Influence of New Technology on Financial Performance; a case of Small scale Tea industry in Kebirigo, Kenya.

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ABSTRACT:
This study provides an overall picture of the role played by the small scale tea industry towards social-economic development. A case study of Kebirigo tea factory has been picked from among the 54 small scale tea factories. The tea industry has of late increasingly become the country's greatest economic asset earning close to Kenya shillings 70 billion between 2008 and 2009; most of it in hard foreign currency (Leo Odera Omolo 2010).The small scale tea industry takes care of lives close to five million Kenyans.
This study project the application of technology as part of efficient management of small scale tea industry. The agency secures finances from the financial institutions on behalf of the tea farmers. The Tea Agency (KTDA) is charged with the responsility of regulating and managing these factories. To establish an extra- modern green leaves tea processing factory required the colossal amount. The farmers contribute towards replenishment of the loan to modernize their factories. They are also subsidized with farm inputs like fertilizers, tree seedlings, technical advice, tea roads improvement and employment. Challenges faced by the industry among others include; tea harking (mang'eroto), human resource, alarming manufacturing costs and change in global technology. There were six factories in the region selected at the time of research. These factories were selected as the sample size.
The study recommends the use of new technology purposely for efficient management of small scale tea industry. The study further recommends the benefits of technology need to be closely weighed against its costs. Managers will need specialized training if they are to keep pace with an ever changing technology. Part of that training should include the decision making process in a fast paced environment.

The study employed a case study of method utilizing a sample out of the target population. Questionnaires and personal interviews were used to collect information. Descriptive statistics was used to analyze data collected. The mean and standard deviation was used to analyze the data collected. Data was presented in tables.

KEY WORDS: social-economic, extra-modern, global technology, small-scale, Tea industry; Technological gap; Technological and attitudinal changes

Introduction

One of the definitions of "technology" given in Webster's Third New International Dictionary is "the totality of the means employed by a people to provide itself with the objects of material culture" (1872). Modern technology includes e-mail, cellular phones, conference calls, fax machines, computers, pagers, and video conferencing. Technology is apparent in every aspect of life. It has changed everyday living dramatically, both in positive and in negative ways. Nowhere is this more evident than in the world of business. Everything from decision-making tohuman resource has been affected by new technology. This paper will discuss the impact of technology, both positive and negative, on business.

(A) TECHNOLOGY'S IMPACT ON THE VARIOUS APPLICATIONS.

(i) Technology's Impact on Decision Making

Technology, especially the Internet, has made obtaining information a much quicker and easier Process. In the past, obtaining information required days or even weeks of research in the tea industry, often tying up the time of several employees. Today, any manager or an employee of the working in the tea industry, using online sources, can compile more up-to-date reports in a matter of hours. Having so much information, literally at one's fingertips, allows for quick, informed decision-making. This is especially important in today's demand in global market, financial decisions and other operational decisions use new technology, essentially for multi-national organizations to have current information from around the world before making crucial decisions.

However, there is a downside to this process. In the past, managers took more time processing the information they received. They shared the information with other concerned parties and came to an agreement regarding the goals of the project. Today's technology may have decreased the amount of time it takes to accumulate data, but it has also decreased the amount of time managers spend on making decisions .More so on the internet applications, Internet time encourages immediate decision-making, even at the cost of mistakes. As a result of such quick decision making, there may be less buy-in by stakeholders because there was no time for information sharing and reaching agreement on goals of the tea industry.

(ii) Technology's Impact on Communication

Today, business communications is alive and well through e-mail. E-mail allows for quick communication and efficient organization of that communication. Messages can be routed to folders, prioritized and, if necessary, immediately responded to. In addition, new hand-held computers, such as "the Blackberry," allow managers to receive e-mails from any location. This device, which takes pagers to a new level, beeps or vibrates when e-mail is received on the computer back in the office. The manager can then read, forward, fax, delete, save or ignore the message (Maciag, 52). It is like carrying a portable office. However, e-mail can also make business communications overwhelming. Many individuals have numerous e-mail accounts, requiring a system to manage them all. In one day, hundreds of e-mails can come across a manager's computer. Although managers can filter this e-mail using selection software, there is an inherent danger in doing so. If an important e-mail does not meet the software's criteria for response, it could go unnoticed. In using the emails, the tea industry has really reduced a huge cost of postages and even a voided inconvenience among staff.

(iii) Technology's Impact on Human Resources

Due to advanced technology such as computers, fax machines, and video conferencing, the tea industry as an organization is implementing telecommuting as an option for their employees. This is expected to create a significant increase in worker productivity. Other benefits that have been cite include reduced costs, improved

recruitment and retention, reduced stress, reduced travel time, and increased job satisfaction. Additionally, telecommuting has global advantages because it will allow the industry as an organization to develop a team of employees from virtually any location in the world. However, this new technology will require the development of new management and communication skills. In addition, the organizations will need to develop creative benefit packages to attract and keep employees since the "job market" will not be limited to their demographic area. Organizational loyalty may become a thing of the past.

(iv) Technology's Impact on Marketing

Marketing may well be the one area on which technology has had the greatest impact. The virtual marketplace is everywhere; it is seen in the tea exporting countries like Egypt, Pakistan, United Kingdom, and Zaire among the rest. The Internet takes the product to the customer, saving the customer time and, in some cases, money. The Internet allows companies to sell merchandise throughout the world without having to amass a great deal of inventory which they might not be able to get rid of later. For example, the tea industry exports over 40 million tines of made black tea. Samples are described and emailed to the customer before the actual sample sent. All the tea factories have their physical address and are easily reached. A huge Auction at Mombasa could do marketing of the black tea through the Internet. In case a customer could buy and but return them to the store if they are dissatisfied. However, it is realized that there are some disadvantages; one disadvantage for consumers buying from an Internet site, as opposed to a physical store, has to return unsatisfactory merchandise to the company, often at their own expense. Another disadvantage is that a customer has to wait for the merchandise to be delivered, a problem that became very apparent incase it is required for a celebration like green teas used for ceremonials in China would be waited in vain. Say during the political crisis.

(v) Technology's Impact on Competitive Advantage

Quicker decision-making, made possible by the easy accumulation of information, enables a company to gain and keep a competitive advantage. Michael Colcannon, vice-president of business development at Bovis Lend Lease Inc. says that technology "has helped us plan our future and allows us to do things in a much more condensed time frame and make decisions in faster scenarios". Better and faster communications, made possible by e-mail and hand-held computers, can also help tea companies gain and retain a competitive advantage. Since managers are always available, any problems that come up can be dealt with immediately, rather than being placed on the back burner.

Additionally, the web can allow tea companies to develop better customer service which creates a competitive advantage. Company web sites allow the company to stay in contact with customers. The KTDA has built web sites around the world. They have found this to be a tremendous cost saving as far as customer service is concerned, allowing them to easily answer customer questions and keep the customers up-to-date on quality of tea in the market.

