

Recycling Of Construction And Demolition Waste la A

Abstract: The construction industry is a very dynamic field. Every day new technologies and methods are invented to speed up the process and increase its efficiency. Efficiency briefly is the measure of the resources used with regards to the actual product being produced. Hence, if a project uses fewer resources it will become more efficient. This thesis examines the recycling of concrete construction and demolition (C&D) waste to reuse it as aggregates in other structural applications for projects in Egypt. This study focuses on the technical and financial components of concrete recycling plants emphasizing on the three main types of concrete recycling plants; stationary, mobile and traditional plant settings. All plant types are designed and compared for different types of recycling projects. The machinery used in the plant is being analyzed technically and financially according to capacity, production rate, country of origin, etc. All the data is extracted from experts in the field and evaluated by university professors and engineers from relevant disciplines. The data is gathered from national and international sources, through numerous interviews, meetings and site visits. The following visits were conducted to extract information to be used in the model, a site visit to a stationary plant in Madrid, Spain, recycling research center in Madrid, Spain, site visit to a mobile plant in Paris, France, interview with director of recycled aggregates, Paris, France, and traditional plant in 6th of October, Giza, Egypt. These findings are gathered and grouped to obtain a comprehensive cost-benefit financial model to demonstrate the feasibility of constructing a concrete recycling plant in Egypt. The type currently being implemented is the traditional one, however, according to the calculations of the model presented in this thesis, the mobile type has generated the most profits among the other types, stationary and traditional. Furthermore, a sensitivity analysis is conducted to provide verification on the model. The exercise of the sensitivity analysis is a change in parameters and then the results are logically tested to verify the correctness of the model. Therefore, the sensitivity analysis is conducted on the mobile type by selecting and maneuvering the expense with the highest impact by -20%, -10%, 10% and 20%. The sensitivity analysis showed that administrative, salaries and cost of goods sold expenses had the most impact on the model. Nevertheless, the case study is conducted to validate the model. The case study at hand is the traditional plant of 50 TPH, in 6th of October, Giza, Egypt. The plant's actual revenues, expense and profits are compared with the same result produced from the model. The actual results available are for the first three years. They are close to the forecasted results, more discussion is available in text. Moreover, a developed user friendly model specialized to forecast revenues, expenses and profits is available in soft copy to be used by any user to help him/her in taking decisions related to his/her investment. In addition, a recommendation is presented to guide investors and contractors when choosing the suitable and most profitable type of equipment based on the project type.

Construction and Demolition (C&D) wastes are materials produced in the process of construction, renovation, or demolition of structures (buildings and roads). It also includes materials generated as a result of natural disasters (EPA, 2009). Preliminary estimates from the U.S. Environmental Protection Agency (EPA) show that the nation generated more than 160 million tons of building related C&D wastes in 2003. Also, Pennsylvania Department of Environmental Protection (PADEP) estimated that in 2005, Pennsylvania disposed over 2.25 million tons of C&D wastes in its municipal and C&D landfills (PADEP, 2009). Though previous studies have shown that it is cost-effective and environmentally friendly for contractors or construction managers to recycle C&D wastes rather than disposing them in landfills, these previous studies, however, paid little or no attention to detailed cost of recycling C&D wastes in a particular geographical area or region as compared to the availability of market for recycled materials or monetary value of the recycled materials. Hence, the objective of this study was to develop a mathematical model that helps stakeholders in construction business to evaluate the potential cost of recycling C&D waste components in their geographical area or region, and the potential revenue from the recycled materials. The model developed in this thesis will enable private companies or individuals to identify, invest and participate in the recycling of C&D waste components that yield good profits in their region or area. It will also enable Government to identify, sponsor or provide incentives for the recycling of C&D waste components that yield no or less profit in order to reduce environmental pollution and generate jobs. A case study is conducted in Pennsylvania to test the model developed in this thesis and the test has been successful. Based on the mathematical model and logic structure for selecting C&D waste components for recycling, drywall, roofing shingles and wood are identified as the components whose recycling will yield good profit and thus may not need government's support or incentives. Moreover, C&D waste components such as concrete, brick, block and asphalt, have been identified as components whose recycling will not be profitable enough and therefore would require government's support or incentives. The result of the case study also shows that the quantity of non-ferrous metals in C&D wastes are very small and their recycling will not yield any significant profit.

