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CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	KNOWLEDGE MANAGEMENT: STRATEGY FOR SUSTAINABLE COMPETITIVE ADVANTAGE	1
2.	NON GOVERNMENTAL ORGANISATIONS AS AGENTS OF DEVELOPMENT: THE CASE OF LAPO IN BENIN METROPOLIS OF EDO STATE, NIGERIA ONUGU, CHARLES UCHENNA & TAIWO ABDULAHI OLABISI	4
3.	DETERMINANTS FOR COMMERCIAL BANKS IN FINANCING SME (WITH SPECIAL REFERENCE TO MEERUT DISTRICT, U.P., INDIA) KALI RAM GOLA & P. K. AGARWAL	9
4.	INVESTIGATING THE IMPACT OF ECONOMIC VARIABLES ON INTERNATIONAL TOURIST ARRIVALS CHENG-WEN LEE, WEN-CHUAN FU, KUO-SUNG HSIEH & YI-CHANG LEE	14
5.	A STUDY ON THE IMPACT OF PERSONAL EFFICACY ON JOB MOTIVATION AND JOB SATISFACTION AMONG WORKING WOMEN WITH SPECIAL REFERENCE TO THOSE WHO ARE STAYING AWAY FROM HOME JAYASRI INDIRAN	20
6 .	EMERGING PROFILE OF WOMEN IN INFORMATION TECHNOLOGY SECTOR IN GOA DR. SHARMILA BORKAR	27
7.	INDIAN CAPITAL MARKET: AN OVERVIEW DR. SHANKAR T. BATTASE & SUNANDA SHANKAR	34
8.	CORPORATE GOVERNANCE AND CORPORATE SOCIAL RESPONSIBILITY: A REVIEW KOMAL CHAUDHARY	37
9.	AUDIT PLANNING: MATERIALITY CONCEPT CHANDRA KANT PARMAR	41
10.	EMPOWERING WOMEN THROUGH PROACTIVE NATIONAL INITIATIVES: A CATALYST FOR HUMAN DEVELOPMENT MANBIR KAUR DHALIWAL	44
11.	NATIONAL FOOD SECURITY ACT OF INDIA AND RELATED CONCERNS SWAPNAMOYEE PRIYABHASINI PALIT & MAMITA DASH	49
12.	ECONOMIC AND ECOLOGICAL ANALYSIS OF LEATHER SOLID WASTES IN VELLORE DISTRICT, TAMIL NADU T. AASIF AHMED & DR. B. MOHAMED RAFEEQ	55
13.	A STUDY ON CUSTOMER SATISFACTION TOWARDS SAKTHI MASALA IN COIMBATORE CITY S. THANGAMANI & E. ARTHI	57
14.	CUSTOMER SATISFACTION OF SMALL SCALE RETAIL OUTLETS IN COIMBATORE CITY J. SAMUEL CAESER PICKENS & P. STARMINI	61
15.	MICRO FINANCE, SELF HELP GROUPS AND ECONOMIC EMPOWERMENT OF WOMEN IN ODISHA DR. BANDANA PATHAK	66
16.	FACTORS OF SPECIFIC JOB SATISFACTION AND GENERAL JOB SATISFACTION TRUONG HONGNGOC & MARIA KATHRINA DIAZ	71
17.	THE CURRENT SCENARIO OF GOLDEN FIBRE: A SPECIAL STUDY ON JUTE IN THE CONTEXT OF INDIA RUSHA SARKAR	77
18.	WOMEN EMPOWERMENT AND ITS IMPACT ON AGRICULTURAL PRODUCTIVITY: THE CASE OF KERSA DISTRICT IN EASTERN HARARGHE ZONE, ETHIOPIA TADELE MELAKU CHALLA	85
19.	IMPACT OF FDI ON INDIAN ECONOMY: AN INTER- COMPARATIVE STUDY BETWEEN CHINA AND USA IRAM KHAN	89
20 .	GEOGRAPHICAL ASSESSMENT OF FINANCIAL INCLUSION IN INDIA PURUSHOTTAM KUMAR ARYA, HIMANSHU MISHRA & AAKASH UPADHYAY	93
	REQUEST FOR FEEDBACK & DISCLAIMER	99

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ISSN 2231-4245

ECONOMIC AND ECOLOGICAL ANALYSIS OF LEATHER SOLID WASTES IN VELLORE DISTRICT, TAMIL NADU

T. AASIF AHMED RESEARCH SCHOLAR DEPARTMENT OF ECONOMICS JAMAL MOHAMED COLLEGE TIRUCHIRAPPALLI

DR. B. MOHAMED RAFEEQ ASST. PROFESSOR DEPARTMENT OF ECONOMICS JAMAL MOHAMED COLLEGE TIRUCHIRAPPALLI

ABSTRACT

As we know that leather industry is currently believed to be one of the sectors supporting economic development of the country significantly by generating foreign currency. Different forms of solid wastes in quality and quantity, which emerge during the transformation of hides and skins into leathers. These solid wastes may pose a potential hazard to the human health or the environment when improperly treated, stored, transported or disposed off or managed. This study examine the various sources, types and quantity of leather solid wastes being produced by the leather industry and also evaluate the system of collection, transportation and disposal of leather solid wastes. The results found that Leather solid waste management is increasingly important from a global perspective of resources management and reduce the environmental impacts of industrial activities.