(B) TECHNOLOGY TRENDS IN TEA MANUFACTURING

Tea plucked from the garden is sent to the factory for processing, which in most cases, is in or near the tea garden. This processing, earlier, used to depend solely on the natural weather conditions, but to become less dependent on the unpredictable weather conditions which affects productivity adversely, modern technology has been introduced in the tea industry. This has made it possible to increase the plantation area by minimizing space; also labour cost has come down and the entire process has become much more speedy.

The starting material in black tea processing is the young shoot, the terminal bud and the two adjacent leaves plucked from the tea plant. The flush is processed in four distinct stages, which are withering, rolling, fermentation and drying. Each stage involves characteristic changes in the physical and biochemical composition of the leaves and the cumulative effect of these changes are ultimately reflected in the quality of the finished product, namely the black tea. After the drying is over, the leaves are sorted, that is, divided into different grades and made ready for the market.

(i) Plantations: Unlike other perrenials, tea is unique because only its vegetative parts - the two leaves and the bud - are commercially exploited. Tea is also maintained as a low bush in a continuous phase of vegetative growth. Both these aspects call for manipulation of plant parts for optimal productivity and growth.

(ii) Plucking & Leaf Handling : The plucking of the two leaves and a bud involves a number of systems - Janam plucking, fish-leaf plucking, step-up plucking and Shear plucking is done when there is a scarcity of pluckers during July to September. Pluckers' productivity is found to be maximum in unpruned teas. The plucked leaves are processed to produce the black tea.

(iii) Tea processing:

(a) Withering: It is a procedure which brings about physical and chemical changes in the shoots to produce quality, apart from conditioning the flush for rolling by reducing turgor, weight and volume. Previously the flush used to be withered under the sun. Now this process is generally achieved either by thinly spreading the flush on mats, or in thick layers in troughs for 8-18 hours depending on the condition of the leaves.

(b) Rolling: The object of rolling is to macerate the leaf so that the enzymes and their substrates get intimately mixed up. This is achieved mechanically either by the use of an orthodox roller, the rotorvane, or by CTC (crushing, tearing and curling) machines. Rolling ruptures the cell wall thereby enabling the production of enzymes.

(c) Fermentation: It is the process of oxidation of leaves. The mechanical aspect involves spreading out of the leaves macerated by rolling a layer 5-8 cms thick, for 45 minutes to 3 hours, depending on the quality of the leaves. Fermenting machines make the process continuous, that is, every unit of macerated leaf has to be spread out for individual treatment. Currently the Continuous Fermenting Unity or machine (CFU) has replaced human labour with the use trolleys that took each employee with a trolley.

(d) Drying: It reduces the moisture content of rolled and fermented leaves from 45-50% level to a 3% level in dried black tea. It also allows development of black tea aroma. Drying is physically achieved by blowing hot air through fermented leaves as they are conveyed in chains. The drying process lasts for about 20 minutes.

(e) Sorting: Sorting may be defined as a procedure in which particles of bulk tea are separated into grades of different sizes. This sizing can be done either manually or by using different sizing equipments. Sorting meshes of various sizes are used to grade the tea.

(C) MONITORING IN TEA PRODUCTION

Because tea factories have, for so many years, been producing tea that always finds a market, monitoring for optimum efficiency and quality has not necessarily been built into the production process. But things are

changing, and as packing companies are now buying more tea directly from the producers, entering into forward contracts, and specifying exactly the type of teas they want, it is becoming more important for manufacturers to be able to meet those specifications. International regulations controlling acceptable levels of pesticides and other residues, health and hygiene, among other things, also make measuring and monitoring an essential part of factory operations. Every tea factory manager should ask himself daily about his process conditions, "If you are not measuring them, how are you going to control them"

The secret to the successful running of a tea production unit is to assess anything that could possibly go wrong, to isolate it, and then modify procedures to ensure that it will not go wrong in the future. If the risk areas are monitored and all procedures are followed correctly, then the risks are eliminated. Built in alarm systems that alert managers and workers when things threaten to malfunction will help to reduce errors and risks are eliminated.

(i) Monitoring in the fields

The two aspects of monitoring needed for the growing crop are of the local climate and attacks by pests. Tea yield and quality are very dependent on the weather, so the first stage of monitoring is the regular collection of data about climatic conditions. Every tea estate should have efficient equipment to measure temperature, humidity and rainfall, and should collect such information as part of the efficient running of the estate. Monitoring methods can range from visual reading to collection of weather records by satellite link. With modern technological methods of weather recording, and routine collection of data, it is often possible to predict such factors as the onset of insect infestation and changes in crop yield, which can be directly influenced by weather patterns. Methods such as plucking rounds, irrigation, fertilizer rates and applications of relevant pesticides can then be adapted to suit the prevailing conditions on a day-to-day basis.

The crop should be regularly monitored for attacks by pests. This is usually done through careful observation by the naked eye, and information should be shared with neighboring estates in order to avoid the rapid spread of infestations over a wider area.

(ii) Monitoring the plucking and transporting of leaf

As soon as the green leaf has been plucked, things can very easily start to go wrong unless temperature is carefully monitored and controlled.

First of all, tea should be processed as soon as possible after plucking, so the fresh leaf must reach the factory in as short a time as possible. Two hours is the recommended; three hours is the absolute limit. During transportation the leaf must also be kept cool or it will start to ferment (oxidize), producing tea with an unpleasant, stewy flavor. Simply throwing the sacks of tea into the back of a lorry in very hot conditions will create these kinds of problems. A better method is used by KTDA factories: they hang the bags of leaf on lorries with racks. This allows air to circulate freely around the sacks and helps to keep the leaf cool. Some also use plastic stacking baskets to stop the leaves being crushed and becoming overheated. It is much cheaper and more efficient to make sure that leaf is handled correctly than to introduce expensive refrigerated lorries. The leaf should be transported in sensible containers and the monitoring of the temperature of the leaf inside the sacks or baskets is essential.

If leaf temperature goes above 43ºC, the cell walls begin to break down, release enzymes and the catechins in the leaf begin to oxidize. What plantation workers often do not appreciate is the fact that when leaf is picked in a field where the ambient temperature is 40ºC and is loaded into a sack where the ambient temperature is also 40ºC, the temperature of the leaves nearest the outside of the sack will drop down to 28º, 29º, or 30º, as water is evaporated from the leaf. But the water stops evaporating in the middle of the sack where the leaf is packed

more tightly and no air is circulating, and here the temperature can rise to as high as 50ºC due to the heat of respiration.

To avoid such high temperatures, leaf should be packed loosely and air must be allowed to circulate freely. Packing can be controlled by monitoring the weight of each container and the heat inside the containers is easily monitored by inserting a thermometer probe into the sacks. Use of portable data loggers ensures that factory management has a permanent record of green leaf transport conditions.

(iii) Monitoring during withering

Withering is normally a 16-20 hour process carried out under ambient conditions which can often fluctuate. It involves two processes. The first is the biochemical process during which the starch in the leaf is converted to sugar, and some of the proteins in the leaf turn to amino acids. The withering process prepares the juices in the leaf for the manufacture of tea. If leaf is taken directly from the field and processed without withering, the resulting liquor will have a harsh, grassy, and unpleasant flavor. This biochemical wither takes an absolute minimum of 12 hours and cannot be speeded up without losing quality-but it can be extended to 24 hours by cooling the leaf. As yet, there is no on-line test to monitor the optimum biochemical wither, but tea scientists are working on it.