The civil engineering sector accounts for a significant percentage of global material and energy consumption and is a major contributor of waste material. The ability to recycle and

reuse concrete and demolition waste is critical to reducing environmental impacts in meeting national, regional and global environmental targets. Handbook of recycled concrete and demolition waste summarises key recent research in achieving these goals. Part one considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants and the economics of managing construction and demolition waste. Part two reviews key steps in handling construction and demolition waste. It begins with a comparison between conventional demolition and construction techniques before going on to discuss the preparation, refinement and quality control of concrete aggregates produced from waste. It concludes by assessing the mechanical properties, strength and durability of concrete made using recycled aggregates. Part three includes examples of the use of recycled aggregates in applications such as roads, pavements, high-performance concrete and alkali-activated or geopolymer cements. Finally, the book discusses environmental and safety issues such as the removal of gypsum, asbestos and alkali-silica reaction (ASR) concrete, as well as life-cycle analysis of concrete with recycled aggregates. Handbook of recycled concrete and demolition waste is a standard reference for all those involved in the civil engineering sector, as well as academic researchers in the field. Summarises key recent research in recycling and reusing concrete and demolition waste to reduce environmental impacts and meet national, regional and global environmental targets Considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants Reviews key steps in handling construction and demolition waste Construction, Demolition and Disaster Waste Management Pavement, Roadway, and Bridge Life Cycle Assessment 2020 Final Report

Concepts for Reuse and Recycling of Construction and Demolition Waste

A Guide to Waste Reduction & Recycling on Construction Sites

Construction and Demolition Waste Survey

An increasing number of agencies, academic institutes, and governmental and industrial bodies are embracing the principles of sustainability in managing their activities. Life Cycle Assessment (LCA) is an approach developed to provide decision support regarding the environmental impact of industrial processes and products. LCA is a field with ongoing research, development and improvement and is being implemented world-wide, particularly in the areas of pavement, roadways and bridges. Pavement, Roadway, and Bridge Life Cycle Assessment 2020 contains the contributions to the International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020 (Davis, CA, USA, June 3-6, 2020) covering research and practical issues related to pavement, roadway and bridge LCA, including data and tools, asset management, environmental product declarations, procurement, planning, vehicle interaction, and impact of materials, structure, and construction. Pavement, Roadway, and Bridge Life Cycle Assessment 2020 will be of interest to researchers, professionals, and policymakers in academia, industry, and government who are interested in the sustainability of pavements, roadways and bridges.

Most books available in the market related to this area consider the use of recycled aggregate only for low-grades of concrete applications. This book presents a thorough analysis of structural and high-grade concrete applications. The use of recycled aggregate concrete is the new trend in construction.

The study identifies the origin and destination of construction and demolition waste. It analyses the practices within the 15 member states to promote the reuse and recycling of construction and demolition waste. The study also examines the economic implications of such measures and puts forward some recommendations to improve the waste management of this waste stream.

EFFECTIVE RECYCLE PLANNING FOR CONSTRUCTION AND DEMOLITION WASTES

Eco-efficiency and Performance Strategies in Construction and Demolition Waste Recycling Systems

Improving quality of construction & demolition waste

Construction and Demolition Waste Recycling Guide

National Survey of the Production, Recycling and Disposal of Construction and Demolition Waste in England and Wales, 1999-2000

Management, Processing and Environmental Assessment

A pre-demolition audit is a tool that can be used to both identify hazardous substances and assess the materials to be removed from the building or infrastructure, and consequently their potential value, prior to the demolition or renovation activity can be established. Audits are essential since they enable all stakeholders involved to get information on the composition of waste and make it easier to find markets for different waste types. It is likely that the European Commission will recommend all Member States to make this pre-demolition audit mandatory to increase high quality recycling of construction and demolition waste. The report presents the current pre-demolition audit systems and existing guidelines in Denmark, Finland and Sweden. The report gives recommendations on key elements to be included in audits for improving the quality of the construction and demolition waste.

