EVALUATION OF ENVIRONMENTAL, HEALTH AND SAFETY PROGRAM

AT

BARKAT RICE MILL ISLAMABAD

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By

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Regd#: 31-FBAS/MSES/S08

Submitted in partial fulfillment of the requirements for the Master of Science in Environmental Science at the Department of Environmental Science, Faculty of Basic and Applied Science, International Islamic University. Islamabad

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DECLARATION

I Samina Nawaz, Registration No. 31-FBAS/MSES/S08 a student pf MS Environmental Sciences at Department of Environmental sciences, International Islamic University, Islamabad (IIUI) , do hereby solemnly declare that the thesis entitled 'Evaluation of Environmental , Health and Safety Program at Barkat Rice Mill Islamabad'' submitted by me in partial fulfillment of requirements for the degree of MS, is my original work, and has not been submitted or published earlier and shell not, in future, be submitted by me for obtaining any degree from this or any other University or Institution.

Date: September 30, 2010

Samina Nawaz

To
My loving Parents and
My Husband Babar
And my cute master Shahnawaz Babar
With all my love

(Acceptance by the Viva Voce Committee)

Title of the Thesis: Evaluation of Environmet, Health and Safety Issues of Rice mill Pakistan.

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Viva Voce Committee

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Dated:

Acknowledgement

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Abbreviations

BC	Before Christ
BRM	Barkat Rice Mill
CCD	Computer Control Device
dBA	Decibel Adjusted
EHS	Environmental, Health and Safety
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
HACCP	Hazard Analysis of Critical Control Points
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
ISO	Organization of International Standard
OSHA	Occupational Safety & Health Administration
PPE	Personal Protective Equipment
SPL	Sound Pressure Level
USA	United States of America
WHO	World Health Organization

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Abstract

Pakistan being an agro-based economy has natural abundance of all agriculture products. In Pakistan rice is the third largest crop after wheat and cotton. It grown over 10 % of the total cropped areas. Rice is highly valued cash crop and is also major export item. It accounts for 6.7 percent in value added in agriculture and 1.6 % in GDP. Pakistan grows enough high quality rice to need both domestic demand and allow for export of around one million ton per year. (Pakistan Rice Export Association)

Unfortunately, rice processing industries in Pakistan is not regulated under labor safety laws, therefore Environmental, Health and Safety regulations are not seriously implemented.

Industrialists want quick return on their investment and they think investing on safety is waste of money, but they do not realize that one unsafe incident can be huge losses to them.

The present study, I attempt to evaluate environmental, health and safety issues and program in small / medium size industries such as Rice Mill. The result shows that the accidents happen due to lack of knowledge of safety rules among workers and the management. The majority of the accidents were caused by human factors and negligence. Employers do not take serious interest against those involved in workplace accidents. Small cut and back pain were identified as the commonest type of accidents in rice mill. My finding also indicated that the employer is less interested in giving any incentives when their employees comply with the safety rules and regulations.

The major occupational hazard for the workers in rice mill is the noise during the operation of various machines. The paddy cleaners, rice cleaners, sieves shakers and electric motors without enclosure were found to be the predominant noise source in the workroom of the mill. The cause

of this high noise in the rice mill may be attributed to use of a large flat belt drive, absence of electric motors enclosure and poor maintenance etc. The result of study showed that the frequency of the accident was not very high but the minor injuries were common due to machines with no safety covers and lifting of heavy load of rice, and lack of safety knowledge and management ignorance towards safety issues at workplace.

Chapter 1

INTRODUCTION

Environmental, Health and Safety (EHS) is a fundamental aspect of managing an organization as it impacts on all the functions within the organization. EHS embraces a number of disciplines reflecting the scope of its influences including finance, insurance, health, personnel and production etc. The barriers to success with health and safety at the same as with other business objectives with an additional barrier being that the main operational requirements of the from implementation of environmental, health and safety programs rather than the benefits that can be gained from doing so in long term. Most of the organization usually diverts resources from environmental, health and safety needs to other issues such as quality improvement, which improper towards safety issues and also taking risk to avoid health and safety issues. Successful organization are realizing the need to take an inclusive approach to health and safety that balances effort between the four primary issues of services, quality, health, safety and environment by implementing technical procedural and behavioral solutions. (National safety council 1973).

The term "health" has been defined as state of well being. It includes well being in a physiological sense. In occupational terms this would include not suffering from deafness, mental fatigue or stress. The "Safety" is considered to be the absence of danger of physical harm to people, and could be harmed in the work place by the equipment, structures and materials etc. "Accident" relates to the variety of events that occur which have or might have a detrimental effect in the work place. The detrimental effect could be a physical injury to a person, damage to equipment or undesired event occurring to death, ill heath, injuries or any other losses (Health & Safety guide, Ian Coombes. 2007).

It is a bigger problem in smaller companies that they do not have full time safety professional. In these type of companies safety duties most of the time fulfilled by the human resources personnel. Who already carrying other responsibilities and have very less time to give on safety issues. As a result companies finding now that safety efforts can translate into significant financial benefits. But unfortunately that the environmental, health and safety management is not

popular in medium size of industries in Pakistan, such as flour and rice mills, printing press, poultry farm, leather and plating industries etc.

Small and medium companies are playing a vital role to stimulate economic development including alleviation of poverty through employment. Small and medium size of companies covers a wide range of business activities but neglecting protection of environment and safety of their workers. The workers are exposed to various health and safety risks. The main reason of neglecting the safety of their workers that the owners are not aware of consequences of unsafe worker place, and also unaware of safety regulations. Therefore safety rules are not seriously implemented.

Actually businessmen wants quick return on their investment, and investment for safety of their workers they think it is waste of their money but they do not realize that investing on safety can bring much more profit in return of high quality, production efficiency and loyalty of workers to their companies. It is a key element of conservation, and mutually beneficial to both, since it save business money and increases profits.

Companies that achieve high health and safety standards, they put their health and safety policies into effective practices. This can be helped by the creation of a positive culture that secures involvement and participation at all levels. It can only be sustained by effective communications and promotion of competence that enables all workers to make a responsible contribution to the health and safety effort. Companies that are successful in achieving high standards of health and safety programs have policies regarding EHS which contribute to their business performance, while meeting their responsibilities to people and their environment in a way which fulfills both the spirit and the law and satisfy the workers, customers and society.

It is cost effective and aim to achieving the preservation and development of physical and human resources and reductions in financial losses and liabilities. The EHS policies will influence all their activities and decisions including those to do with the selection of resources and information, the design and operation of working system, delivery of products and services and control of waste disposal. The aim is not simply to avoid accident, but to motivate and empower workers to work safely. Meeting this challenge in our rapidly expanding and changing technology can eliminate not only the tragedy of human suffering and death but also the high costs, waste and poor quality that result from accident.

Pakistan being an agro-based economy has natural abundance of all agriculture products including Rice, I therefore chose this topic to evaluate the environmental, health and safety issues in one of our Rice Mill in Islamabad.

The purpose of this study is to identify Environmental, Health and Study program and practices in relation to rice processing industries as rice is one of the major export commodities of Pakistan. Environmental, Health and Safety is a serious issue in industries of Pakistan. Unless this industrial weakness is properly managed

1.1 Objectives of study

The purpose of this study is to identify Environmental, Health and Safety program and practices in relation to rice processing industries are rice is one of major export commodities of Pakistan. This study is design to evaluate heath and safety conditions in Barkat Rice Mill and is on identification of health and safety issues in rice mill. Not only identification but also suggest possible measures to minimize potential health and safety risks and hazards are included in this study. Environmental, Health and Safety is a serious issue in industries of Pakistan unless this industrial weakness is properly managed. The main objective was:

1. To evaluate all possible risks to the environment, and occupational health and safety of the employees at the Barkat Rice Mill.
2. To suggest different measures to eliminate or minimize risk to employees at the Barkat Rice Mill.

Chapter 2

LITERATURE REVIEW

"Health, Safety and Environmental Control" book by Reynolds L. Hoover and Robert L. Hancock offers the answer to those and many questions required for a safety program in a small manufacturing or processing industries. It deals with the day to day problems of the processing units. The book also explained EHS control functions how to be organized and basic minimum requirements needed to make a program work, and how to get management support and become a viable member of the management team. The book gives hand on information concerning cost effective ways of administering safety program.

"Comprehensive Guide to OSHA Safety Program and Its Implementation" by Victoria Cooper. This book gives a clear and comprehensive guide to successful implementation of safety program in a medium size company. The book explains in depth discussions of the many solid, economical and safety aspects and safety laws and how to implement in successful manners at work place. Problems associated with risk assessment and hazard communication are discussed and program planning requirements and implementation strategies are suggested to make safety program successful. The book is very helpful to understand safety program and how to implement it in an industry.

"Environmental, Health and Safety Auditing Handbook" by Lee Harrison provides information regarding how environmental, health and safety auditing program can be managed in a company. It also gives step by step guide lines for setting up the program. It directs about auditing methods and how to reduce risks, and manage chemicals storage and waste disposal. The book is very comprehensive in regards to health and safety implementation program; it gives step by step information how to manage environmental, health and safety program.