The second part of the process is the physical wither during which water is removed from the leaf, in order to reduce the moisture content from 80% to 68%. This part of the process can be accelerated by blowing dry air through the leaf and by applying heat. To ensure best quality, there should at least be some checking of the temperature of the air the leaf is receiving. An air temperature of a steady 25-30°C is ideal, but if it goes above 35°C the leaf may become overheated and quality will fall off very rapidly. A temperature of 40°C is definitely damaging. Alarm bells therefore need to sound-perhaps when air temperatures reach 33°-35°C-warning staff to turn down the heat.

Measuring of how much moisture has been lost from the withering leaf is traditionally carried out by examining and squeezing a handful of leaves. Checks are also run by weighing a bag of leaf into the withering trough and then taking the leaf bag out at intervals and weighing it again to see how much moisture has been evaporated during that time. The first of these monitoring methods depends on the skill and experience of the individual worker. In a factory of 50 troughs, the second method is laborious.

With orthodox leaf, the target moisture content after withering is between 50% and 75% moisture, depending on the type of manufacture. Assams are traditionally soft withered (65-75% moisture) and Ceylons are hard withered (50-60% moisture). In CTC leaf, a wither of between 68% and 70% is usual. Variations in the moisture content of leaf after the withering process are, however, often greater than variations in the moisture content of fresh leaf coming into the factory from the fields. This means that the withering process often widens the standard deviation of moisture content, instead of reducing it, in the withered leaf. This quite common problem can be expensive and complicated to solve. The best way to tackle it is to install Near Infra Red (NIR) moisture measurement. NIR equipment shines a light on the leaf and measures the amount of interference caused by water in the reflected light. Measurements are taken 10 times every second by a sensor head as the tea moves along on a conveyor belt. This is the only known way of accurately measuring moisture content instantaneously and on-line. Its use is standard in other related industries (tobacco, coffee, flour milling and food products).

NIR is expensive but can also reduce production costs at the later drying stage. Dryers work best when run under constant conditions. If the tea to be dried enters the dryer at a fixed rate with a fixed moisture content, the dryer will work more efficiently. As the moisture content varies, the dryer conditions also have to be varied to suit the tea, or factory managers have to accept that some tea will not be dried enough and other tea will be

dried too much. The former compromise increases fuel costs and both compromises reduce tea quality. NIR moisture monitoring allows dryer feed rate to be varied automatically to ensure a constant load of water into the dryer. One liter of oil is required for every two kilograms of tea dried, and running the dryer at a constant setting optimizes evaporation, saves fuel, reduces costs and improves quality. These kinds of savings and improvements are particularly relevant to larger factories where up to four or five million kilos of tea are being dried annually.

(iv) Monitoring during cutting

Leaf maceration by cutting is swift and little monitoring is needed during the cutting process, but checks on increases in temperature in the Rotorvane and the CTC machines will give the factory manager an indication as to how efficiently his machinery is working. If the temperature rises too high, it is an indication that the nip is too tight. If there is no steady increase in temperature from one machine to the next, then one nip is insufficiently closed. In the ideal factory, this background information should be consistently monitored and logged. The actual temperature does not need to be checked all the time, but staff do need to be quickly aware if it is too low or too high.

The size of CTC cut or degree of maceration will usually be checked by eye, but monitoring the efficient use of machinery will help to ensure that costs are kept down and machinery is well maintained. The electric current drawn, the sounds the machine makes while operating, the vibrations, and the smells of the process, all add to the overall picture of how the factory is running and operators should be constantly aware of them.

(v) Monitoring during oxidation

More can go wrong during the natural oxidation (fermentation) stage of processing than in any other part of tea manufacture. This is because oxidation involves a very sensitive, exothermic reaction that produces heat and which can easily get out of hand and go too fast. Monitoring the time and temperature of fermentation is therefore crucial.

The modern method of temperature control is to blow cool moist air through the dhool (macerated or rolled withered leaf). Temperature, humidity and airflow all therefore need to be monitored.

The duration of oxidation at a given temperature determines the rate of change of green catechins to theaflavins and the amounts of theaflavins that are converted to thearubigins. Thus time determines the final briskness, strength, thickness and the flavor of the liquor. So, timing also needs to be monitored.

Given that during oxidation, cool air is blown from bottom to top, the dhool at the bottom of the layer is cooler than that at the top. Ideally, the dhool should be forked over at regular intervals to prevent the lower layer remaining under-fermented and the upper layer from over-fermenting. This can happen even more easily if the layer of dhool is too thick. It is possible to install continuous monitoring to check the temperature at different depths to see what the differential is. Too great a difference indicates either that the air is not moving fast enough through the dhool or that the air temperature is too high. The best thermometers to use for this 3-level temperature checking are stainless steel probes or electronic thermometers that are inserted into the dhool at appropriate depths on the oxidation bed.

On a continuous fermenter, which generally turns the tea throughout the process, it is important to monitor the inlet air temperature, the inlet air humidity, the temperature of the surrounding air, and the temperature of the dhool.

The length of time that the fermenter is set up for varies according to conditions and often needs resetting to suit the optimum oxidation time for the leaf on any particular day or hour. This varies according to the raw material, the time of the wither and the oxidation temperature. The only way that the factory manager can know the

optimum fermentation time is to run his process line with the fermenter set at a particular time and save a sample of black tea from the dryer, then to repeat that process three more times at a range of fermentation times, until the optimum time of oxidation has been decided by liquoring and tasting the four samples. The problem with this method is that it takes four hours to run the test and, during that time, the temperature, humidity and general conditions in the oxidation room can change, often negating the purpose of the test. And yet, a factory can be losing between 5 and 7 US ¢/kg of tea by being 10 minutes wrong with the fermenter setting.

To save time and to accurately find out the optimum setting for the fermenter, it is recommended to use the Tea craft Op-Tea-Mizer. This unique piece of QC equipment allows the factory to take samples from four timed points on the fermenter and to dry the tea under similar conditions in 20 minutes instead of the normal four hours mentioned above. The fermenter can then is set to its optimum time and ensure that the factory produces the best tea possible from any given line of dhool.

(vi) Monitoring during drying

Most tea driers have some kind of system for indicating temperatures, but they are often inaccurate-sometimes by as much as 10° C- because they are old or they were wrongly calibrated in the first place. Temperature variations of only 3°-4° can mean the difference between good and spoiled tea. Thermometers need to be absolutely accurate and they need to be in the right position in the drier to be of any use. If an accurate thermometer is in the wrong place in the drier, or is the wrong length, it is of no use at all.

Two aspects of airflow need to be checked-both the volume going into the drier and the air pressure inside the drier. Because in a fluid bed drier the air passes through the bedplate at high resistance, it goes through the holes into the chamber very quickly to fluidize the tea particles. As water is lost from each tea particle, its temperature increases proportionally and so, by measuring and comparing the temperature of the inlet air and the temperature of the exhaust air, it is possible to monitor the moisture content of the tea accurately within the drier.