This book focuses on the utilisation of construction waste material as coarse aggregate in making concrete. It discusses in detail the behaviour of recycled aggregate under impact load along with other structural applications, and explains the various quality-improvement techniques for recycled aggregate and recycled aggregate concrete (RAC). The first chapter describes the importance of recycling construction and demolition waste and the status quo of global construction and demolition waste recycling. The second chapter examines the recycled aggregate production methodology. Subsequent chapters address the physical and mechanical characteristics and different research findings, as well as the engineering properties of recycled aggregate concrete. Further, the interrelationships among the mechanical properties of recycled aggregate concrete are discussed. The book also explores long-term properties like shrinkage and creep, durability properties, and microstructural characterisation. It will serve as a valuable resource for researchers and professionals alike.

Advances in Construction and Demolition Waste Recycling: Management, Processing and Environmental Assessment is divided over three parts. Part One focuses on the management of construction and demolition waste, including estimation of quantities and the use of BIM and GIS tools. Part Two reviews the processing of recycled aggregates, along with the performance of concrete mixtures using different types of recycled aggregates. Part Three looks at the environmental assessment of non-hazardous waste. This book will be a standard reference for civil engineers, structural engineers, architects and academic researchers working in the field of construction and demolition waste. Summarizes key recent research in recycling and reusing concrete and demolition waste to reduce environmental impacts Considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, and the types and optimal location of waste recycling plants Reviews key steps in handling construction and demolition waste Study on Construction & Demolition Waste Management in Construction Site Recycled Aggregate in Concrete Construction and Demolition Waste Management Practices and Their Economic Impacts Research Into the Recycling of Construction and Demolition Wastes in Australia Reuse of Materials and Byproducts in Construction An Integrated and Sustainable Approach

This chapter discusses the recycling of construction and demolition wastes (CDW) and the use of recycled aggregates in concrete. Classification and characteristics of recycled aggregates, physical and mechanical properties, and durability of recycled aggregate concrete are also discussed.

This publication provides introductory technical guidance for professional engineers and construction managers interested in recycling construction waste.

Advances in Construction and Demolition Waste Recycling Management, Processing and Environmental Assessment Woodhead Publishing

From Science to Innovation

Sustainable Waste Management and Recycling

Proceedings of the International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020 (LCA 2020, Sacramento, CA, 3-6 June 2020)

Recycling Concrete Construction and Demolition Wastes

Recycling of Construction Materials in Construction and Demolition of Buildings

Eco-efficient concrete

The need to establish material cycles in the building industry is undisputed. Knowledge on this topic is available in many places: In this book it is summarised and systematized. After a general overview of the quantities generated, recovery rates and areas of application of recycled building materials, the current processing steps on which recycling is based and the possibilities for influencing the product properties are discussed. Furthermore, recycling building materials are characterized and their fields of application are presented. The starting point is always the original building material, which is later found in the construction waste. The focus is on the structural properties. The environmental aspects, which have determined the discussion for years, are shown to the necessary extent. The book concludes with a chapter that presents new developments in processing technologies and analyses the potential of construction waste as a source of raw materials.

This report is a useful tool for countries starting to recycle aggregates or construction and demolition waste. It contains the latest developments in this field, introduces a completely new approach to the procedure of proportioning concrete mixtures with recycled aggregate, references recent publications, opinions and discrepancies in relation to the durability of recycled concrete, such as freeze-thaw standards, studies of chloride penetration and diffusion, and sulfate attacks, the use of the fine fraction This volume will be of interest to recyclers, researchers and consumers.