The book "Occupational and Environmental Safety Engineering and Management" by H.R. Kavianian and Charles Wentz is one of the important book on safety issues. This book provides the knowledge of legal, engineering and scientific aspects of safety in a small company. The field of occupational safety has grown quite rapidly therefore it requires a fundamental regulatory attitude for workers to work safely and understand safety as one of the basic need for performing the work in proper manner. Therefore it is imperative that safety manager and

workers should work together to protect the workforce as they are exposed to a variety of complex and potentially hazardous situations. This book also provides insight and direction to facilitate safety management approach in scientific manner to achieve the goals and objectives.

"Safety Management Handbook" published by the Bureau of Business Practice, Westford. Ct, USA. This book provided the knowledge and the technology how to manage environmental, health and safety program in a company. The book also provides firsthand knowledge for protecting workers from potential unsafe situations and save money for company by implementing the safety laws. The book also provides step by step guidelines to solve serious problems in small companies that do not have a full time safety professional. The book also explained how to train workers to work safely and motivate them for safe attitude, and controlling the growing cost of employee injuries, illness and loss of work time. The book gives the knowledge that EHS efforts can be translate into significant financial benefits to companies large or small. The book is designed to help to meet safety responsibilities to workers with effectiveness. The provided some common case studies on workers safety in small industries which was very helpful for writing this report.

Mainsha et al (2003) carried out a research on occupational exposure to airborne fungi in rice mill workers. This study was carried out Ahmadabad rice mills. Agriculture dust contains airborne aflatoxin and human respiratory system is capable of metabolizing aflatoxin B1(AFB1) to its ultimate chronogenic form. High concentration of airborne dust was found in stores. This study concluded that employees working in rice mills are exposed to aflatoxin as these strains of Afflatus as these strains are recovered from work environment.Aflatoxins are potent hepatotoxins and hepatocarcinogen and can damage respiratory route. Therefore workers inhale these strains containing aflatoxin.So workers who work for more than 8 hours should wear mask and personal protective equipment.

From this study it is concluded that rice mills environment contain toxic substances that are harmful to employees health so proper protective equipment.

Musa et al (2000) carried out a cross sectional study to determine the effect of rice dust husk in rice mills workers in Malaysia. During rice processing activities huge amount of dust is generated. Therefore rice mill workers are expose to organic and inorganic dust and synthetic chemicals that may have very adverse effect on respiratory system.

This exposure of dust may lead to pulmonary fibrosis and have adverse effect on nose,eyes,skin and lungs. There were 63 workers in mill.Chest tightness was reported by most employees followed by morning phlegm,shortness of breath and morning cough.

Along with non-specific irritation effect of rice husk exposure on respiratory system,it is suggested that it could cause keratocojunctival irritation,corneal scars,chronic conjunctiva inflammation and pterygium formation and prorates.In addition it can cause many types of allergies nasal catarrh,occupational asthma,eosinophilla,allergic inflammatory reaction of pulmonary diseases if personal safety equipment not used.

A research was conduct in India by GV Prasanna Kumar, K.N Dewanga et al(1985) to determine the various operation of machine in rice mills. This noise survey was conducted in workrooms of eight different mills.

About 26% of the total workers were found to be exposed to higher levels of noise than 85dBA And noise interferes in their work and 49% workers replied that noise interferes with their conversation. This noise survey revealed that predominant noise sources in the rice mills were paddy cleaner, rubber roll sheller.compartmenrt separator,rice cleaner,sieve shaker and electric motor without enclosure. A well maintained rice mill produces less noise with each machine using an individual motor. Noise control measure and maintenance of machines is necessary to control noise level.

At least 974 working people killed and 3650 injured in different occupational accidents and violent occurrences happened at workplaces in Bangladesh in 2006.121 of the killed and 740 of the injured are women workers.Among these rice mills annual people killed by various accidents are 7 and injured are 30.

Chapter 3

MATERIALS AND METHODS

The research of the present thesis is a significant effort considering the importance of the subject. I have chosen the topic "Evaluation of Environmental, Health and Safety Program at Rice Processing Mill" with the view that no research has been made in the past on the basis of collecting comprehensive data and putting them together with analytical and substantive studies. The objective of the study is to focus attention on one of the most important issue of industries in Pakistan i.e. safety of workers at work place which is very much neglected in the past. The value of this study probably is the first serious effort of its kind to address this problem academically.

The study is done at Barkat Rice Mill, Sector I-10. Islamabad Pakistan, to conduct a survey to evaluate the environmental, health and safety issues. The visit was made during month of January/February 2010. Barkat Rice Mill (BRM) was established in 1992 and rice processing plant was imported from Germany and came into production in 1999 with collaboration of German firm Buhler GmbH a famous name in food processing. The complete plant was supplied by the Buhler Company. The Barkat Rice Mill has rice processing capacity of 12000 tons per year (8 hrs/day, 300 d/yr). It is the first modern rice processing plant in Pakistan. Some of the machines installed at the plant have been introduced for the first time by Buhler Company in Pakistan for Barkat Rice Mill. There are around 40 rice processing plants in Pakistan. BRM claims that they are ISO 14000 and ISO 9000 certified company, and largest exporter of rice to Europe, Middle East and USA. BRM employed around 60 to 80 people depending on seasons; most of the unskilled labors are on daily wages and some technicians are permanent and are working since beginning of the company.

A walk through survey was conducted as well as interviews were also taken. An approval was obtained from the management of Barkat Rice Mill for the visit and interviews. The General Manager has assured to provide correct facts and figures about procedures and operation of mill and also allow workers to give correct information regarding work and mill operation related activities.

The study follows descriptive as well as analytical and substantive research methodology. For theoretical purposes study will be made from questionnaire asked from different level of workers

and staff of the company. The information provided in this research report is based on several data collected through different available sources, from company itself and other related sources. With these approaches combining both research methods, the study will contain on strong support of academic analysis on the subject. Therefore this research report will be useful for industrialists who wish to implement safety program in their company, especially in Pakistan where safety issues in industries are highly neglected.

BRM claims that they have an effective management system. According to their environmental management policy it is committed to do environmental friendly and pollution curtailing rice processing business and trying to continually improve its green practices. A walk through survey were taken and during walk through questions were asked directly from the foreman, machine operators, maintenance staff and workers loading and unloading the rice gunny bags.
To achieve the objectives of the study two phase approach has been used to obtain information and data. The research methodology was done in two steps. (1) Information collected through questionnaire, plant visit, operation process observations; walk thru, on site interview with management staff, operators and workers (2) Data analysis, Data collected thru different sources. Out of 48 employees present on the visit day, 15 workers from plant side and 6 people from lower level management group were taken as sample of study to ask the questions. General Manager Consents were acquired before questions were asked from the employees. General Manager has also taken part in answering the questionnaires.

Almost all day was spent on Barkat Rice Mill plant, environmental, health and safety issues were closely watched. The work process, work body posture and machine size and guards were inspected. Accidents figures were obtained from the company's records. Nature and kind of accidents were obtained during the interview also. The information provided in this report is based on the information available from the Barkat Rice Mill management staff, interview with BRM workers, and Barkat Rice Mill websites.

The environmental, health and safety issues facing industry today have expanded considerably beyond traditional concerns. Waste water, air emissions, potential soil and ground water contamination, solid waste disposal and employee health and safety have become increasingly

important concerns. Therefore this research report presents an assessment of workers safety of the Rice Processing Mill and recommendations for safety program to increase company's productivity. (Health, Safety and Environmental Control – Hoover & Hancock)

During the survey of Barket Rice Mill interview were taken from both employees and employer.

The administrative staff was asked for the following:

1) Total number of workers in Rice mill.
2) Production of rice mill per month.
3) Health and safety policy of Mill.
4) Risk assessment methodology.
5) Insurance policy of the employees.
6) Waste disposal methodology.
7) Fire drill training.
8) Training record and its management.
9) Evaluation plan.
10) Availability of personal protective equipments.
11) Maintenance of material safety data sheets.
12) Provision of safe and clean drinking water.
13) Nature and level injuries.
14) Cause of accidents.
15) Preventive action to avoid accidents.
16) Incentive given to employees.
17) Contingency plan.
18) Provision of medical facility.
19) Prohibition of smoking.
20) Maintenance of machines.
21) Fire alarms installation.
22) Tree plantation.

The employees involved in milling process were interviewed to questions as follow:

1) Means of rice delivering to Mill.
2) Employee's awareness about hazardous chemicals.
3) Training given to employees.
4) Major health concern like lung diseases, skin diseases, asthma, eye infection, hearing problems.
5) Medical facility provided to employees.

Chapter 4

Results and Discussions

4.1 History of Rice

Rice was first mentioned in the Yajur Veda 1500-800 BC in Sanskrit text in India. Rice was directly associated with prosperity and fertility, hence there was ancient custom in India throwing rice at newlywed.