Most modern fluid bed driers have built-in temperature recorders but, again, these are only any good if they are accurate. It is necessary to check and recalibrate thermometers to be absolutely sure that readings are accurate and to use a reliable platinum resistance thermometer as the factory standard.

In some driers, there can be a +/- 3% deviation in moisture content of the made tea. Final monitoring needs to be carried out as the dried tea exits the dryer in order to again check the moisture content. Ideally, NIR equipment should be used here for purposes of accuracy. Alternatively, tea samples need to be taken every 10-20 minutes to check the moisture content using a reliable moisture meter such as the Teacraft Thermoray. It is also advisable to check the moisture meter regularly for accuracy: ISO standards exist for this.

(vii) Monitoring grading

In the tea factory, checks on grading are traditionally done by eye. The grading machines (sifters) are set up with standard meshes which must not have any faults or large holes in, and a more exact way to check that the meshes are doing their job of separating the leaf into particles of regular sizes is to use particle size analysis. This passes a set amount of tea through the sieves in a set time to check that the grading profile is the same each day or each week. The grade profile is measured using a set of certified sieves and a laboratory sieve shaker to test that the size range of particles going into a grade is always the same. If it is not, then the settings and meshes of the factory sifters must be adjusted slightly.

The amount of emphasis put on grading depends very much on what packers and blenders are demanding from their suppliers. It is especially important for teabag manufacturers. If the density of a given tea is incorrect, it can affect the amount that goes into the tea bags and may mean that expensive adjustments have to be made to packing machinery.

To help with this problem, modern factories use tapped density volume meters to make sure that after grading, a given volume of tea has a certain weight. The old-fashioned way to check this is to use a measuring cylinder that is filled with tea, and then bang on a hard surface to see how the level of tea settles. However, there are too many variables for this method to efficiently measure density and it does not meet international standards, thus an automatic tapped density volumeter is recommended for consistent monitoring.

(viii) Monitoring the moisture content in made tea

Once the made tea has been packed it is possible that it will absorb quality-destroying moisture during transportation and storage. Paper sacks, with their four layers of paper, foil and polythene, are a vast improvement on tea chests, but if sacks are not made to internationally acceptable standards, are not properly sealed at the valve or are ruptured in any way, the tea will not be totally protected from taints and moisture.

When sacks of tea arrive in the factory where they are to be blended, it is important to check the moisture content so that tea with a higher level of moisture content is used before tea with a lower level of moisture. Monitoring bulk moisture content can be carried out by plunging a probe moisture meter into the sacks or tea chests.

(D) FUTURE EXECUTION

Tea companies may feel that all the tea they make will find a market and that they therefore do not have to worry very much about monitoring the various stages of the manufacturing process. But monitoring can help them to save money by making efficient use of machinery and equipment, and by improving and standardizing quality they will attain better prices in the marketplace.

The amount of monitoring needed varies from one factory to another and monitoring must be appropriate to the particular situation. Many factories would benefit from the use of simple equipment to run simple checks. But the most important aspects of manufacture that every factory should be concerned with are the monitoring of temperature, humidity, airflow, moisture content and density in the packing room.

One of the most useful pieces of equipment that can help tea manufacturers improve quality and reduce costs is the unique award-winning Teacraft ECM System for Miniature Manufacturing of Black Tea. This mini-scale tea factory can precisely simulate any process conditions and is being used by tea research institutes and forward-looking tea producers throughout the world. It can be set up to show how tea quality varies according to process conditions and helps the factory manager to set conditions that are ideal for the quality he is trying to achieve. Samples of teas made under a range of different process conditions can be sent to brokers who can immediately put a value on the tea and therefore tell the manufacturer how much he would make or save on the production of that tea in the factory situation.

Nigel Melican knows tea from nursery through field and factory to value added packing. He claims to have processed tea on every continent except Antarctica. After 27 years with Unilever Research, he set up Teacraft Ltd. in 1990 to provide advice and supply technology to the tea industry worldwide. Teacraft is based in England but the company works wherever tea grows.

(E) TEA PRODUCTION IN KENYA

Tea is a major cash crop that is grown in Kenya. Tea is ranked as third major Forex earner, in Kenya behind Tourism and Horticulture. Most tea produced in Kenya is Black Tea. However green tea, yellow tea and white tea are produced on order by major tea producer.

Tea was discovered more than 5000 years ago,by an emperor Shen Nung in China. Tea was first introduced in Kenya in 1903 by GWL and was planted in present day Limuru. However commercialization of the tea started in 1924 and since then, Kenya can boast itself as major producer of black tea. Kenya is one of the world's top

producers and exporters of tea, currently Kenya is ranked 3rd behind china and India. Kenyan tea is also one of the top foreign exchange earners, alongside tourism, horticulture and Kenyan coffee. The task of managing the small scale holder lies with KTDA. Currently KTDA has 62 tea factories serving over 500,000 small scale farmers cultivating over 100,000ha. Of all tea produced in Kenya KTDA produce over 60% while the rest is produced by the large scale producer.

(i) Labour

in most ares of tea growing region, labour is usually manual. However in tea plucking machine are currently being in use by multinationals. Workers who pick and pack tea on plantations in developing countries can face harsh working conditions and can earn below the living wage.

(ii) Cultivation

Kenya's Tea growing regions endowed with ideal climate; Tropical, volcanic red soils; well distributed rainfall ranging between 1200 mm to 1400mm per annum; long sunny days are some of the climatic features of the Tea growing regions. Tea is planted in an area of over 157,720 hectares, with production of about 345,817 metric tonnes of made Tea. Over 325,533 metric tonnes exported. Vegetative propagation of high-yielding, well-adapted clones. Over 49 varieties so far developed by the Tea Research Foundation of Kenya (TRFK). No chemicals used. Fertilizers are regularly added to replenish soil nutrients.

(iii) Processing

Distinct, high quality Teas made from the upper two leaves and a bud. Young shoots plucked in regular cycles ranging from seven to 14 days. Tea manufactured using Cut, Tear and Curl (CTC) method to ensure maximum cuppage per unit weight. Good agronomical and manufacturing practices, making Kenya the leading producer of the best black tea in the world. Teas with medium to very fine qualities, the attributes that make Kenya Tea the most sought after beverage in the world.

(iv) Product

When processing the tea it is graded in to different grades. The major grades are;

BP1 - Broken Pekoe 1 forms about 12-14% of the total production. It has the largest size. The liquors are a bit light in body but with encouraging flavouring characteristics.

PF1 - Pekoe Fanning 1. This is about 58-60% and forms the bulk of the production. Its made up of black grainy particles slightly smaller in size than the BP1 grade.

Dust1 - This is made up of the smallest particles and form about 4- 6% of the total production.

PD -Pekoe Dust. It forms 10-12% of the production, often black and finer than the PF1 often with thick liquors and aroma.

Fngs1 - The mixture has traces of black tea and large amount of smallish cut fibres often sifted out of the primary grades. F1 forms about 3-4% of the production and quite useful in tea bags due to its quick brewing, strong flavour and good colour.