Abstract: Egypt faces serious solid waste management challenges. Currently, waste is either burned or dumped along roads and canals. Not only do these wastes cause health problems, but they also contribute significantly to soil, air, and water pollution. Solid waste can be categorized as residential, industrial, institutional, municipal, manufacturing, and construction and demolition waste (C&DW). The construction industry threatens the environment in three main ways: during the production of raw materials in the process of cement and aggregate production; during the construction process itself due to high consumption of energy; and, in the final stages of the construction process due to demolition waste disposal problems. It is a common practice at the end of the lifecycle of a building in Egypt to demolish it, leaving the construction and demolishing waste without proper waste management. This underscores the unfortunate fact that the concept and practices of adequate recycling are still not applied in Egypt. This study aims at exploring potential uses for construction waste in feasible applications. More specifically, it targets the possibility of employing construction and demolition waste to produce non-load bearing bricks that is suitable for use in the construction industry. A case study is provided to highlight the socio-economic value of recycling. In addition, a cost and benefit analysis is included in which the feasibility of the proposed bricks is explored. To meet this objective, standard tests, such as compressive strength, flexural strength, water absorption and density, were performed on the bricks. The results of this study reveal that the final product meets expected properties of standard bricks used in construction. The case study demonstrates that the impact of using bricks made from construction and demolition waste extends beyond the technical and functional to include socio-economic and environmental positive impacts. The cost and benefit analysis pinpoints that applying the recycling concept in this area also offers financial merits; this provides an incentive for the use of such products in future construction projects. Recommendations for future work to further validate the findings of this study are presented.

Recycling Construction and Demolition Waste

Through Planning, Job Site Reuse and Recycling

Recycling of Building Materials

Economic and Environmental Impact Assessment of Construction and Demolition Waste Recycling and Reuse Using LCA and MCDA Management Tools

Handbook of Recycled Concrete and Demolition Waste

Incorporating recycled aggregates in concrete, despite the fact that effective technologies are available, is being adopted at a slow rate. These shortcomings have been associated with poor quality recycled aggregate (RA) products, lack of guidelines facilitating the use of RAs in various applications, and little incentive to incorporate these materials into civil engineering projects in Cape Town. In order to promote the use of RAs, a construction and demolition waste (C&DW) recycling culture has to be developed. Analysis of municipal waste data over the past 10 years

shows that the commercial aggregate industry and market has not grown. A major contributor to the excess C&DW in the City, is the discarded C&DW once used to manage landfill sites with regard to activities such as cell creation, road building etc. This has resulted in 195 000 tons of the estimated 680 000 tons per annum (2012) of C&DW being disposed in Cape Town. The approach of the City and the construction industry to waste management is characterised by quality control issues, resource inefficiencies, economic and social burdens and environmental impacts. The realisation of C&DW as a resource and the development of on-site recycling procedures are seen as the key to creating more sustainable C&DW management systems. This is achieved internationally through detailed integrated waste management plans (IWMPs) that require waste generators to identify and separate a variety of C&DWs, as well as specify their proposed uses for these materials. This creates an environment where a specialist waste-processing sector can develop and practices such as the re-use and recycling of multiple C&DWs can flourish. It is important that the management and handling of C&DWs is carried out in a manner such that the technical requirements of this resource are understood. This study analyses two major C&D materials in clay and concrete masonry (CMA) materials and waste concrete (RCA). "

Construction and Demolition Waste (CDW), from the construction, maintenance, renovation and demolition of buildings and structures, represents a large proportion of the waste in industrialized societies. Compared to other forms, such as household waste, more than 90% of CDW can be used as a resource and a substitute for construction materials, especially for primary, natural raw materials. Reuse, recovery and recycling depends on the quality and market for the materials, and the environmental impact of the processes for conversion of CDW from old structures to its use in new structures. However, the utilization today of CDW products as secondary resources is marginal. Most CDW is deposited or used as fill material, and the opportunities of high quality recycling are generally neglected. This book presents the opportunities for the sustainable and resource efficient utilisation of CDW, focusing on recycling of concrete and masonry as the major forms of CDW. The recycling of gypsum, timber, mineral wool, asphalt and other types are also described. Its aim is to present a chain of value and material streams in the transformation of obsolete buildings and structures into new buildings and structures. It takes a holistic view, focusing on the lifecycle economy (the circular economy) and integrated management aspects of various scenarios ranging from high industrial urban renewal to debris removal and management after disasters and conflicts. It is based on the author's 35 years of research and development combined with practical international experience within the demolition and recycling area. It addresses students, architects, civil engineers, building owners, public authorities and others working in urban planning, demolition and resource management in the building and construction sector and in the reconstruction of damaged buildings after disasters and wars.