Rice was first domesticated in the region of the Yangtze River valley, Central China. The Diaotonghuan archaeological site clearly shows the transition from collection of rice to the cultivation of domesticated rice. The large number of rice phytoliths at the Diaotonghuan level during 12000 – 11000 BC indicates that the rice growing was part of the local means of hunger survival. In the late third millennium there was rapid expansion of rice cultivation into mainland South Asia, China and westwards across India.

The earliest remains of cultivated rice in India have been found in the north and west around 2000 BC. Evidences were also found in Assam part of India and Nepal of rice cultivation during 1400 BC. It then spread to all fertile alluvial plains watered by the rivers. Cultivation of rice and cooking methods was thought to have spread to the west rapidly during medieval times.

(Vaughan, The evolving story of rice evolution)

4.2 Varieties of Rice

While most rice is bred for crop quality and productivity, there are varieties selected for characteristics such as texture, smell and firmness. Cultivars exist that are adapted to deep water, International Rice Research Institute (IRRI) in Philippines, with over 100,000 rice accessions. Rice cultivars are often classified by their grain shape and texture, for example Thai Jasmine rice is long grain and relatively less sticky, as long grain rice contains less amylopectin than support grain cultivars. Chinese usually eat long grain as plain unseasoned steamed and sticky rice. Japanese mochi rice and Chinese sticky rice is short grain.

Indian rice cultivars include long grain and aromatic Basmati, they are long grained known as Patna Rice (named after a city in Bihar province) and short grained Sona Masoori Rice (named after a city). In the state of Tamil Nadu of India, most prized cultivar is Ponni which is primarily

grown in the delta regions Kaveri River. A short grain variety of rice called Ambemohar is very popular in the region.

Aromatic rice has very good aroma flavors. The most popular aromatic rice is Thai rice, Patna Basmati rice and also American rice known as Texmati. In Indonesian flavor rice is known as red & black cultivars. High yields cultivars of rice suitable for cultivation in Africa and other dry ecosystems called the new rice for Africa. (IRRI, International Rice Research Institute, Philippines)

The high yielding varieties are a group of crop created internationally during the Green Revolution to increase global food production. Rice like corn and wheat was generally manipulated to increase its yield. German and Swiss researchers have developed rice to produce Beta-carotene, with the intent that it might someday be used to treat vitamin A deficiency. They have improved the quantity and quality of other nutrient in the rice and named them as "Golden Rice" because carotene turns the rice a gold color.

Rice containing added proteins can be used as a component in oral rehydration solutions which are used to treat diarrheal diseases, thereby shorting their duration and reducing recurrence. Such supplements may also help reverse anemia.

(Bethell, D. R., Huang, J. "Varieties of Rice")

Figure 4.1:Different verieties of Rice

4.3 Nutritional Value of Rice per 100 grams

Table 4.1:Nutritional value of rice

Energy	1,527 KJ (365 Kcal)
Carbohydrate	79 gr
Sugar	0.12 gr
Dietary fiber	1.3 gr
Fat	500 mg
Water	11.62 gr
Protein	7.12 gr
Thiamine (Vitamin B1)	0.07 mg (5 %)
Riboflavin (Vitamin B2)	0.049 mg (3 %)
Niacin (Vitamin B3)	1.6 mg (11 %)
Pantothenic Acid (B 5)	1.014 mg (20 %)
Vitamin B6	0.164 mg (13 %)
Folate (Vitamin B9)	8 ug (2 %)
Calcium	28 mg
Iron	0.8 mg (6 %)
Magnesium	25 mg
Manganese	1.088 mg
Phosphorus	115 mg
Potassium	115 mg
Zinc	1.09 mg

Source: USDA Nutrient database

4.4 All about Rice

In Pakistan, rice production occupies 2.5 million hectors that is 10.9 % of the total cultivated area produces 5.1 million tons of milled rice. Rice plays multifarious roles in Pakistan economy. Firstly, it is second staple food and contributes more than two million tones to our national food requirement. Secondly rice processing industries are an important source of employment and income for rural people. Thirdly, it contributes one of the major foreign exchange earnings for the country. For instant, during 1999-2000 about two million tones rice worth of 26 billion rupees was exported (Rice Corporation of Pakistan).

Inspite of the fact that Pakistan is one of the largest rice producing countries, having annual production of more than 5 million tones, it is facing decline in export due to several reasons. One of the major reasons is neglecting health and safety of the workers involves in processing milled rice effecting the production and quality of fine rice. The significance of this commodity in our economy is evident from the above facts. Therefore it is imperative to focus on the export, needed further improvement to its competitiveness in the international markets. (Rice Export Association of Pakistan).

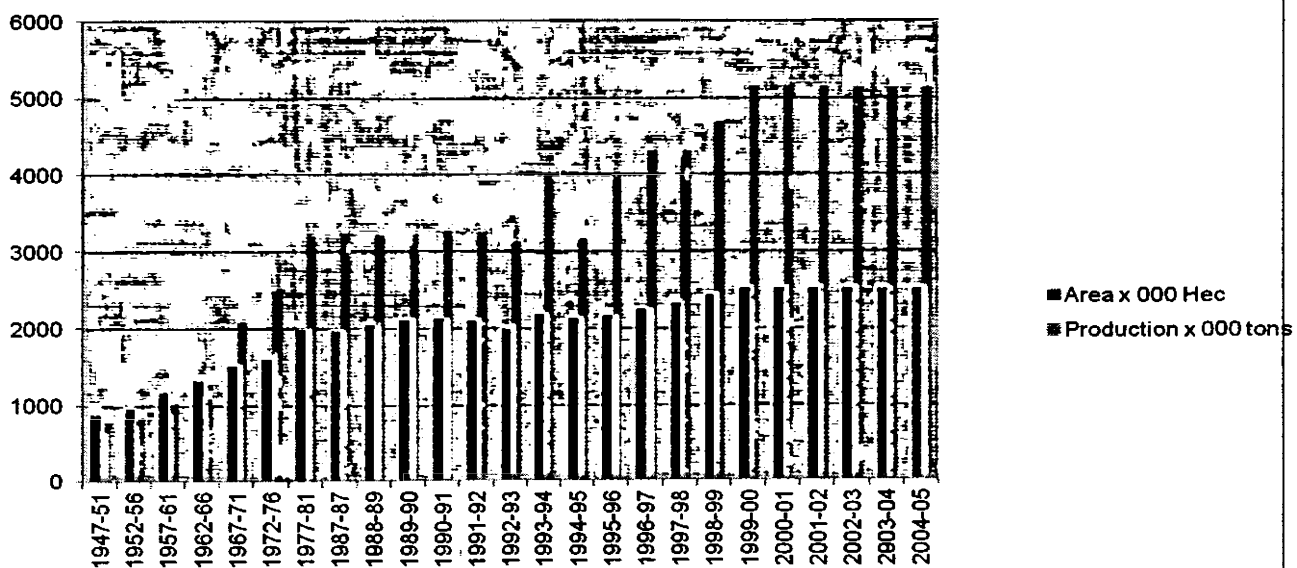
4.5 Area, Production and Yield of Rice

The overall situation regarding rice growing in Pakistan for the year 1947 to 2005 is shown in table 1. The data shows that there is quantum jump in the rice production in sixties due to large scale adoption of high yielding. There is marginal increase in the production but unfortunately after year 2000 the production started declining.

In Pakistan rice is cultivated under diverse climate and hydrological conditions and is divided into four distinct agro-ecological zones. In most cases critical problems in rice production and protection are specific to a particular zone. Production technology is developed keeping in view the distinct agro-ecological conditions to overcome the problems (Rice Corporation of Pakistan)

Table 4.2:Area Production and Yield of Rice In Pakistan

Year	Area x 000 Hec	Production x 000 tons	Yield x kg/Hec
1947-51	883	768	870
1952-56	965	855	886
1957-61	1165	1024	880
1962-66	1326	1264	952
1967-71	1511	2079	1372
1972-76	1611	2491	1547
1977-81	1974	3198	1620
1987-88	1963	3241	1651
1988-89	2042	3200	1567
1989-90	2107	3220	1528
1990-91	2113	3261	1543
1991-92	2097	3243	1546
1992-93	1973	3116	1579
1993-94	2187	3995	1826
1994-95	2125	3447	1622
1995-96	2162	3966	1835
1996-97	2251	4305	1912
1997-98	2313	4325	1870
1998-99	2424	4674	1928
1999-00	2515	5156	2050
2000-01	2515	5150	2045
2001-02	2513	5145	2043
2002-03	2513	5139	2040
2003-04	2508	5130	2035
2004-05	2503	5127	2030



4.2 Area Production and Yield of Rice in Pakistan

4.6 Brief Description of Pakistan Rice Producing Zones

Zone 1: It consists of northern mountainous areas of the country and irrigated rice is grown either in flat valleys or terraced valley sides. The climate is humid monsoon with 750 to 100 mm average rainfall, mostly concentrated in summer. Rice is damaged due to cold weather temperature and cold irrigation water, which are major problems. Low temperature stresses the leaf of the rice and causes yellowish grains. Stunting in the seeding in early vegetative stages will delay heading and sterility in the reproduction stage. Therefore yield of rice is not fully grown and the production will be declined.

