

Study on Cleaning Challenges Faced in Using Juicer, Mixer and Grinder by Street Juice Vendors

Avilisa Acharya¹, Aastha Deshpande²

^{1,2}World University Of Design Plot No. 1, Rajiv Gandhi Education City, Sonipat, Haryana 131029

Abstract

The street vendors regularly use juice mixer grinder to produce juices and shakes.

After each use, cleaning of the machines is essential to ensure hygienic conditions, but cleaning may not be easy because of narrow openings, grooves and difficulty in cleaning blades and other hard to access regions due to accumulation of food pulp and residue.

They generally use cloth, water, their hands and cleaning brushes, which does not give satisfactory cleaning and may fail to clean effectively and are not convenient to use repeatedly.

The aim of this study is to understand the cleaning practices and difficulties encountered by the vendors in cleaning the machines.

To design an efficient, durable and user friendly cleaning equipment for cleaning juicer-mixer-grinder.

This study adopts user centric approach including primary and secondary researches.

Primary research involves interviewing the vendors, observation of their cleaning routines, problems and requirements faced by them.

Secondary research involves understanding the existing products on juice cleaning tools, brushes, ergonomics and materials.

A The difficulties associated with cleaning of the narrow and difficult to reach places of juice equipment, removal of the fruit pulp and remaining residue, manipulation of the tools and following the method repeatedly also understanding the durability of existing products.

This study provides a fundamental base to design a cleaning tool specifically for the juice vendors which makes the cleaning process easier and convenient.

Taking into consideration their needs such as durability, easy maintenance and effective cleaning.

Keywords-Street juice vendor, juicer mixer grinder, cleaning tool, food hygiene, juicer cleaning.

Introduction

A street juice vendor is a common and important entity in urban area mainly in markets, residential areas, schools, office areas, where they have stalls or carts having juicer equipment, glasses, ice boxes, knife board, stack of fruits and many more.

Juicer mixer grinders are the most important and major equipment in juice stalls and it is used repeatedly during the working day.

Continuous use of these equipments results in continuous contact with the fruit pulp, seeds and other food residues.

Thus, regular cleaning is required to maintain proper hygiene and sanitation while preparing juices. Cleaning of the juice extractor machine is not only the cleaning of the visible residue but also of the residue that remains in the narrow parts, grooves, blades, and other hard to clean areas of the machine. If this area is not washed and cleaned in a proper manner, the buildup of the residue will happen that will make the cleaning process difficult and may even lead to breaking down and ruin of the equipment. Cleaning of the juicer mixer grinder can be a difficult process for juice vendors as compared to general household cleaning since it is repeatedly used to make juice and shakes. The equipment consists of many parts such as blades, mesh screens, grooves, corners, and many more hard-to-clean places. And cleaning of these parts using the cloth, hands, and brushes becomes a difficult task due to repeated use of the equipment. Fruit pulp and juice residue become stuck in these places, and it is difficult to clean them using the conventional method of cleaning. Improper cleaning leads to the buildup of the juice residue, and it also affects the sanitation and hygiene of the machine. So, proper cleaning needs not only sufficient water and effort but also an efficient cleaning tool that makes the process simpler, faster and more efficient. The work environment and workspace conditions are very important during this whole process. The street juice vendors often operate from small space such as in a cart or stall. They have to do activities like preparation of juice, water provision, serving the customers, cleaning and washing the equipment and many other things at one time. Based on their routine and resources used for cleaning, the vendor uses cloth, water, hands and general cleaning brushes which cannot provide proper cleaning of food processing equipment. These techniques may provide some basic results but they are not efficient. There are several tools available for cleaning kitchen including different types of brushes and scrubbers but they are mainly made for common household purposes. Though a brush may prove to be effective, it might fail to clean the grooves and blades, while the material used to manufacture it might lack durability as it is an essential feature, for the street juice vendors employ the same cleaning tool every day and have to put it under water and juices all day long. Another essential aspect to consider while designing a cleaning tool is that of ergonomics. It involves repeated hand and wrist motions, scrubbing and gripping. An awkwardly shaped handle of the cleaning tool may prove to be inefficient due to discomfort and may lead to strain and fatigue while cleaning. Therefore, when designing a cleaning tool, factors such as efficient cleaning, ergonomic shape, durability, ease of use, user comfort and maintenance should be taken into account. Hygiene and sanitation are also very important issues and cleaning tools should be designed in a way which will make them easy to clean and dry so that they do not become sources of residual deposits themselves. The objective of the study is to investigate and understand the cleaning procedures and problems of a juice vendor and to find out