Concrete is the most used man-made material in the world since its invention. The widespread use of this material has led to continuous developments such as ultra-high strength concrete and self-compacting concrete. Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste focuses on the recent development which the use of various types of recycled waste materials as aggregate in the production of various types of concrete. By drawing together information and data from various fields and sources, Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste provides full coverage of this subject. Divided into two parts, a compilation of varied literature data related to the use of various types of industrial waste as aggregates in concrete is followed by a discussion of the use of construction and demolition waste as aggregate in concrete. The properties of the aggregates and their effect on various concrete properties are presented, and the quantitative procedure to estimate the properties of concrete containing construction and demolition waste as aggregates is explained. Current codes and practices developed in various countries to use construction and demolition waste as aggregates in concrete and issues related to the sustainability of cement and concrete production are also discussed. The comprehensive information presented in Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste will be helpful to graduate students, researchers and concrete technologists. The collected data will also be an essential reference for practicing engineers who face problems concerning the use of these materials in concrete production.

Construction Demolition Waste : Proceedings of the International Conference Organised by the Concrete and Masonry Research Group and Held at Kingston University - London on 14-15 September 2004

Recycling Construction & Demolition Waste: A LEED-Based Toolkit (GreenSource)

Requirements for pre-demolition audit

A Report

A Financial Feasibility Model

Generation, Regulation, Practices, Processing, and Policies

The three volumes from part of the Proceedings of the two-day International Conference organised by the Concrete and Masonry Research Group within the School of Engineering at Kingston University, held in September 2004. The Conference deals with issues such as the regulatory framework, government policy, waste management, processing, recovery, the supply network, recycling opportunities, sustainable ways forward and the economics of sustainability. This open access book provides insight into the implementation of Life Cycle approaches along the entire business value chain, supporting environmental, social and economic sustainability related to the development of industrial technologies, products, services and policies; and the development and management of smart agricultural systems, smart mobility systems, urban infrastructures and energy for the built environment. The book is based on papers presented at the 8th International Life Cycle Management Conference that took place from September 3-6, 2017 in Luxembourg, and which was organized by the Luxembourg Institute of Science and Technology (LIST) and the University of Luxembourg in the framework of the LCM Conference Series.

This report presents the situation within the Nordic countries with respect to production and recycling of construction and demolition waste, in particular crushed concrete, in the form of aggregates, and discusses the conditions and requirements relating to environmental impacts for a possible application of the End-of-Waste option in the Waste Framework Directive. If this option is applied, the material may become a product and it will no longer be regulated by waste legislation. Regulation of crushed concrete under product legislation presents a number of challenges, particularly with respect to environmental protection. The report presents and proposes a methodology for the setting of leaching and risk-based criteria to be fulfilled by crushed concrete (and other waste aggregates) in order to obtain End-of-Waste status. It is further recommended to set impact-reducing conditions on the use of materials obtaining End-of-Waste criteria, and not to allow free use. It should be noted that the work described in this report was carried out during the period from 2010 to 2012.

Construction & Demolition Debris Guidebook

An Introduction to Recycling Construction and Demolition Waste

Advances in Construction and Demolition Waste Recycling

Re-use of Construction and Demolition Waste in Housing Developments

Progress of Recycling in the Built Environment

Reducing Construction and Demolition Waste

The Malaysia construction industry nowadays generates a large quantity of construction and demolition waste.