Zone 2: It lies in the broad strip of land between rivers Ravi and Chenab where both canal and sub-soil water are used for irrigation. The climate in sub-humid, sub-tropical type with 400 to 700 mm rainfall mostly in July – August, these climate is most suitable for rice growing. The season is fairly long and suitable for cultivating fine aromatic quality of rice.

Zone 3: It consists of the large tract of land on the west bank of river Indus. It has an arid sub-tropical climate with 100 mm of average rainfall and maximum temperature higher than Zone 1 and Zone 2. The impeded drainage and excessive water application to rice has resulted in high water table. The season which is long and extremely hot summer well suited for rice growing provides good yields.

Zone 4: It is the Indus delta which consists of vast spill flats and basins and well irrigated lands for rice growing. The climate is tropical and is highly suited to coarse varieties of rice. The Zone produces good yields of rice. (Source: Pakistan Agriculture Research Council)

4.7 Some Facts about Rice

1) Between 1961 Ind 2002, per capita consumption of rice increased by 40 %
2) Rice is the most important crop in Asia, Cambodia, China and Vietnam
3) In these country 90 % of the total agricultural area is used for rice cultivation
4) Rice consumption in The United States has risen sharply over the 25 years
5) It is reported that Americans are eating at least half serving of rice per day

Source: Iowa State University, Rice consumption in the USA, July 2005

4.8 Processing of Rice

The seeds of the rice plant are first milled using a rice huller to remove the chaff or husk. At this point in the processes, the product is called brown rice. The milling is continued to remove the bran i.e., the rest of husk and the germ, thereby creating white rice. White rice at this stage lacks some important nutrients, in a diet which does not supplement the rice; brown rice helps to prevent the disease beriberi. White rice is buffed with glucose or talc powder called polished rice. The term polished rice is referred to white rice in general. Nutrient is added to white rice because some nutrient lost during the milling process. Some time rice grain is coated with water insoluble nutrient, which is resistant to washing.

Removal of husk from rice is needed to make it edible and bran layer needs to be removed also to make it perfect. Paddy grain is covered with layer of husk. Paddy grain as it is not suitable for eating. It becomes edible only if the husk and bran are removed. Rice milling involves the removal of the husk and the bran layer to produce the edible portion for consumption.

4.9 Rice processing Flow Chart

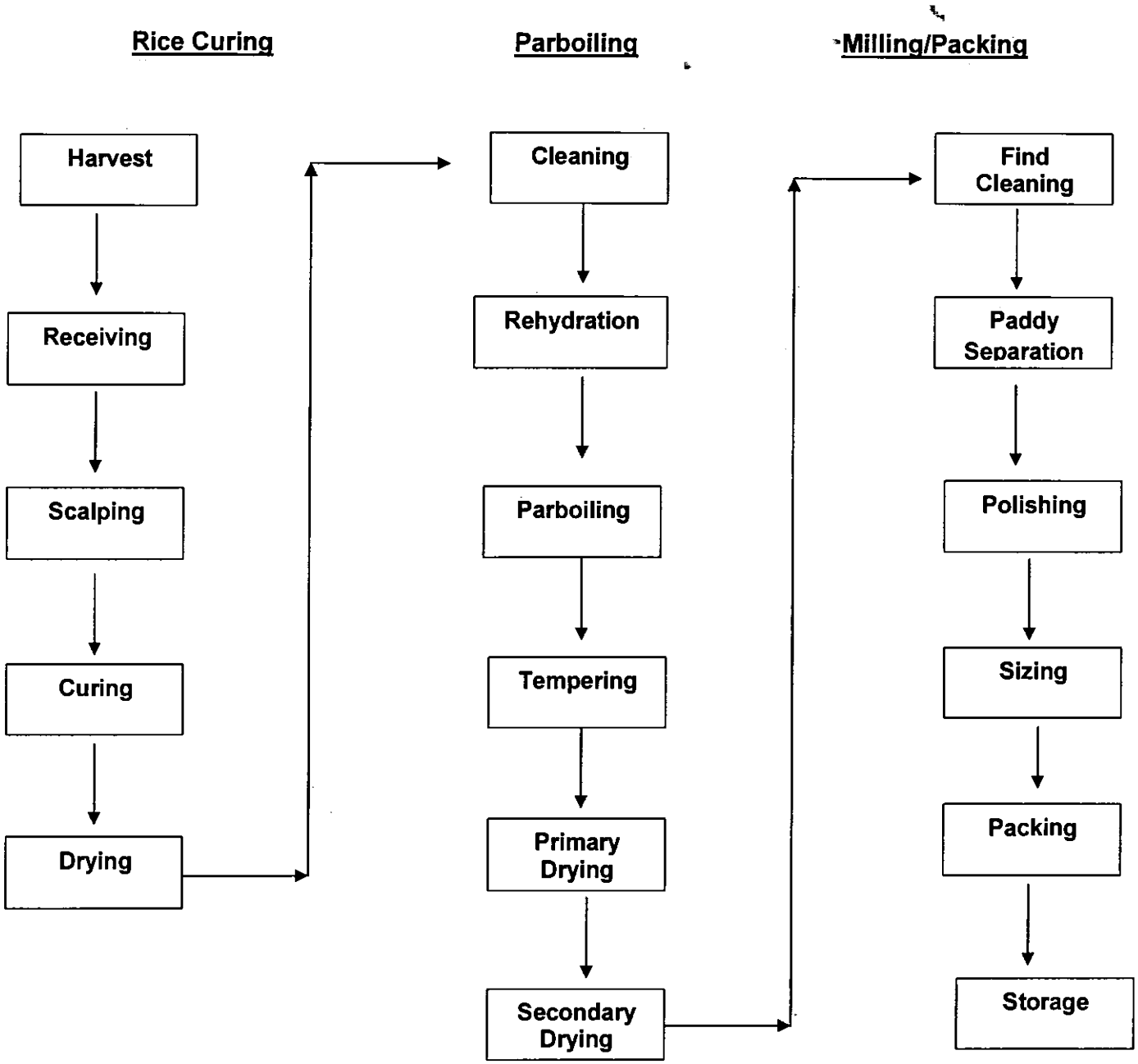


Figure 4.2:Rice processing flow chart

Sources: Jay Noel & James Ahern, Technological Choice 2001

Rice milling process has two basic operations. First process is the removal of the husk to produce brown rice. This process is called de-husking. The second process is the removal of the bran layer from brown rice to produce polished white rice. This process is called polishing or whitening of rice. The milling also removes the germs and a portion of the endosperm on broken Kernels and powdery materials (Pakistan Rice Corporation).

Figure 4.3:Reduction of moisture content from rice by natural light before husking at BRM

The basic objective of rice milling system is to remove the husk and the bran layers to make it edible white rice kernel that is sufficiently milled and free from impurities. Rice milling system is a simple two stages process. In this two processes husk and bran are removed separately and brown rice is produced as an intermediate product. To get paddy to rice needed to pass through several steps namely husking, paddy separating, polishing and grading. All these steps are called "milling."

The paddy rice is passed through coarse screens to remove all straw, stones and other unwanted objects that are larger than rice. Then the rice passes through fine screens to remove small weeds and seeds, sand, dirt, stones and other objects smaller than rice. Air separators systems are used in this process. The husk is removed from the rice, this done by passing the rice through two spinning rubber roles. One roll is spinning faster than the other. The rubber roles are tightly pressing against the rice from both sides and strip the husk off. After husking, brown rice is passed through husk separating step, which is separating husk from the rest of the rice. This is done by the sieving process.