the requirement of an improved cleaning device for juicer mixer grinder.

Literature Review

Fruit juices prepared by street vendors are highly popular because of their availability, low cost, freshness and vitamin content.

The preparation process, equipment usage and hygiene of the environment also affect the microbial quality. Juice preparation equipment such as juicer mixer grinder, water, utensils, fruits, personal hygiene and working area can be sources of contamination in absence of proper cleaning procedures.

The objective of the study is to investigate and understand the cleaning procedures and problems of a juice vendor and to find out

the requirement of an improved cleaning device for juicer mixer grinder.

Review of Literature Fruit juices prepared by street vendors are highly popular because of their availability, low cost,

freshness and vitamin content.

The preparation process, equipment usage and hygiene of the environment also affect the microbial quality. Juice preparation equipment such as juicer mixer grinder, water, utensils, fruits, personal hygiene and working area can be sources of contamination in absence of proper cleaning procedures.

Research papers A study conducted(2020) by Neha Sharma(Antibiotic Resistance in Microbes from Street Fruit Drinks and Hygiene Behavior of the Vendors in Delhi, India)among street juice vendors in five markets in Delhi investigated hygiene practice cleaning routine and microbial contamination level of water and juice samples.

The researchers carried out the experiment on fifty juice vendors and found out that several food hygiene and safety procedures are not followed.

Moreover, the experiment showed the presence of E. coli, Salmonella, and other microorganisms in juice samples.

Thus, improved hygiene practice and cleaning schedule of equipment is crucial for the safety of food.

In another research carried out in 2025 by Azmathullah Rahmathullah (Scrubbing with risk: health and environmental hazards of

kitchen cleaning tools and sustainable alternatives), health and environmental risks of commonly used kitchen cleaning tools

such as brushes, sponges, and scrubbers are analyzed.

If the cleaning tool is used again and stays wet and moist, bacterial contamination can develop quickly on it.

This can lead to the accelerated development of microorganism depending on the material of the tool.

Also, the researchers looked into different sustainable alternatives of kitchen cleaning materials such as natural fiber, cellulose, loofah, silicone, and coconut coir.

This research draws attention to the importance of using cleaning tools that are hygienic, durable, sustainable, and healthy.

The experiment conducted in 2023 researched cleanability of different plastics and metals that are used in the food industry.

So, proper cleaning needs not only sufficient water and effort but also an efficient cleaning tool that makes the process simpler,

faster and more efficient.

The work environment and workspace conditions are very important during this whole process.

The street juice vendors often operate from small space such as in a cart or stall.

They have to do activities like preparation of juice, water provision, serving the customers, cleaning and washing the equipment and many other things at one time.

Based on their routine and resources used for cleaning, the vendor uses cloth, water, hands and general cleaning brushes which cannot provide proper cleaning of food processing equipment.

These techniques may provide some basic results but they are not efficient.

There are several tools available for cleaning kitchen including different types of brushes and scrubbers but they are mainly made for common household purposes.