KEYWORDS

Solid Wastes Resource Management (SWRM), Economic and Ecological Management.

INTRODUCTION

he waste resources management issue has never received as much attention throughout the history of mankind as it has in the past couple of decades as a result of the disruption in the environmental balance resulting from the negative consequences of the industrial revolution and man's consumption of natural resources.

Solid waste is one of the most challenging issues in Leather industry. Apart from liquid and gaseous wastes, the solid waste generation from tanning process in the world is estimated at 6 million ton per year. The problems of Leather solid waste collection, transport, proper use and disposal have become a gigantic task. However if not properly managed, it can adversely affect environment, health and safety. But on the other hand, waste prevention, recycling, minimization & valorization; and the use of energy efficient process technologies are more and more desirable options in waste management.

The paper is organized as follows: it presents a brief review of related literature, followed by a description of the data and methodology used in the analysis. Subsequently, it presents the empirical results and implications. Finally, it offers the conclusion with identifying the best findings, suggestions, and recommendations for policy formulation and practice regarding the planning, funding and design of waste management construction and renovation.

LITERATURE REVIEW

A thorough literature study is an indispensable component of all research which makes demarcate the boundaries of the research theme. In this study, the literature has considerable volume of research on the research theme, but the results are conflicting predictions concerning the leather solid wastes resource. Therefore, amongst the most debated issues in this context is industrial waste, the concern of which is not limited to a single country, but rather encompasses the whole world.

INDUSTRIAL SOLID WASTE

Industrial solid wastes resource refers to solid wastes resource generated in production activities that are not permitted to discharge into the environment. Industrial solid wastes are classed into organic wastes and inorganic wastes based on their components; into hazardous wastes and common wastes hold hazardous characteristics, they usually receive special attention.

Industrial solid waste pollution has become an increasingly serious problem in the world. The developing countries have to specially confront it. Every year, large quantities of ISWs are generated from the growing industries. However, there are no proper SWRM in the developing countries and done harm to the human being health and the environment. Now it has witnessed a changing perspective in waste management, which holds that waste should be recovered or disposed of without endangering human health and without using processes or methods which could harm the environment. Alternatively, the following should be discussed: How does one avoid avoid all environmental threats? What causes the environmental disasters the world is witnessing? Who's responsible for this? Should striving for economic growth be at the expense of the environment?

LEATHER SOLID WASTES GENERATION AND UTILIZATION

The State of the economy influences waste generation¹. Usually, greater economic prosperity and a larger urban population results in a larger amount of solid waste generation². Different forms of solid wastes in quality and quantity, which emerge during the transformation of hides and skins into leathers. These solid wastes may pose a potential hazard to the human health or the environment when improperly treated, stored, transported or disposed off or managed.

The solid wastes can be hydrolyzed and used as a useful byproduct (Ramamoorthy.G and others, 1989). "Wastes from one industrial process can serve as the raw material for another, thereby reducing the impact of industry on the environment" (Frosch and Gallopoulos, 1989). 800 kg of solid wastes per ton of rawhide are discharged by the leather industry (Ludvik J, 1996)³.

Leather waste can be divided into three kinds as follows

- Chrome-free leather waste, such as raw hide waste and limed hide waste, which is easy to be reused because of their simple components.
- Chrome –containing leather waste, such as chrome shavings, splitting and trimming waste of wet blue, which is difficult to be reused because of containing chrome.
- Dyestuff-containing leather waste, such as trimming and cut waste of leather, old leather products, which is very difficult to be reused because of containing chrome, dyestuff, fat liquor and retaining agent⁴.

J Kanagaraj and others (2006)⁵ pointed out that out of per ton of raw hide, 850 kg is generated as solid wastes in leather processing. Solid wastes are raw trimmings, fleshings, Chrome shavings, buffing dusts and keratin wastes which lead to sludge problem and choking of treatment pipes and finally results in reduction in efficiency of treatment plant. Raw trimmings and wet blue trimmings are useful in developing glue and gelatin. Keratin waste can be used as an

VOLUME NO. 5 (2015), ISSUE NO. 02 (FEBRUARY)

exhaustive aid for chrome tanning. Similarly, Fleshing waste can also be used as a tanning agent by proper chemical modification and develop glue, gelatin and poultry feed. Chrome and buffing dust are useful in developing retanning agent, poultry feed, fertilizer and landfill sites.