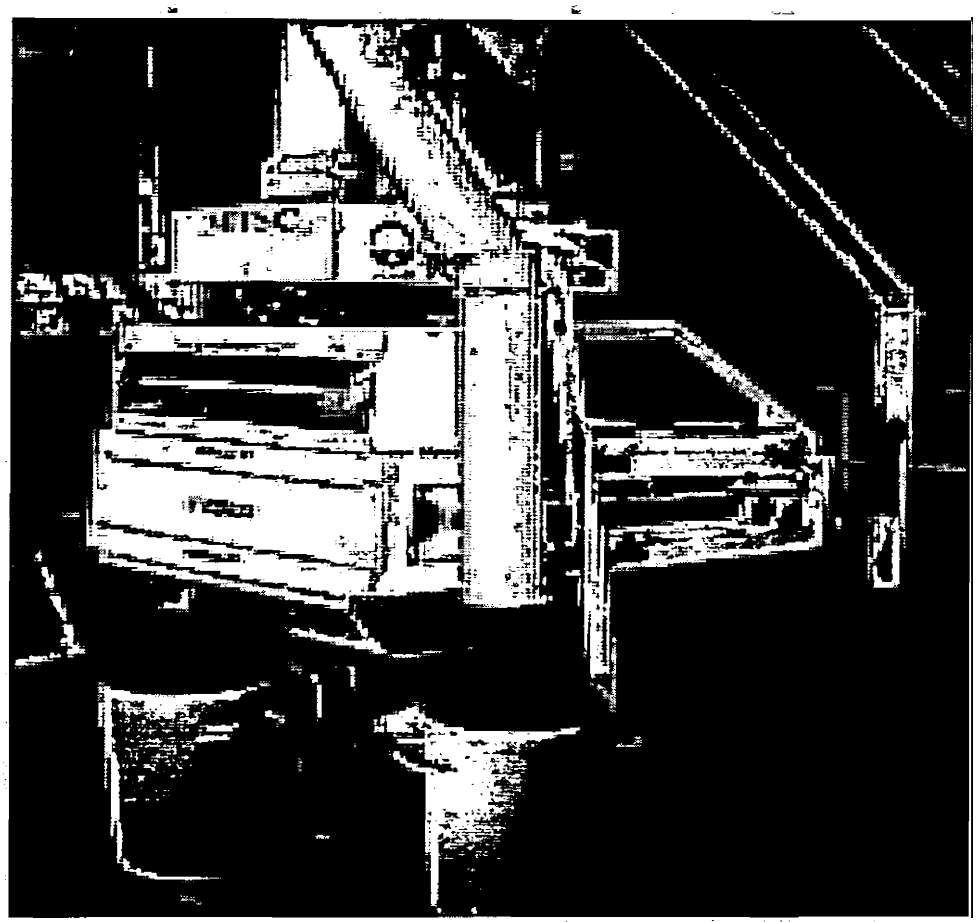


Figure 4.4:Pre cleaners used in BRM

The bran is removed from the rice through a milling chamber that has an abrasive stone spinning in the center and a metal screen on the outside. The rice passes through a milling chamber that has a metal roller spinning in the center and a metal screen on the outside. The machine is rubbing the many kernels of rice against themselves and the screen in order to remove the bran. The rice is polished by the mist of water passed through frictional water jet machine, the rice rubbing each other to polish the surface of the rice. A portion of the rice leaving the husking operation still has the husk on the kernel. The paddy separating machine that works with specific gravity separates the light paddy kernels from the heavy brown kernels.

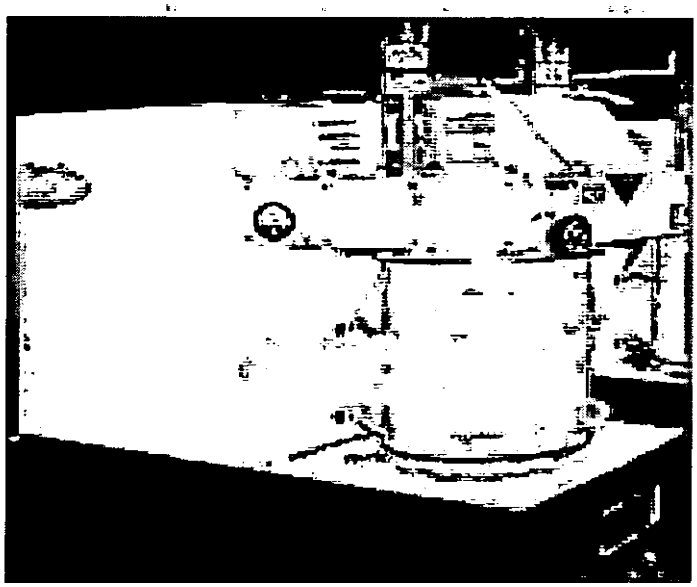


Figure 4.5:Rice whitening machine used in BRM

Milled rice is passed through different types of sieves to take out broken rice. The milled unbroken kernels rice is passed through an electronic sorter to remove defective rice. Then the rice is passed before electronic eye that detects any difference in color. Air jet removes the defects. Usually damaged kernels with black specks, yellow kernels and stones are removed. The very best rice passed through two breaks of sorters. Sorters can be adjusted to remove green immature kernels from brown rice. These are special sorters which remove other impurities from rice kernels and clean and white rice is obtained.

Milling of the rice can yield as many as 40 percent of broken kernels depending on quality of incoming rice and the adjustment of the milling machines. Most of the high quality of rice can yield less than four percent broken rice. The broken rice is removed during the milling process. Finally the rice is passed through graders. These are cylinder type with small pockets on the wall of cylinders just right to fit broken rice into these pockets. The pockets are too small to fit whole grain of rice. The broken rice is passed through additional grader screen to be separated further into various sizes. Magnets are fitted throughout the milling system to remove the metal and non-ferrous metal particles from the rice before rice is finally packed for consumers.

(Source: Barkat Rice Mill).

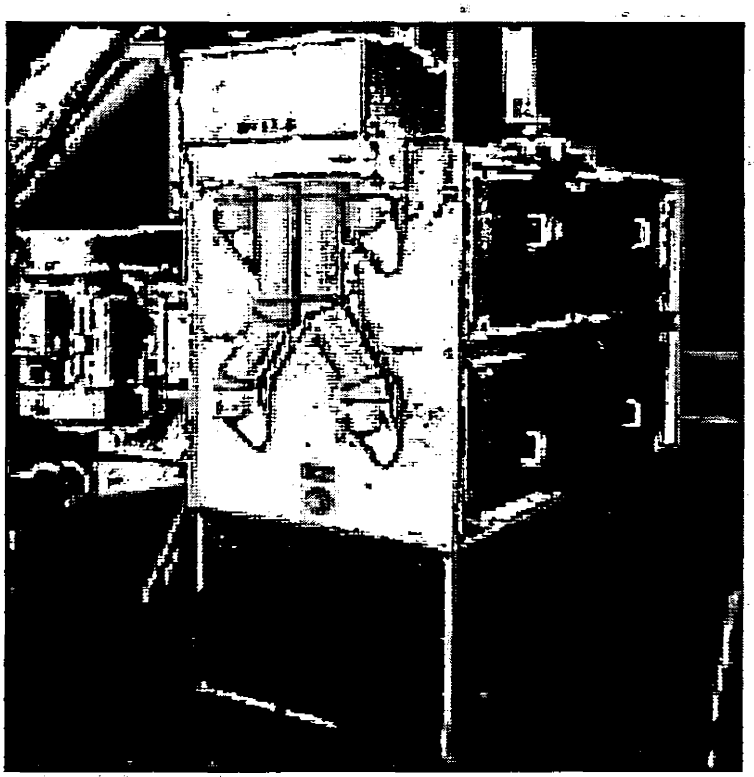


Figure 4.6:Grader used in BRM

4.10 Production of Rice by the Country Million Metric Tons In year 2006

4.3:Production of Rice by the country

Country	MMT / Yr	Percentage
China	182.0	28.8
India	136.5	21.6
Indonesia	54.5	8.6
Bangladesh	43.7	5.7
Vietnam	35.8	5.7
Thailand	29.3	4.6
Myanmar	25.2	4.0
Philippines	15.3	2.4
Brazil	11.5	1.8
USA	8.8	1.4
Pakistan	8.1	1.3

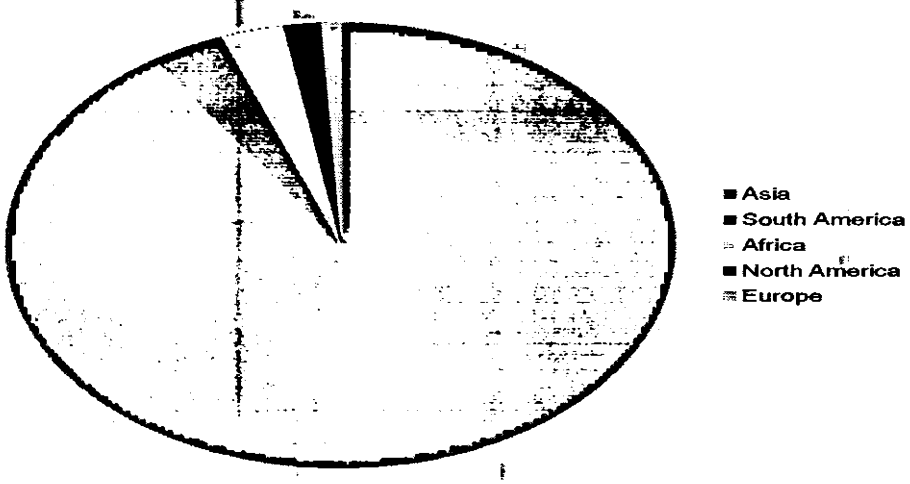
Korea	6.3	1.0
Cambodia	6.3	1.0
Egypt	6.1	1.0

Source: World Food Statistic, Wikipedia 2008

4.11 Rice Production by Continent

Table 4.4:Rice production by continent

Asia	574.2 million tons	91 %
South America	22.6 million tons	3.6 %
Africa	20.0 million tons	3.0 %
North America	11.1 million tons	1.8 %
Europe	3.4 million tons	1.0 %