The study explores that the surface characteristics and material of the tool is an important factor and it influences cleanability and microbial removal. These are relevant according to juicer mixer grinder cleaning because their material properties and surface characteristics can affect the removal of food residue and microorganisms. A study conducted in 2023 by Claudia Waldhans (Microbial investigation of cleanability of different plastic and metal surfaces used by the food industry) studied how easily different plastic and metal surfaces used in the food industry can be cleaned. The study found that the type and condition of a surface can affect how easily food residue and bacteria are removed. It shows that material and surface design are important when making food-related equipment and cleaning tools. Guidelines for Cleaning Equipment The Food Safety and Standards Authority of India (FSSAI) offers hygienic requirements for food street vendors. According to its necessity and requirement the food processing equipment and utensils should be properly cleaned and washed also should be in good condition. Water used for juice and shakes preparation should be safe and fit for human consumption. FSSAI also states that the utensils and equipment should be washed properly with detergents and cleaned washed after use. According to FSSAI guidance the materials of the equipment and utensils should be made of materials that are food grade, non toxic , non-corrosive and impenetrable.

This establishes the level of cleanliness and hygiene expected to be achieved.

Cleaning of food equipment and utensils is achieved by removal of dirt, residues, grease, food particles and microorganisms from the surface of the equipment.

In the case of juicer mixer grinder, juice, food particles, grease, residues, fiber and the fruit pulp remains on the blade, mesh, corner and difficult to reach areas.

Proper removal of visible particles is the first cleaning and sanitation process.

Food processing equipment is highly affected by the ease at which it is cleaned.

Equipment and utensils that have been poorly designed are difficult to clean because they contain areas that can lock food residue and microorganisms grow quickly.

It has been shown through research that cleaning tools that make cleaning easy reduce time, effort, water, detergent and energy needed.

In the juicer mixer grinder, there are multiple geometries and surfaces that can be effectively cleaned using one brush only; and hence it requires more time, effort and water.

Existing Cleaning Tools There are various methods of cleaning that are commonly used for food and kitchen equipment.

The common method is through cloth cleaning, scrubbing, manual brushing and rinsing with water.

For street juice vendors this solution is particularly used because vendors generally need solution that are not expensive, compact for small workspace, reusable. Existing manual solution includes water rinsing -

useful for removing loose fruit pulp and residue but may not clean strongly attached residue, cloth or sponge cleaning-helps cleaning board and open surface but cannot reach narrow surface, scrubbing brushes, scrappers-it can remove attached residue from the surface but can not clean mesh areas and blades. Several types of brushes are available to clean the equipment. Different materials are used in different parts of the brushes. Nylon is commonly used for the bristles cause its flexible, durable and suitable for scrubbing. PET is also used for the same purpose. Polypropylene (PP) is used for the handle part cause its lightweight, water resistance and affordable. The materials should be durable , water resistance and easy to maintain.

The durability of the material is crucial and it is due to the fact that cleaning tools will be exposed to water, fruit pulp, residue, and soap detergents regularly.

There are several common issues that may occur with cleaning tools; they are losing and breaking of bristles with the repeated usage, damage of handle and joints, and water collection.

A cleaning tool for a street juice vendor should be durable enough.

Several conclusions from literature review can be provided.

In scientific papers dedicated to street vended juice stalls, it is stated that maintaining hygiene and sanitation are crucial steps for avoiding hygiene issues and microbial contamination.

According to the FSSAI guidelines, food equipment should be cleaned and in good conditions.

Research on food equipment shows that the shape, structure, grooves and hard to reach areas affect cleaning and it can require more water consumption, efforts and time. existing cleaning tools has different shape brushes, bristles, sponges.

Research in the past has mostly concentrated on issues of food hygiene and sanitation of food equipment, significance of materials selected.

There are several tools which are used in cleaning of juicer mixer grinders and glasses along with cleaning of difficult to clean areas.

There are a few challenges which vendors have while cleaning equipment and utensils, in terms of physical effort, time and labor.

This study tries to address the requirements of the street juice vendors, in order to design a better cleaning tool based on the requirements.

Methodology

The study uses a mixed research approach in which both qualitative research and quantitative research are undertaken in order to find out the

challenges that street juice vendors have while making juices and shakes with juicer mixer grinder food processing equipment.

Primary Research

First Primary research was executed through interviewing a street juice vendor .