Dust - Made up of tiny bits of broken leaf often used to brew strong tea quickly and popular for the tea bags

(v) International Prices

Inside the auction house, where etiquette is strict, with ties required for brokers and collared shirts for buyers.Tea is sold through public auction in Mombasa. The bidding is automated and all bids are made in USC. The prices of teas depend on grades where tea prices for factories and countries range between USC200 to USC400. The average price is USC300.

(vi) Institution and Research

Tea in Kenya is controlled by different institute and government bodies. They are; Ministry of Agricuture - bear responsibility to the government Tea Board of Kenya - to manage tea industry in Kenya on behalf of the

Government; Kenya Tea Development Agency(KTDA) - To manage small scale trades East Africa (EATTA) - to facilitate tea trade in East Africa and southern Africa. Tea Research Foundation of Kenya(TRFK)- to facilitate tea research in Kenya.

In 2011 the TBK and Egerton University entered into a partnership in order to strengthen tea industry in Kenya. They drafted a curriculum,that will offer Undergraduate, Post graduate,Certificate and diploma Tea production & Marketing and Tea Processing Technology & Management.

(F) EFFECT OF TECHNOLOGY IN TEA PRODUCTION ON COSTS

When technology advances so does the production of units increase which causes the average variable cost, which is the costs that vary with the quantity produced, to decrease. Also as the production increases, the fixed cost is spread over more units, causing the average fixed cost to also decrease. The decreasing average variable cost is reflected by advancement on technology such as machinery and computer technology. With the advancement get better grades of technology today the decreasing variable cost is also reflected by the labor by now machinery is replacing workers and or jobs. An example is the automotive industry twenty years ago was constructing automotives with workers and today is constructing automotives with robots. By buying new technology and hiring fewer workers a small firm will receive more production of units on average. The amount of work and time required per unit of the output decreases, which decreases the average variable cost. The average total cost, which is the total of the average fixed cost and the average variable cost, will also decrease by when the output increases by the new technology and spreading the fixed cost. By advancement of technology for small quantities of output, the average variable cost decreases as output increase, because of the new technology increased its production with more output with less time and human labor. Spreading the fixed cost of a small amount of output by one.

(G) CONSUMPTION OF TEA IN RELATION TO CULTURE AND ATTITUDES

Tea plant (Camellia sinensis) from kohler's medicinal plants ; Tea is an aromatic beverage commonly prepared by pouring boiling hot water over cured leaves of the Camellia sinensis plant. The term also refers to the plant itself. After water, tea is the most widely consumed beverage in the world. It has a cooling, slightly bitter, astringent flavour which many people enjoy.

Consumption of tea (especially green) is beneficial to health and longevity given its antioxidant,flavanol,flavonoids , polyphenols, and catechins, content. Tea catechins have known anti-inflammatory and neuroprotective activities, help to regulate food intake, and have an affinity for cannabinoid receptors, which may suppress pain and nausea, and provide calming effects. Consumption of green tea is associated with a lower risk of diseases that cause functional disability, such as "stroke, cognitive impairment, and osteoporosis" in the elderly.

Tea contains l-theanine, and its consumption is strongly associated with a calm but alert and focused, relatively productive (alpha wave dominant), mental state in humans. This mental state is also common to meditative practice. The phrase herbal tea usually refers to infusions of fruit or herbs made without the tea plant, such as rosehip tea or chamomile tea. Alternative phrases for this are tisane or herbal infusion, both bearing an implied contrast with "tea" as it is construed here.

Two principal varieties are used: the China plant (C. s. sinensis), used for most Chinese, Formosan and Japanese teas (but not Pu-erh); and the clonal Assam tea plant (C. s. assamica), used in most Indian and other teas (but not Darjeeling). Within these botanical varieties, there are many strains and modern Indian clonal varieties. Leaf size is the chief criterion for the classification of tea plants,[18] with three primary classifications

being: Assam type, characterized by the largest leaves; China type, characterized by the smallest leaves; and Cambod, characterized by leaves of intermediate size.

Teas can generally be divided into categories based on how they are processed. There are at least six different types of tea: white, yellow, green, oolong (or wulong), black (called red tea in China), and post-fermented tea (or black tea for the Chinese) of which the most commonly found on the market are white, green, oolong , and black. Some varieties, such as traditional oolong tea and Pu-erh tea, a post-fermented tea, can be used medicinally.

After picking, the leaves of C. sinensis soon begin to wilt and oxidize, unless they are immediately dried. The leaves turn progressively darker as their chlorophyll breaks down and tannins are released. This enzymatic oxidation process, known as fermentation in the tea industry, is caused by the plant's intracellular enzymes and causes the tea to darken. In tea processing, the darkening is stopped at a predetermined stage by heating, which deactivates the enzymes responsible. In the production of black teas, the halting of oxidization by heating is carried out simultaneously with drying.

Without careful moisture and temperature control during manufacture and packaging, the tea may become unfit for consumption, due to the growth of undesired molds and bacteria. At minimum, it may alter the taste and make it undesirable.

Numerous recent epidemiological studies have been conducted to investigate the effects of green tea consumption on the incidence of human cancers. These studies suggest significant protective effects of green tea against oral, pharyngeal, esophageal, prostate, digestive, urinary tract, pancreatic, bladder, skin, lung, colon, breast, and liver cancers, and lower risk for cancer metastasis and recurrence. Possibly most noteworthy are human intervention studies that find consumption of green tea cuts the risk of ovarian and endometrial cancers, and advanced prostate cancer by 50%. Cholesterol and blood sugar levels are lowered significantly by drinking green tea. Drinking green tea is negatively associated with diabetes, possibly due to moderated oxidative stress on fats, which may reduce insulin resistance.

Consumption of green tea is associated with a lower risk of diseases that cause functional disability, such as "stroke, cognitive impairment, and osteoporosis" in the elderly. Specific to mental function, researchers in 2010 found people who consumed tea had significantly less cognitive decline than tea nondrinkers. The study used data on more than 4,800 men and women aged 65 and older to examine change in cognitive function over time. Study participants were followed for up to 14 years for naturally occurring cognitive decline.

L-theanine in tea may reduce stress by inducing a calm but alert, focused, and relatively productive (alpha wave dominant) mental state in humans. This mental state is also common to meditative practice. However, a 2012 Scottish based study indicated that men who drink more than seven cups of black tea a day could increase their risk of prostate cancer.

While tea is the second most consumed beverage on Earth after water, in many cultures it is also consumed at elevated social events, such as afternoon tea and the tea party. Tea ceremonies have arisen in different cultures, such as the Chinese and Japanese tea ceremonies, each of which employs traditional techniques and ritualized protocol of brewing and serving tea for enjoyment in a refined setting. One form of Chinese tea ceremony is the tea ceremony, which typically uses small clay teapots and oolong tea.

In the United Kingdom, especially England, it is consumed daily and often by a majority of people across the country, and indeed is perceived as one of Britain's cultural beverages. In British homes, it is customary good manners for a host to offer tea to guests soon after their arrival. The British prefer black tea, usually from a tea bag, served in mugs with milk and perhaps sugar. Tea is generally consumed at home; outside the home in cafés. Afternoon tea with cakes on fine porcelain is a cultural stereotype, sometimes available in quaint tea-

houses. In southwest England, many cafes serve a 'cream tea', consisting of scones, clotted cream, and jam alongside a pot of tea. Throughout England, and Scotland, 'tea' may also refer to the evening meal.