Source: World Food Statistic, Wikipedia 2008

4.12 Waste of Rice Processing

The main waste products generated during the processing of rice milling is rice husk, rice barn and brewers. Rice husk is generated during the first stage of rice milling. When rough rice or paddy rice is husked, rice brown is generated, and then brown rice moves to the whiteners and polishers. When paddy rice is milled through steel hauler rice bran is produced mixed with rice husk, and then it is milled again. Husk is produced as a waste. Common use of husk is used for burning and used as a fuel for the boiler to produce heat for rice drying after polishing. Another waste is rice bran, is mostly used for animal feed especially poultry feeds. Brewer's rice is used as ingredient for beer brewing; it is also used for rice flour. (Barkat Rice Mill)

4.13 Barkat Rice Mill, The Company

Barkat Rice Mill incorporated in Islamabad, sector I-10 under Pakistan companies' ordinance of 1984. Barkat Rice Mill (BRM) is one of the finest plants confirming to international standards. The plant is supplied by Bahler GmbH of Germany; they are one of the leading rice plant builders of the world. BRM owns a modern rice processing plant installed in the year 2000. The rice paddy is allowed to reduce its moisture by natural sun drying methods to achieve optimum moisture content for husking. This technology is unique and first of its kind in Pakistan. Paddy is spread over large fields during the day and left for drying in the sun. This gradual drying helps to avoid thermal cracks in the rice grains. Paddy is then brought into BRM shelter where brown rice is produced after cleaning, de-husking and grading. In bran rice only the outer husk is removed, leaving the germ and bran layer and retaining most of the nutritional value. The brown rice after grading is transported to BRM's warehouses. Milling of rice starts with the cleaning of rice. This is one of the intermediate steps of rice processing where foreign material like straws, dirt, paddy stones and metal particles are removed from the rice. All the machines conveyers' bins and hoppers are equipped with sized aspiration system, keeping the entire building dust free.

The Barkat Rice Mill is in the implementation stage of HACCP (Hazard Analysis of critical Control Points) system. It will provide BRM a hygienic processing and suitable sanitation facilities. At BRM Plant rice is gently milled in whitening machines, rice passes through several stages to ensure efficient removal of bran.

Further rice is passed through mist polishers which impart an extremely clean and glossy white appearance to the kernels. Some of the machines installed at the plant have been introduced for the first time in Pakistan by the company who designed the system; these machines are unique and producing very good results.

Final step in rice processing is color sorting. This is aimed at to remove discolored grains from processed rice to give the final product a uniform color look. Color sorting is an intricate computer controlled process where CCD technology is used for performing high resolution optical inspection of each and every kernel. It removes the high concentration of predominantly chalky and dissolved kernels to give final product uniform appearances. (Barkat Rice Mills)

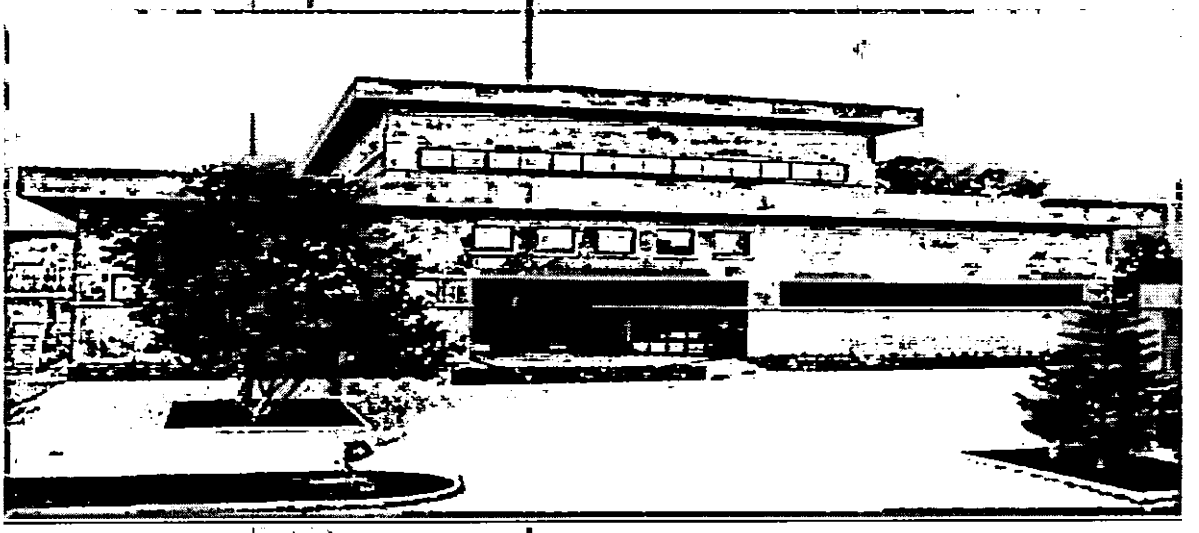


Figure 4.7:Building of Barkat Rice Mill

4.14 Packing of Rice

Barkat Rice Mill has the most modern electronic bagging system that ensures high degree of accuracy in weighing. The system is capable of packing in different sizes of bags ranging from one kilogram to 50 kilograms.

Rice is packed very hygienically and systemically. Each package is checked for quality and quantity. Barkat Rice Mill operates a very effective and well organized transportation system for inland and export of the rice outside country. Storage of rice packages are kept in neat and clean and free from humidity room.

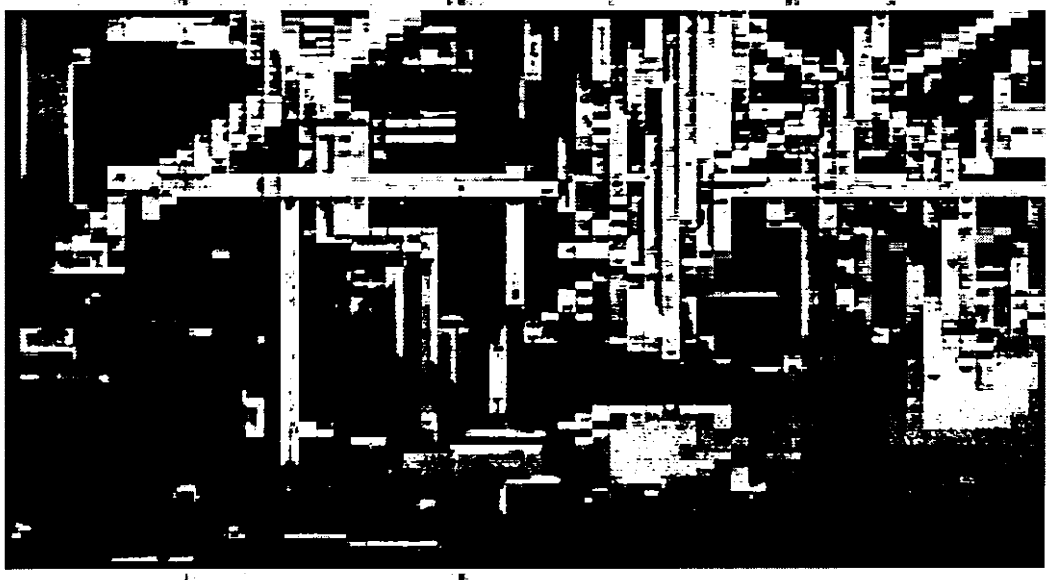


Figure 4.8:Paking of rice at Rice Mill

4.15 Health and Safety Issues

Occupational health and safety is a cross disciplinary area concerned with protecting the safety, health and welfare of people engaged in work especially in manufacturing or processing industries. As secondary effect, it may also protect co-workers, family members, employers, customers, suppliers, communities and other members of the public who are impacted by the workplace environment. Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations; the prevention of workers from health hazards caused by their working conditions. The protection of workers in their employment from risk resulting from factors adverse to health, and the placing and maintenance of the workers in an occupational environment adapted to their physiological and psychological capabilities.

Environment health addresses mainly ambient environment of the work place. State of the ambient environment of the work place largely depends on the function of the working environment and the environment around the establishment. Ambient environment includes working environment, natural environment, vegetation, habitat, local community, and livelihood of local community.

Occupational health and safety is the function of working environment that includes ventilation, lighting, density, fire extinguishers device, fire exist, safe drinking water and sanitation etc. It also deals with personal health and safety that includes personal protective equipment (gloves, masks, apron, ear pads & muffs, goggles etc), first aid, health check- up etc. Ambient environment is also the function of working environment. It as well includes buffer zone, drainage system, air emission, noise pollution, waste management etc. Arrangement of sufficient fire extinguishing equipments in the factory is necessary to protect the property and lives of the people working in the factory and the life of neighborhood community. Therefore awareness program on fire fighting and safety of the both workers and owners of the company is necessary. (EHS guidelines for medium size industries by Sarkar and Akhter)

During the visit of Barkat Rice Mill occupational health and safety issues were very closely observed. During walk through observation, it was noticed that noise and dust of husk are serious health issues.