Observing vendors perform their routine activities from morning till night from setting up their stall to cleaning it and taking their cart back to their home.

The primary research was done through observing the vendor, interviewing him through various questionnaires.

The vendor was observed while cleaning and washing the juicer mixer grinder used for making juice to find out the process

that they follow, what areas are difficult to clean, how much time does it take to clean an equipment and how much effort is needed to clean.

Through this primary research with a street juice vendor it can be concluded that cleaning of juice equipment is a difficult task especially after its continuous use.

And it takes a lot of time and consumption of water and efforts for cleaning the difficult areas.

Continuous movements of the hands strain the hand muscles.

Sometimes they get injured while cleaning the blade part with their bare hands and cloth.

These informations help in identifying problems and in understanding the design requirement of an effective kitchen equipment cleaning

tool that will make cleaning easy, quick and durable.

Secondary Research Secondary research was conducted through researching on articles, research papers, FSSAI guidelines and existing product information.

These researches mainly revolve around food hygiene, cleaning process, cleaning food equipment, ergonomics, durability and materials.

Existing juice cleaning brush and kitchen cleaning tools were studied to understand about the material, functionality, features, limitations, and accessibility.

From the research paper it was understood that food hygiene is very important and necessary.

Food hygiene research paper focused on maintaining cleanliness in work space and cleanliness of equipment is mandatory to avoid microbial contamination.

Also understood the challenges faced by vendors in cleaning food equipment.

FSSAI guidelines were referred to understand the recommendations required in maintaining cleanliness and sanitation.

Existing kitchen cleaning tools were studied to learn about its design, shape, limitation, bristle types, material and cleaning capabilities.

Material research was done to know about different materials and their properties such as nylon, PET, polypropylene and silicone.

Ergonomic study also conducted to study the design, shape, grip, handle, comfort during cleaning.

The findings of secondary research provided insight about existing solutions and limitations in developing a cleaning tool that could address the needs of a juice vendor.

The various designs were developed based on the requirement through sketches.

A few selected sketches were then created as mockups before developing a prototype to test the size, shape, and usability of the product.

The tests were performed in order to test the usability, accessibility, comfort and durability of the tool.

Then the feedback was collected for improving the design.

Result

Through this research project, I have been able to discover the key problems faced by street juice vendors when it comes to cleaning their juicer mixer grinders.

After talking to the vendor and watching their process, it was found that the process of cleaning narrow areas, blade parts and grooves becomes very difficult when done with bare hands, cloth, and water.

Street vendors preferred the above methods because they are inexpensive.

But other than being inexpensive, they do not provide much of a solution.

Cleaning everyday using materials such as cloths, bare hands, scrubbers and regular brushes will eventually make them lose their efficiency and they have to be replaced by new products. And thus, in the long term, the cost of cleaning might become high. While it might look like an inexpensive method, in the long run, the continuous buying of the products will become expensive.

Thus designing an effective, efficient and sustainable cleaner tool is important.

While the tool might be more expensive than the cloths, scrubbers and general brushes, its sustainability will reduce the frequency of replacing it.

On the basis of research and requirements, different designs were generated using sketches. And out of those concepts, few were chosen. They were further developed as mockups. Mockups made of different materials were used in order to know about the size, shape, grip and usability of the tool.

Final Cleaning Tool Concept The final purposed cleaning tool is a multi functional cleaning tool , it has four main components and three different work it does.

The major head portion consists of a characteristic of scraping and scooping, wherein it scrapes off the fruit pulp and residue but scraping and scooping of the food particles from the juicer mixer grinder interior portion.

Its design is such that it has a somewhat bent shape that can help to effectively scrape and scoop off the pulps and residues from the surface.

The material of this portion is food grade silicone that can allow the head portion to effectively scrape and scoop off the pulps owing to its slightly bent shape and somewhat sharp edged top portion.

Behind the scraping and scooping head is the silicone scrubber that can effectively scrape off the food particles from the surface.