In Burma (Myanmar), tea is consumed not only as hot drinks, but also as sweet tea and green tea known locally as laphet-yay and laphet-yay-gyan, respectively. Pickled tea leaves, known locally as laphet, are also a national delicacy. Pickled tea is usually eaten with roasted sesame seeds, crispy fried beans, roasted peanuts and fried garlic chips.

The traditional method of making a cup of tea is to place loose tea leaves, either directly or in a tea infuser, into a tea pot or teacup and pour freshly boiled water over the leaves. After a few minutes, the leaves are usually removed again, either by removing the infuser, or by straining the tea while serving.

Most green teas should be allowed to steep for about two or three minutes, although some types of tea require as much as ten minutes, and others as little as 30 seconds. The strength of the tea should be varied by changing the amount of tea leaves used, not by changing the steeping time. The amount of tea to be used per amount of water differs from tea to tea, but one basic recipe may be one slightly heaped teaspoon of tea (about 5 ml) for each teacup of water (200–240 ml) (7–8 oz) prepared as above. Stronger teas, such as Assam, to be drunk with milk, are often prepared with more leaves, and more delicate high-grown teas such as a Darjeeling are prepared with somewhat fewer (as the stronger mid-flavors can overwhelm the champagne notes). Some tea sorts are often brewed several times using the same leaves. Historically in China, tea is divided into a number of infusions. The first infusion is immediately poured out to wash the tea, and then the second and further infusions are drunk. The third through fifth are nearly always considered the best infusions of tea, although different teas open up differently and may require more infusions of hot water to produce the best flavor.

One way to taste a tea, throughout its entire process, is to add hot water to a cup containing the leaves and after about 30 seconds to taste it. As the tea leaves unfold (known as "The Agony of the Leaves"), they give up various parts of themselves to the water and thus the taste evolves. Continuing this from the very first flavours to the time beyond which the tea is quite stewed will allow an appreciation of the tea throughout its entire length.

In the West, water for black tea is usually added near the boiling point of water, at around 99°C (210°F). Many of the active substances in black tea do not develop at temperatures lower than 90 °C (194 °F).[citation needed] Lower temperatures are used for some more delicate teas. The temperature will have as large an effect on the final flavor as the type of tea used. The most common fault when making black tea is to use water at too low a temperature. Since boiling point drops with increasing altitude, it is difficult to brew black tea properly in mountainous areas. It is also recommended that the teapot be warmed before preparing tea, easily done by adding a small amount of boiling water to the pot, swirling briefly, and then discarding it. In the West, black teas are usually brewed for about four minutes and are usually not allowed to steep for less than 30 seconds or more than about five minutes (a process known as brewing or mashing in Britain). In many regions of the world, however, boiling water is used and the tea is often stewed. For example in India, black tea is often boiled for fifteen minutes or longer as a strong brew is preferred for making Masala chai. When the tea has brewed long enough to suit the tastes of the drinker, it should be strained while serving. The popular varieties of black (red) tea include Assam tea, Nepal tea, Darjeeling tea, Nilgiri tea, Turkish tea and Ceylon tea.

Water for green tea, according to regions of the world that prefer mild tea, should be around 80 to 85 °C (176 to 185 °F); the higher the quality of the leaves, the lower the temperature. Hotter water will produce a bitter taste. However, this is the method used in many regions of the world, such as North Africa or Central Asia, where bitter tea is appreciated. For example, in Morocco, green tea is steeped in boiling water for 15 minutes. In the West and Far East, a milder tea is appreciated. The container in which the tea is steeped, the mug or teapot, is

often warmed beforehand so the tea does not immediately cool down. High-quality green and white teas can have new water added as many as five or more times, depending on variety, at increasingly higher temperatures. Oolong teas should be brewed around 90 to 100 °C (194 to 212 °F), and again the brewing vessel should be warmed before pouring in the water. Purple clay teapots are the traditional brewing-vessel for oolong tea. For best results, use spring water, as the minerals in spring water tend to bring out more flavor in the tea. High quality oolong can be brewed multiple times from the same leaves, and unlike green tea, it improves with reuse. It is common to brew the same leaves three to five times, the third steeping usually being the best.

Some teas, especially green teas and delicate oolong teas are steeped for shorter periods, sometimes less than 30 seconds. Using a tea strainer separates the leaves from the water at the end of the brewing time if a tea bag is not being used. However, the black Darjeeling tea, a premium Indian tea, needs a longer than average steeping time. Elevation and time of harvest offer varying taste profiles; proper storage and water quality also have a large impact on taste. Pu-erh teas require boiling water for infusion. Some prefer to quickly rinse pu-erh for several seconds with boiling water to remove tea dust which accumulates from the aging process, then infuse it at the boiling point (100°C or 212°F), and allow it to steep from 30 seconds to five minutes.

In Southeast Asia, particularly in Malaysia, the practice of pouring tea from a height has been refined further using black tea to which condensed milk is added, poured from a height from one cup to another several times in alternating fashion and in quick succession, to create a tea with entrapped air bubbles creating a frothy "head" in the cup. This beverage, teh tarik, literally, "pulled tea", has a creamier taste than flat milk tea and is extremely popular in the region. Tea pouring in Malaysia has been further developed into an art form in which a dance is done by people pouring tea from one container to another, which in any case takes skill and precision. The participants, each holding two containers, one full of tea, pour it from one to another. They stand in lines and squares and pour the tea into each others' pots. The dance must be choreographed to allow anyone who has both pots full to empty them and refill those of whoever has no tea at any one point.

Tea is the most popular manufactured drink in the world in terms of consumption. Its consumption equals all other manufactured drinks in the world – including coffee, chocolate, soft drinks, and alcohol – put together.[3] Most tea consumed outside East Asia is produced on large plantations in the hilly regions of India and Sri Lanka, and is destined to be sold to large businesses. Opposite this large-scale industrial production are many small "gardens," sometimes minuscule plantations, that produce highly sought-after teas prized by gourmets. These teas are both rare and expensive, and can be compared to some of the most expensive wines in this respect.

India is the world's largest tea-drinking nation, although the per capita consumption of tea remains a modest 750 grams per person every year. Turkey, too follows India with 2.5 kg of tea consumed per person per year.

(H) TEA HARVEST AND ITS CONTENTS

(i) Blending and additives

Although single estate teas are available, almost all teas in bags and most other teas sold in the West are blends. Blending may occur in the tea-planting area (as in the case of Assam), or teas from many areas may be blended. The aim of blending is to obtain better taste, higher price, or both, as a more expensive, better-tasting tea may cover the inferior taste of cheaper varieties. Some teas are not pure varieties, but have been enhanced through additives or special processing. Tea is highly receptive to inclusion of various aromas; this may cause problems in processing, transportation, and storage, but also allows for the design of an almost endless range of scented and flavored variants, such as bergamot (Earl Grey), vanilla, caramel, and many others.