Due to operation of various machines noise is the major health issues. There was no precaution for the workers to protect them from noise. It was noticed that the sound pressure level (SPL) at the machine site of the rice mill was estimated 78 to 92 dBA (per BRM foreman). The paddy cleaner, rubber rollers, compartment separators, rice cleaner, sieves shaker and electric motors without enclosures were found to be the predominant noise source at the rice mill machines site. The cause of high noise may be attributed to the use of a long flat belt drive, absence of electric motors enclosure and poor maintenance of the machines. With the discussion with workers about 50% of total labor force was found to be exposed to higher levels of noise. Noise from machines in the Barkat Rice Mill was found to be major occupational hazard for workers. The machines are 10 year old but not properly maintained.

The normal working hours is 40 hours per week and 56 hours per week during the peak seasons of rice milling. For extra work hours workers are paid over time at the rate of one and half hour extra of their wages. There is no formal safety and fire prevention training given to workers. There is no written safety and fire protection plan.

4.16 Noise Issue

Machines at Barkat Rice Mill were moderate and in good conditions but little less maintained. Motors were also mot maintained properly. Most of the machines were dusty. It was noticed

during walk through that noise level is higher than the limit. The labors working in sieving shakers, paddy cleaners and roll shelter were exposed to high noise above the acceptable limit. None of the workforce working in the plant was using noise muffs, though noise muffs were available at the store, they were not aware of personal protective equipment (PPE).

4.17 Environmental Impact

It has been found that, rice cultivation is responsible for most of the methane gas emissions. Rice requires more water to grow than other crops. When water stays longer time in field it cuts the soil off and from atmospheric oxygen it causes fermentation of organic matter in the soil. During the wet season, rice cannot hold the carbon in anaerobic conditions. The microbes in the soil convert the carbon into methane which is then released through the respiration of the rice plant or through diffusion of water. The contribution of methane gas from agriculture is almost 15 % of atmospheric greenhouse gases. Methane is twenty times more effective as a greenhouse gas than carbon dioxide. (United Nations Environmental Report on climate change, IPCC 2007)

Rice pests are organisms or microbes with the potential to reduce yield or value of the rice crop. Rice pests are weeds, pathogens, insects, rodents and birds. A variety of factors can contribute to pest outbreaks, including the overuse of pesticides and high rates of nitrogen fertilizer application. Weather conditions also contribute to pest outbreaks, such as worms and other insects, tend to follow period of high rainfall early in the wet season also contributes the pest outbreak, while thrips outbreaks are associated with draught.

(Heinz & Ulrich, Methane emission from Rice field)

4.18 House Keeping

Housekeeping at Barkat Rice Mill is not very well maintained. Though BRM claims that they are ISO 9000 and ISO 14000 certified. Plant floors are sloppy, things are scattered all over and not organized, and walking space is very narrow. Emergency route is not specified and posted. Some of the working areas are dark though provision of light is there but light bulb is not working. Fire extinguishers are there but not checked some of them are expired and not in working order. There is no fire hose for fire fighting. Some of the exits are blocked with rice bags, most of the floor areas are used for storage of rice bags. Machines are dusty and motors covers are missing. Emergency telephone numbers were listed in administration office instead of plant area. Some of

the plant window glasses were broken. Sanitation area was filthy and backyard was also not clean. Very less time is given to housekeeping. Finding indicated that human factor was the major cause of workplace accidents; such as accidents were mainly caused by co-workers. Employee could also play an important role in enhancing the awareness of workers and safety training should be done seriously to avoid workplace accidents.

Figure 4.11: Warehousing at BRM

4.19 Accidents Rate at Barkat Rice Mill

Management staff was very reluctant give accident figures. They explained that there was only minor accident happened and they do not have record of it. Very reluctantly last two years of accident figures were given. As explained by the management staff accident rate was very nominal. There was no major accident in last three years. Few accidents happened which was minor like burses and small cut, and there was no loss of work time. The most common complaint of the workers was back pain due to lifting of heavy rice gunny bags.

Table 4.5 Accident Rate at Barkat Rice Mill

	Year 2008		Year 2009	
Accident	No of workers	Loss of workdays	No of workers	Loss of workdays
Minor	6	4	5	4
Major	2	5	1	3

Minor accident: Small Cut, Burses, Back Pain, Sickness and Sprain etc.

Major accident: Serious Injuries, Heavy Cut, Fall, and Death etc.

No death accident occurred in the history of BRM

Source: Barkat Rice Mill

4.20 Type of Accidents

Type of accidents that occurred in BRM for the past two years and not recorded.

Table 4.6: Types of accidents

Type of Accidents	Ranking of Cases
Small Cut	Common
Finger Cut	Common
Hit by falling objects	None
Back Pain	Common
Sickness Flue / Fever	Common
Sprain	Common
Bone Broken	None
Heavy Cut and Bleeding	Rare
Serious Burning	None
Loss of body part	None
Physical Injuries caused by Machine	Rare

Permanent Disablement	None
Death caused by serious accident	None
Any Insurance Claim due to injuries	Yes

4.21 Type of Incentive

Is there any incentives given to workers when complying with all safety rules and regulations?

Table 4.7: Type of Incentive

Incentives	Frequency
Any Incentives	None
Salary Increment	Yes on yearly basis
Bonus	Yes on yearly basis
Extra day leave with pay	No
Recognition Certificate	No
Safety Training	Some times

Source: questions asked during the visit,

4.22 Type of Punishment

Kind of punishments an employee would receive if she/he does not comply with safety rules

Table 4.8:Type of punishment

Punishment	Frequency
Warning	Some time
Penalty	None
Fired	Yes, on serious issues
Demotion	None
Transfer to other dept.	Yes
Salary deduction	No

Source: Barkat Rice Mill

4.23 Accident Analysis

The workplace accidents could occur due to three main factors, the mill operators did not patiently wait for the machine to deliver the product completely. The operators are not fully trained or they are careless, and they are not clear about job descriptions. Often no proper work schedules, and frequently their jobs are changed from operation of one machine to another. Also the working environments are not favorable as the workplace is not well organized and work area is not wide enough to work comfortably. The operator's movement is restricted due to crowded work area usually passage aisle are used as storage. Most of the time the machine is not equipped with safety devices.

It was noticed to speed up the process; the operator went up to the material inlet of the machine and pushed the raw material with the feet. If the machine had no proper protective device, operator's toes or heel might enter the rollers and his feet would be crushed. Sometimes a small stone is trapped between the rollers and the mill stopped, workers tried to remove the stone by his hand without protection, his hand can also be crushed by the rollers.

After finishing the process, when the workers start to clean the rollers by hand while machine is still running his finger might be crushed. There was no safety covers around the mill gears, operator pushed the gears by hand even if the machine was on. All these kind of habits are due to unawareness of safety rules, negligence and safety training is not given to them and also carelessness of supervisor not watching the operators for safe work.

All over the mill's machines operating areas can easily cause an accidents when machines are operating, but workers knowledge about safe machine operation are not enough to avoid the high risk of accidents. Workers are lacking safety training; they are not taking sufficient precaution for their own safety. This is very unfortunate; the owners are not realizing that spending time and money on safety of workers will benefits to them in long run.

4.24 Workers at Barkat Rice Mill

Barkat Rice Mill employee about 38 permanent workers including office staff members and 10 to 15 extra labor forces are hired during peak season. The workers were in their age group of 26 to 56 years. The mean age all workers were about 42 years. There were five workers who had 21

years of experience of the rice mill. Most of the workers were working in BRM for last 3 to 5 years. About 40% of the workforce was women. Female workers were assigned to light work only. Heavy lifting was done by male workers; none of them used safety belt during heavy lifting job and most of them complained about back pain. All the laborers work on average 56 hours a week, 8 hours per day seven days a week during the peak season of rice mill, and 48 hours per week, six days a week during rest of the period in the year. Male workers were employed mainly for heavy task such as collection and storage of rice gunny bags. Female workers are paid less than male workers because nature of their work. The workers were not given any safety training, they do not have any health insurance from the company though there was one first aid box but it was almost empty.

Almost all workers look in poor health, and skinny, few of them look healthy and strong. It was observed that few workers were coughing mostly female workers. Five percent of workers remain absent from the work without giving any reasons, since workers are on daily wages the management do not care about their absence. There are extra workers always easily available on short notice, therefore work does not suffer.

4.25: Permanent Staff

Table 4.9: Labor Force at Barkat Rice Mill

General Manager	1
Accountant	1
Administrator	1
Clerks	2
Maintenance Engineer	1
Electrician	1
Maintenance Technician	1
Machine Operators	10
Unskilled Labors	22

Source: Barkat Rice Mill

Chapter 5

CONCLUSIONS

Pakistan is one of the largest rice growing country of the world with an annual production of eight million metric tons per year (2006) and around 40 rice processing mills exist in Pakistan. The rice mills in Pakistan generally owned by private entrepreneurs and produces high quality of rice for export markets. Most of the rice mills have high capacity and high speed processing machines and they operate using either by electric motors or diesel engines. The mills employee large numbers of unskilled labors for the processing of paddy rice besides technical man power for repair and maintenance of the machines.

