined the influence of technology transfer on the growth of micro and small catering enterprises in Nairobi County. The study concludes that there are more male enterprises owners than there are female enterprise owners of micro and small catering enterprises. This indicates that female participation in micro and small catering enterprises is lower than that of males despite their important contributions to the County's

economy. The study concludes that the current age of firm owners ranged from 18 years to 50 years. Majority of businesses had operated between 1-4 years. Those that operated in duration of between 5 and 10 years were 91 respondents (32.5 %). Only 76(27.1%) had operated for over ten years. The study concludes that most of the micro and small business owners were not new entrants and had been in business for between one and ten years. Regarding the level of education, majority of firm owners (n=84, 30.0%) had attained a diploma level of education. This level was followed by owners with university education having a bachelor's degree (27.9%). Owners with masters degree were (3.2%) and owners with primary level of education were also few (13.2%). The equipment/objects embodied technology transfers comprised of four variables, namely, Effective Equipment, Employees Satisfaction, Customers Care and Role of Equipment. All these variables were found to be highly and positively associated with the growth of micro and small catering enterprises. The study can therefore, conclude that technology transfer of equipment leads to the growth of micro and small catering enterprises in Nairobi County, Kenya. The growth is measured in form of profit margin, increase in employees, increase in customers, enlargement in firm size and enhancement in quality of products and services.

#### **5.4 Recommendation**

As noted earlier in the current study, one major component in the growth of micro and small catering enterprises is the adoption of technology transfer. All the micro and small catering enterprises in Nairobi County operate under a capital portfolio of below Kshs three million. This implies that micro and small catering enterprises are constrained by finances. Moreover, access to finance continues to be an area that warrants further attention and requires effective initiatives. This study recommends that the government should initiate special capitulation through budgetary allocations to cushion micro and small catering enterprises from collapse due to financial constraints. There are no unique policies that target the development of MSEs. Identifying and recognizing the specific characteristics of MSEs and their special needs could enhance their growth. One of the strategies should focus more on enhancing training, market identification and process benchmarking.

In general, the study has noted that technology transfer in equipment is a key determinant in the growth of micro and small catering enterprises in Nairobi County,

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In general, the study has noted that technology transfer in equipment is a key determinant in the growth of micro and small catering enterprises in Nairobi County,



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