It is because Silicone is a good material due to its durability, flexibility, non-porosity, and fast drying nature.

The surface of the product does not retain moisture and food particles, hence, preventing any kind of bacterial growth.

This makes Silicone a good material for use in the cleaning tool which is always in contact with water and other liquid substances.

There is a small part at the base of the handle, which is actually a brush, and which is used to clean the blades and grooves in the surface of juicer mixer grinder and their caps with the help of long handle and brush portion at its base.

The material of the brush bristles are nylon cause of its durability , it is flexible, moisture resistance and it had good bend recovery. And it has a cap that can cover the brushes after drying and at the bottom of the cap there is hook that helps in hanging the cleaning tool. This cleaning tool combines scrapping, scooping, scrubbing and brushing functions in one tool making it more convenient and efficient for cleaning different part properly of the equipment. Feedback was taken from the juice vendor for improvement. The shape of the main scraping scooping head needed to bend a bit more slightly curvy and the size of the head from the sides needed to increase slightly for better comfort. easier handling, more efficient cleaning and experience.

It is necessary for keeping utensils and equipment clean and sanitized since otherwise many problems connected with the growth of microorganisms will appear. The utilization of cloth, scrubber, and general brushes is not very effective and these products require frequent replacing.

The proposed cleaning device consists of a set of functions which include scraping, scooping, scrubbing, brushing in one device.

The main head is used for scraping and scooping fruit pulps and residue, the back side of which is made of

silicone scrubber and is useful in scrubbing food particles. The lower part of the handle consists of nylon brushes and are useful in cleaning the blade, grooves and other hard-to-reach parts.

The food-grade silicone and nylon brushes are the material used in the tool and thus this tool is durable. Silicone is durable, flexible, non-porous and easily gets dry, Nylon is durable, flexible, moisture resistance and has bend recovery quality.

These material are good enough to be used for making a kitchen cleaner tool which will frequently come in contact with water.

Feedback from the juice vendor for improving the design of the tool was taken.

The changes to be made would be in making the main head slightly curvy and also making its sides slightly larger.

For future it is recommended that the tool should be tested in various juice stalls and carts under various working conditions for more feedback and improvement.

The test can also be conducted for knowing the durability and life of the tool along with the cleaning effectiveness.

Various other silicone and nylon material can also be tried to further improve the tool.

Conclusion

In the study of juicer mixer grinder it was found out that maintaining food pressing tools and utensils clean and sanitized is an essential task.

There can be several problems if the cleaning is not done properly such as diarrhea, food poisoning, and stomach infections.

For maintaining the equipment clean one must know about proper methods of cleaning.

It is difficult to maintain the cleanliness of the blades, grooves, and other parts of the juicing machine through cloth, hand, and ordinary brush.

Due to regular use, the quality of the material decreases and gets spoilt.

From these observations, it has been decided to design an efficient cleaning device to meet the demands.

The tool incorporates a few aspects such as scrap, scoop, scrub, and brush which helps in cleaning the residue and pulp.

The design has been created through sketches, mockups, and user feedback.

Feedback has been taken from the juice vendor to improve the design in terms of experience and proper cleaning.

The design was durable and reusable for regular use by the street juice vendor.

References

1. Antibiotic Resistance in Microbes from Street Fruit Drinks and Hygiene Behavior of the Vendors in Delhi, India(2020) by Neha Sharma. International Journal of Environmental Research and Public Health Volume 17, Issue 13
2. Scrubbing with risk: health and environmental hazards of kitchen cleaning tools and sustainable alternatives(2025) by Azmathullah Rahmathullah. Arashi Journal of Metals & Material Sciences Volume 2, Issue 1

3. Microbial investigation of cleanability of different plastic and metal surfaces used by the food industry(2023) by Claudia Waldhans. Journal of Food Science and Technology Volume 60
4. Food Safety and Standards Authority of India (FSSAI),Licensing and Registration of Food Businesses Regulations, 2011, Regulation 2.1.2 ,Schedule 4, Part I.