As the activities of the rice mills are not regulated under any legal provision, they are considered under unorganized sector of small industries. Hence under the small industry law, occupational health and safety cover for the workers in the rice mill does not exist. Therefore owners of rice mills do not care about the health and safety of the workers of their mills because they are not legally bonded to obey the law.

The following conclusions have been drawn from this study:-

1) The recoded accidents were very few, mostly minor injuries
2) Most of the injuries were of mobile type such as back pain
3) Major causes of the accidents were absence of safety devices on the machines, ignorance of safety rules and lack of knowledge of working procedures

Barkat Rice Mill does not give much importance to the safety of workers because there are no safety rules and regulations implemented by the government. The major occupational hazard for workers in Barkat Rice Mill is the noise, produced during the operation of various machines at the mill and husk dust which is not fully controlled due to poor maintenance of the dust control equipment. In Pakistan noise in the machine rooms of industries is considered as a part of the routine and there is no such safety law to protect the workers from high level noise. The effect of high level noise is hearing loss, sleep disturbance and high blood pressure. Unfortunately there is no industrial and labor law to provide any protection to workers from noise pollution. Though Barkat Rice Mill claims that they are ISO 9000 and ISO 14000 certified company. BRM is equipped for dust control system, but the dust control equipment is not 100% efficient due to poor maintenance. Dusts were notice in the air; dusts were accumulating on the machines and on

the equipment. Workers were inhaling dust which is very health hazard and danger to their lungs. Very few workers were wearing dust mask though BRM has all kind of personal protective equipment but they were in the store and not implemented forcibly by the management. The administrator who was also incharge of safety seldom visits plant site and unaware of safety rules. Husk was also piled in the corner of the plant. Husk is burnt to dispose it off. Husk is also used as cattle feed.

The greatest environmental health threat continues to be, as it has always been, pathogenic (disease causing) (WHO 1955). Existence of safe sanitation in working place is necessary for the workers of the company. It has fruitful meanings and impact on production system including individual life of the workers if the arrangement of safe sanitation is maintained separately for both male and female workers within the factory premises. Getting safe working environment is one of the rights of the workers, which should be ensured by the management of the enterprise. Supply of safe drinking water for the employee is also one of the responsibilities of the management because safe drinking water is needed for safe life. Access to safe water supply is one of the most important determinants of health and socioeconomic development (EHS guidelines for medium size Industries by Sarkar and Akhter).

But unfortunately at Barkat Rice Mill there is no conception of cleanliness, the sanitation system is not very well maintained. Though there is filtered water fountain is available for drinking water but filter is not changed frequently, it looks like the water filter was not changed for long time. Due to limited information and no record of injuries and accidents, it was very difficult to get exact incidence information of working accidents among mill operators. The data analyzed in this study are only based on retrospective recollections of accidents. There was no record of accidents available and management was very reluctant to provide the information also. The incidence of mobile type of accidents was higher than that of the stationary type accidents. Hand and foot accidents were more predominant. Even the frequency of the accidents seems to be small. No severe injuries were in record. The detail accidents were not recorded also.

Rice mill is important for the comprehensive development of economy in Pakistan. The study of noise level in the rice mill work room will present status of noise level exposure to workers so that appropriate measures should be under taken to minimize the noise exposure.

Protecting the health and safety of workers should be the major consideration of a company, not only site personnel performs a variety of technical tasks correctly and effectively but they also must work for an often unpredictable and potentially dangerous environment. By adequately equipping and training to workers and by using appropriate standard operating procedures, the potential for harm from exposure to unsafe and hazardous works can be greatly reduced.

The purpose of this study to provide guidelines for ensuring the health and safety of workers at the mill also. This report is meant to supplement professional training, experience and knowledge can be used as a guide and planning tool for safety manager, an educational tool that addresses fundamental aspects of the required health and safety programs.

A reference documents to make workplace safe Barkat Rice Mill should have a written Environmental, Health and Safety plan. The primary purpose of the written plan is to serve as company's health and safety policy that applies to all employees.

Recommendations

Training

Safety training must be given to all employees of rice mill at the regular interval of six months. New workers should not be allowed to start the work without safety training. Employees should also be trained for emergency preparedness for this purpose drills should be arrange on regular bases to reduce possible risk. Supervisor should be made responsible for workers safety. Safety Training and Contingency Plan manual should be prepared.

Hazard identification

Identify hazards at all stages of production. When employees enter storage areas, they should stay above the material ay all times and should never stand on top of stored material. Eliminate hazards or minimize the likelihood of occurrence. Establish what the critical limit is and formulate suitable preventive measures. Establish procedures to monitor the critical points.

Corrective and preventive actions

Establish corrective action to be taken. Establish procedures to verify that system is working properly. Employees should be trained about all processes and procedures. Safety sign should be posted to warn employees of the hazard of working with electrical equipment, machinery, stored grains and other loose materials. A whole safety program should be design and such signs are one part of this program. Standard Operating Procedure should also be prepared.

Dust and noise control

Dust control equipment is not working properly, should be fixed. For noise control each machine should have its separate cover and personal protection equipment should be used.

Record keeping

Annual accident report should be prepared and posted on Notice boared.Injuries and sickness record should be maintained.

Machinery maintenance

Portable fire extinguishers should be properly mounted on wall and regularly maintained. Wheel machinery should meet the safety code, should have safety cover. Moving machines and motors should be properly guarded. Hand and power tools should be properly grounded to avoid any electric shocks. Fork lift should be regularly checked and the driver must be trained.

Emergency plan

Portable fire extinguisher should be properly mounted on wall and regularly maintained. Exit door should be clearly marked with lighted signs and should not be obstructed. Emergency exit route map should be displayed.

General safety measures

Floor should remain clean and dry. Walking aisles should remain out of obstacles all the time. General requirements of housekeeping should be maintained seriously all the time. Stairway should have proper railings. Toilet facilities should meet the standard of sanitation. Working areas should be properly lighted. All fused bulbs should be changed .

Barkat Rice Mill should establish, implement and maintain documented environmental, health and safety objectives. The aims and objectives should be measurable, where practicable and consistent with EHS policy including commitments to the prevention of injuries and ill health, to compliance with applicable legal requirements with continual improvement.

The management needs to guard against potential hazards and disasters. They should take risk assessment time to time because it became critically important for the enormity of their impact. The risk analysis and safety management must be fundamental element of good governess of a successful business. Therefore supervisor should be asked to keep watch on safety issues seriously. Above all safety training to all staff of the company is very important and should be implemented seriously.

Bibliography

Barkat Rice Mill, Sector I- 9, Islamabad. Pakistan

N. Sethunathan, S. Kumaraswamy, A. K. Rath, B. Ramakrishnan, S. N. Satpathy, T. K. Adhya and V. R. Rao,(2000) . "Methane Production, Oxidation, and Emission from Indian Rice Soils", volume 58, November 2000

Raymond C. Sinclair, Randall Smith, Michael Colligan, Mary Prince, Trang Nguyen, Leslic Stayner, (2003). "Evaluation of a safety training program in three food service companies". *Journal of Safety research*, Volume 34, 2003, pp 547-558.

GV Prasanna Kumar, KN Dewangan, Amaresh Sarkar,(2008). "Noise exposure in oil mills", volume 12, issue 1, page 23-28

Melamed, Samuel; Fried, Yitzhak; Froom, Paul,(2001). ''Journal of Occupational Health Psychology'', Volume 6, July 2001, pp 82-195

Duncan A. Vaughan, Bao-Rong Lu, Norihiko Tomooka ,(2008). ''The evolving story of rice evolution'', February 2008

Bethall, D.R and Huany,(2004).''Veriey of Rice '', Volume 8, issue 10, 2004

Samuel S, Gnanamickem,(2009), ''Rice and its importance to human life '', Volume 8, issue 11, July 2009

China Deals with Dust , '' Environmental Health Prospective '' , Volume 110 ,September 2002

A., M., Makin and C.,Winder,(2008)."A conceptual framework to improve the application of occupational health and safety management systems". *Safety science,* Volume 46, Issue 6, July 2008.

Health and Safety Information Sheet, (1997): www.hse.gov.uk/pubns/fis13.pdf

Harrison, Lee (1999), "Environmental, Health and Safety Hand Book". 2nd Edition

Mc Graw Hill, New York USA

International Rice Research Institute, Philippines (Report 2001)

Karianian, H. R, and Wentz. Charles, (2001) "Occupational and Environmental Safety Engineering Management" Van Nostrand Reinhold, New York USA ,3rd Edition

Palvi Hamalainen, Jukka Takala, Kaija Leena Saarela, (2006). "Global estimates of Occupational Accidents". *Safety science*, Volume 44, Issue 2, 2006.

World Food Statistic: Wikipedia- 2008

USDA Nutrient Data Base. USA (2000)

Pakistan Agriculture Research Council Report 2006

Jay E. Noel, James J. Ahern, Jess Errecarte, and Kyle Schroeder.(2001) "Technological Choice", September 2001

Field, JM, (1993). "Effect of personal and situational variables upon noise annoyance in residential areas". *Journal of the Acoustical Society of America*, Volume 93, January 1993.