F. Langmaier and others (2005)⁶ the experiment also showed that wider use of chrome-tanned leather hydrolysate utilized as a biodegradable packing material for agricultural chemicals including herbicides, insecticides, pesticides, fertilizers etc.

LEATHER SOLID WASTES TRANSPORTATION AND DISPOSAL

Transportation is another key component in determining the economies of waste management. Smaller vehicles are utilized for solid waste transportation from collection points to dumping yard. Transportation of solid wastes over long distance is another problem which is often encountered as there are no relay centres.

Solid wastes containing protein and fat that constitute more than 60% of raw hide weight are disposed to the environment by leather factories without revolving them to good use. Depending upon the characteristics of the wastes, different types of disposal methods can be used for hazardous and non-hazardous industrial wastes. The most predominant and widely practiced methods for wastes disposal are: (a) Landfill, (b) Incineration and (c) Composting.

ENVIRONMENTAL AND HEALTH IMPACT ASSESSMENT

There are potential risks to environment and health from improper handling of leather solid waste. It causes all types of pollution and impacts on health are Skin diseases, Chemical Poisoning through chemical inhalation, Neurological diseases, Nausea & Vomiting and infectious diseases. Health and safety issues also arise from improper MLSWM. Proper leather solid waste management have to be undertaken to ensure that it does not affect the environment and not cause health hazards to the people living there.

DATA AND METHODOLOGY

The study is non-experimental. The study area was Vellore district of Tamil Nadu. The data gathered from literature and Questionnaires are analyzed and evaluated with the help of SPSS. Hypotheses and theories are compared thoroughly and related to each other. Samples of leather solid wastes from pre-tanning, post-tanning and finishing stage were examined and their characteristics have been determined within the scope of the study. Methodologies for analyzing waste management system include material flow analysis (MFA), cost-benefit analysis (CBA), and life cycle analysis (LCA). In this study, Descriptive statistics, gross margin analysis and Cost-benefit analysis were the analytical techniques used. Statistical tests (t-test and ANOVA test) used for testing the hypothesis.

RESULTS AND DISCUSSION

The following results obtained from the study

- It was found that out of per ton, 650-700 kg of leather solid waste generated during the transformation of raw hide to leather which containing protein and fat that constitute more than 65% of raw hide weight are disposed to the environment without turning them to good use.
- The study inferred that the perception of respondents (47%) is that it would be expansive if environmentally responsive methods are applied.
- 52% of the respondents believed that will be more satisfied with private enterprises to carry out the functions of leather solid waste collection, disposal and transportation generated in this study area.
- The study asked the respondents on their willingness to pay (WTP) anything financially for improved management of leather solid waste. Most (53%) of the respondents are willing to pay some amount of money in order to valued the benefits of improved management of leather solid waste. But 47% of the respondents are not willing to pay anything.
- In this study, 64% of the respondents believed that water content determination in leather solid waste, especially fleshing and shaving wastes which included higher amount of waste water that are not properly managed in this study area. That's why it degrades water and soil quality and also creates unpleasant odor in the air.
- The study reveals that some of the study area where leather solid waste not properly managed, it caused negative impacts on human health. 38% of the respondents affected by the following diseases; Skin diseases 18%, Chemical Poisoning through chemical inhalation 9%, Neurological diseases 3%, Nausea & Vomiting 2% and infectious diseases 6% were the impacts on health to the people working and living there.

The study also reveals that 30% of the respondents believed that it may causes the above mentioned diseases and 32% of the respondents physically well and good where leather solid waste properly managed.

Cost estimates for the LSWM include capital costs and operation and maintenance (O & M) costs. The objective of cost estimates in this study area is mainly to serve the cost benefit analysis and recommendations that will follow. The study reveals that the benefits from marketing the produced recyclables and compost in the treatment facility has added value as benefits. Therefore, benefits have been estimated for this scenario, assuming that the produced compost will be sold at a affordable price. The discounted revenues from the selling this product have been subtracted from the present worth of O & M costs to obtain the net PW O & M costs. Finally, the study indicates that significant improvement in all environmental parameters due to the diversion of waste to recycling.

CONCLUSION

In this study, the technical, economical, and environmental aspects of leather solid waste management were investigated. The results showed that every year, large quantities of leather solid wastes are generated. However, there are no adequate treatment and disposal facilities and qualified personnel in the leather industry. All these have seriously hindered the development of leather industry and done harm to the human being health and the environment. Significant progress has been made in establishing corresponding management and legislation systems, in developing treatment and disposal technologies, and in turning the research results into industrial practice. As a result, the serious situation of leather solid waste pollution has been alleviated although this situation has not completely changed. However, many problems in the management of leather solid wastes need to be resolved.

ACKNOWLEDGEMENT

The whole research work was assisted by PG & Research Dept. of Economics, Jamal Mohamed College, Tiruchirappalli-20. Therefore, the authors are grateful to the department for their valuable support.

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