Tea contains catechins, a type of antioxidant. In a freshly picked tea leaf, catechins can compose up to 30% of the dry weight. Catechins are highest in concentration in white and green teas, while black tea has substantially

fewer due to its oxidative preparation. Research by the U.S. Department of Agriculture has suggested the levels of antioxidants in green and black tea do not differ greatly, as green tea has an oxygen radical absorbance capacity (ORAC) of 1253 and black tea an ORAC of 1128 (measured in μmol TE/100 g). Antioxidant content, measured by the lag time for oxidation of cholesterol, is improved by the cold water steeping of varieties of tea.
Tea also contains l-theanine, and the stimulant caffeine at about 3% of its dry weight, translating to between 30 mg and 90 mg per 8 oz (250 ml) cup depending on type, brand, and brewing method. Tea also contains small amounts of theobromine and theophylline. Due to modern environmental pollution, fluoride and aluminium have also been found to occur in tea, with certain types of tea brick made from old leaves and stems having the highest levels. This occurs due to the tea plant's high sensitivity to absorp Tea leaves contain more than 700 chemicals, among which the compounds closely related to human health are flavonoids, amino acids, vitamins (C, E and K), caffeine and polysaccharides. Moreover, tea drinking has recently proven to be associated with cell-mediated immune function of the human body. Tea plays an important role in improving beneficial intestinal microflora, as well as providing immunity against intestinal disorders and in protecting cell membranes from oxidative damage. Tea also prevents dental caries due to the presence of fluorine. The role of tea is well established in normalizing blood pressure, lipid depressing activity, prevention of coronary heart diseases and diabetes by reducing the blood-glucose activity. Tea also possesses germicidal and germistatic activities against various gram-positive and gram negative human pathogenic bacteria. Both green and black tea infusions contain a number of antioxidants, mainly catechins that have anti-carcinogenic, anti-mutagenic and anti-tumoric properties.
Catechins in green tea possess anticancer properties against "cancer in various organs, including the colorectum and liver, and are known to exert anti-obesity, antidiabetic, and anti-inflammatory effects." "Branched-chain amino acids in green tea may prevent progressive hepatic failure in patients with chronic liver diseases, and might be effective for the suppression of obesity-related liver carcinogenesis."
An anticarcinogenic effect of tea polyphonols has been provided by numerous in vitro and experimental studies, which describe their action to “bind directly to carcinogens, induce phase II enzymes such as UDP-glucuronosyl transferase and inhibit heterocyclic amine formation.” “Molecular mechanisms, including catechin-mediated induction of apoptosis and cell cycle arrest, inhibition of transcription factors NF-κB and AP-1 and reduction of protein tyrosine kinase activity and c-jun mRNA expression have also been suggested as relevant chemopreventive pathways for tea.” Protective effects from tea consumption are observed less frequently in populations whose intake of black tea predominates.

(ii) Characteristics and origin of tea

Camellia sinensis is an evergreen plant that grows mainly in tropical and subtropical climates. Some varieties can also tolerate marine climates and are cultivated as far north as Pembrokeshire in the British mainland and Washington in the United States. Tea plants are propagated from seed or by cutting; it takes about four to 12 years for a tea plant to bear seed, and about three years before a new plant is ready for harvesting. In addition to a warmer climate, tea plants require at least 127 cm. (50 inches) of rainfall a year and prefer acidic soils. Many high-quality tea plants are cultivated at elevations of up to 1,500 m (4,900 ft) above sea level: at these heights, the plants grow more slowly and acquire a better flavor.
Only the top 1-2 inches of the mature plant are picked. These buds and leaves are called "flushes". A plant will grow a new flush every seven to 15 days during the growing season, and leaves that are slow in development always produce better-flavored teas. A tea plant will grow into a tree of up to 16 m if left undisturbed, but cultivated plants are pruned to waist height for ease of plucking.

Although tea contains various types of polyphenols and tannin, it does not contain tannic acid Tannic acid is not an appropriate standard for any type of tannin analysis because of its poorly defined. Tea plants are native to East and South Asia, and probably originated around the point of confluence of the lands of northeast India, north Burma and southwest China. Although there are tales of tea's first use as a beverage, no one is sure of its exact origins. The first recorded drinking of tea is in China, with the earliest records of tea consumption dating back to the 10th century BC. It was already a common drink during the Qin Dynasty (third century BC) and became widely popular during the Tang Dynasty, when it was spread to Korea, Japan and possibly Vietnam although it was not recorded when the Vietnamese began to drink tea. Trade of tea by the Chinese to Western nations in the 19th century spread tea and the tea plant to numerous locations around the world.

Tea was imported to Europe during the Portuguese expansion of the 16th century, at which time it was termed chá. In 1750, tea experts traveled from China to the Azores Islands, and planted tea, along with jasmines and mallows, to give the tea aroma and distinction. Both green and black tea continue to grow in the islands, which are the main suppliers to continental Portugal. Catherine of Braganza, wife of Charles II, took the tea habit to Great Britain around 1660, but until the 19th century, tea was not as widely consumed in Britain as it is today. In Ireland, tea had become an everyday beverage for all levels of society by the late 19th century, but it was first consumed as a luxury item on special occasions, such as religious festivals, wakes, and domestic work gatherings such as quiltings. Several of the potential health benefits proposed for tea are outlined in this excerpt from as following:

(iii) Different words of tea

Tea has been known in different words: té or thé, but this term is considered archaic and is a literary expression; since roughly the beginning of the 20th century, čaj is used for "tea" in Czech language. The different words for tea fall into two main groups: "te-derived" (min)"cha-derived"(Cantonese and Mandarin). The words that various languages use for "tea" reveal where those nations first acquired their tea and tea culture. Portuguese traders were the first Europeans to import the herb in large amounts. The Portuguese borrowed their word for tea (cha) from Cantonese in the 1550s via their trading posts in the south of China, especially Macau.

In Central Asia, Mandarin cha developed into Persian chay, and this form spread with Persian trade and cultural influence. The Dutch word for "tea" (thee) comes from the Min dialect. The Dutch may have borrowed their word for tea through trade directly from Fujian, or from Fujianese or Malay traders in Java. From 1610 on, the Dutch played a dominant role in the early European tea trade, via the Dutch East India Company, influencing other languages to use the Dutch word for tea. Other European languages whose words for tea derive from the Min dialect (via Dutch) include English, French (thé), Spanish (te), and German (Tee). The Dutch first introduced tea to England in 1644. By the 19th century, most British tea was purchased directly from merchants in Canton, whose population uses cha, though English never replaced its Dutch-derived Min word for tea.

The Chinese character for tea is te. It is pronounced differently in the various Chinese languages. Most pronounce it along the lines of cha (Mandarin has chá), but the Min varieties along the central coast of China and in Southeast Asia pronounce it like te. These two pronunciations of the Chinese word for tea have made their separate ways into other languages around the tion of environmental pollutants.

(iii) Certification of the production of tea.

A number of bodies independently certify the production of tea. Tea from certified estates can be sold with a certification label on the pack. The most important certification schemes are Rainforest Alliance, Fairtrade, UTZ Certified, and Organic. All these schemes certify other crops (such as coffee, cocoa and fruit), as well. Rainforest Alliance certified tea is sold by Unilever brands Lipton and PG Tips in Western Europe, Australia

and the US. Fairtrade certified tea is sold by a large number of suppliers around the world. UTZ Certified announced a partnership in 2008 with Sara Lee brand Pickwick tea.

Production of organic tea is rising; 3,500 tonnes of organic tea were grown in 2003. The majority of this tea (about 75%) is sold in France, Germany, Japan, the United Kingdom and the United States. According to the FAO in 2007, the largest importer of tea, by weight, was the Russian Federation, followed by the United Kingdom, Pakistan, and the United States.[66] Kenya, China, India and Sri Lanka were the largest exporters of tea in 2007 (with exports of: 374229, 292199, 193459 and 190203 tonnes respectively). The largest exporter of black tea in the world is Kenya, while the largest producer (and consumer) of black tea in the world is India.

In 1907, American tea merchant Thomas Sullivan began distributing samples of his tea in small bags of Chinese silk with a drawstring. Consumers noticed they could simply leave the tea in the bag and reuse it with fresh tea. However, the potential of this distribution/packaging method would not be fully realized until later on. During World War II, tea was rationed in the United Kingdom. In 1953 (after rationing in the UK ended), Tetley launched the tea bag to the UK and it was an immediate success.

Tea leaves are packed into a small envelope (usually composed of paper) known as a tea bag. The use of tea bags is easy and convenient, making them popular for many people today. However, the use of tea bags has negative aspects, as well. The tea used in tea bags is commonly fannings or "dust", the waste product produced from the sorting of higher quality loose leaf tea. However, this is not true for all brands of tea; many high quality specialty teas are available in bag form.[citation needed] Tea aficionados commonly believe this method provides an inferior taste and experience. The paper used for the bag can also be tasted by many, which can detract from the tea's flavor. Because fannings and dust are a lower quality of the tea to begin with, the tea found in tea bags is less finicky when it comes to brewing time and temperature.

Dried tea loses its flavor quickly on exposure to air. Most bag teas (although not all) contain leaves broken into small pieces; the great surface area to volume ratio of the leaves in tea bags exposes them to more air, and therefore causes them to go stale faster. Loose tea leaves are likely to be in larger pieces, or to be entirely intact.

The small size of the bag does not allow leaves to diffuse and steep properly. Some tea bags are made using a wet paper strength-reinforcing coating using epichlorohydrin, a known carcinogen. The "pyramid tea bag" (or sachet) introduced by Lipton and PG Tips/Scottish Blend in 1996, attempts to address one of the connoisseurs' arguments against paper tea bags by way of its three-dimensional tetrahedron shape, which allows more room for tea leaves to expand while steeping[citation needed]. However, some types of pyramid tea bags have been criticized as being environmentally unfriendly, since their synthetic material is not as biodegradable as loose tea leaves and paper tea bags.

The tea leaves are packaged loosely in a canister or other container. Rolled gunpowder tea leaves, which resist crumbling, are commonly vacuum packed for freshness in aluminized packaging for storage and retail. The portions must be individually measured by the consumer for use in a cup, mug, or teapot. This allows greater flexibility, letting the consumer brew weaker or stronger tea as desired, but convenience is sacrificed. Strainers, "tea presses", filtered teapots, and infusion bags are available commercially to avoid having to drink the floating loose leaves and to prevent over-brewing. A more traditional, yet perhaps more efficient way around this problem is to use a three-piece lidded teacup, called a gaiwan. The lid of the gaiwan can be tilted to decant the leaves while pouring the tea into a different cup for consumption.

Some teas (particularly Pu-erh tea) are still compressed for transport, storage, and aging convenience. The tea brick remains in use in the Himalayan countries or Mongolian steppes. The tea is prepared and steeped by first loosening leaves off the compressed cake using a small knife. Compressed teas can usually be stored for longer periods of time without spoilage when compared with loose leaf tea.

In recent times, "instant teas" are becoming popular, similar to freeze-dried instant coffee. Similar products also exist for instant iced tea, due to the convenience of not requiring boiling water. Instant tea was developed in the 1930s, but not commercialized until later. Nestea introduced the first instant tea in 1946, while Redi-Tea introduced the first instant iced tea in 1953. These products often come with added flavors, such as chai, vanilla, honey or fruit, and may also contain powdered milk. Tea connoisseurs tend to criticize these products for sacrificing the delicacies of tea flavour in exchange for convenience. Switzerland is considered as the motherland of bottled iced tea. Maks Sprengler, a Swiss businessman, tried the famous American iced tea and was the first to suggest producing ready-made iced tea in bottles. In 1983, Bischofszell Food Ltd. became the first producer in the world of bottled ice tea on an industrial scale. Canned tea is a form of tea that has already been prepared, and is sold ready to drink. Canned tea was first launched in 1981 in Japan. As such, it is a fairly recent innovation. Tea shelf life varies with storage conditions and type of tea. Black tea has a longer shelf life than green tea. An exception, pu-erh tea, improves with age. Tea stays freshest when stored in a dry, cool, dark place in an air-tight container. Black tea stored in a bag inside a sealed opaque canister may keep for two years. Green tea loses its freshness more quickly, usually in less than a year. Gunpowder tea, its leaves being tightly rolled, keeps longer than the more open-leafed Chun Mee tea. Storage life for all teas can be extended by using desiccant packets or oxygen-absorbing packets, and by vacuum sealing.

When storing green tea, discreet use of refrigeration or freezing is recommended. In particular, drinkers need to take precautions against temperature variation. Improperly stored tea may lose flavor, acquire disagreeable flavors or odors from other foods, or become moldy.

(J) CONCLUSION

Technology has certainly made a tremendous impact on the business world. In many ways, it allows an organization to gain and maintain a competitive advantage. Quicker access to up-to-date information allows for more rapid decision making. E-mail, video conferencing, and hand-held computers allow for quicker communications and more rapid problem solving. Computers, fax have to assimilate that information and make decisions. According to an article by Paul Rogers, machines and conference calls allow organizations to employ highly skilled individuals, disregarding demographics.

However, technology is not without its drawbacks. Along with rapid decision-making comes more frequent errors. Quality can suffer as a result. Along with rapid communication, comes a loss of free time. If a manager is always accessible, his or her personal life will suffer. Along with this comes increased stress from being constantly under pressure. This could lead to increased health problems. Although there is a real advantage to telecommuting, it can lead to a lack of organizational loyalty both for the employer and for the employee. More rapid turnover in

employees can cause discontinuity in an organization. For employees, there will be less job security and less opportunity for long-term employment.

(K) RECOMMENDATIONS

The benefits of technology need to be closely weighed against its costs. Managers will need specialized training if they are to keep pace with an ever changing technology. Part of that training should include the decision making process in a fast paced environment. Perhaps managers should heed the old sayings ‘Act in haste, repent in leisure’ and ‘Make haste slowly.’ Additionally, managers will need to establish personal boundaries. No one can or should be “on the clock” twenty-four hours a day. Finally, organizations will need to focus on practices

for attracting and maintaining good employees and find means to develop organizational loyalty even when employees are located
throughout the world.

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