Construction and demolition waste defined as a mixture of surplus materials arising from any excavation, civil or building construction, site clearance, demolition activities, road works, and building renovation. The disposal of

construction and demolition waste at landfills has caused major environmental concerns and government sources indicate that there is an acute shortage of landfill space in Malaysia. The aims of this study are to give background information on C&D waste problems in Malaysia and propose a practical guidance to building professional on how to manage and minimise C&D waste. Construction site waste management is not the major issues in construction site nowadays. But, with the new development of town and country, it probably will increase time to time and it is also effect directly into environmental issues. Further developments are recommended to develop a scientific methodology to quantify construction & demolition waste. Furthermore, more practical support is required to enforce the implantation of Construction & Demolition Waste management scheme in the construction and building field. It is also recommended to extend research on the area of recycling technique of building materials to induct feasibility studies, including cost and payback period analysis for each technique.

-Author.

Introductory guidance for professional engineers and construction managers interested in recycling construction and demolition waste.

A Complete Reference on Construction Waste Recycling This GreenSource guide offers comprehensive information on how to recycle as much as 95 percent of new construction and demolition waste, reuse existing materials, and comply with U.S. Green Building Council (USGBC) LEED waste management guidelines. Recycling Construction & Demolition Waste provides the strategies and tools you need to develop and implement a successful jobsite waste management plan. This practical resource also covers other programs that promote sustainable construction, such as the International Code Council's ICC-ES program, the National Association of Homebuilders (NAHB) Green Building Program, the Green Building Initiative Green Globes Program, BREEAM, and more. FIND OUT HOW TO: Manage construction and demolition waste on the jobsite Set up an efficient jobsite recycling center Recycle new construction waste Conduct an on-site audit to assess demolition waste Reuse existing materials, including asphalt, brick, concrete, insulation, structural steel, wood, glass, and more Develop a comprehensive waste management plan Comply with LEED standards to earn waste management credits Get details on other green certification and code programs Document waste management compliance Include appropriate specifications in construction documents Market your jobsite recycling program Downloadable forms, templates, spreadsheets, and checklists available at www.mhprofessional.com/rcadw.

Use of Industrial, Construction and Demolition Waste

Waste Minimization and Recycling

Systematic Approach of Characterisation and Behaviour of Recycled Aggregate Concrete

The Use of Construction and Demolition Waste in Concrete in Cape Town

Final report of the RILEM Technical Committee 217-PRE

Designing Sustainable Technologies, Products and Policies

The construction industry is the largest single waste producing industry in the UK. Ensuring a supply chain of recycled materials affords many potential gains, achieved through: reducing the material volume transported to already over-burdened landfill sites, possible cost reductions to the contractor/client when considering the landfill tax saved and the potential for lower cost material replacements, a reduction in the environmental impact of quarrying and the saving of depleting natural material resources. Reuse of Materials and Byproducts in Construction: Waste Minimization and Recycling addresses use of waste and by products in the construction industry. An over view of new “green” design guides to encourage best practice will be examined and current legislation that channels on site practices, such as site waste management plans. Fundamental individual construction materials are discussed and the process of reforming by products and waste products into new construction materials is investigated, examining the material performance, energy required to convert waste into new products and viability of recycling. The main range of constructional materials will be examined. Aimed at postgraduate students, lecturers and researchers in construction and civil engineering, the book will also be of interest to professional design practices.

Research Paper (postgraduate) from the year 2015 in the subject Economy - Environment economics, grade: 4.0, The American University in Cairo, language: English, abstract: Sustainable development is considered to be the main solution for various environmental problems facing the world nowadays. In this project, we are going to discuss the definition and importance of sustainability. Moreover, this Project States the condition of C&D (construction and demolition) wastes in Egypt, and their handling. It also explains the concepts of zero waste and green entrepreneurship, and connects these concepts through a variety of integrated case studies. Therefore, we can define a solution to the C&D waste problem in Egypt. The vision of the report that C&D wastes is one from the largest and most hazard wastes in Egypt and up to now Egypt does not appreciate the economic value in these wastes and does not realize their environmental impacts on the people health nor their social impacts on the free lands which are used to be dump sites for these wastes. The report show five case studies aim to reach 100% recycling or zero waste and build green entrepreneurship for C&D waste. This connection between zero waste and build green entrepreneurship will produce comprehensive solution for C&D waste in Egypt to solve the different aspects of this problem and get great economic benefit through this solution.

Viability of On-site Construction and Demolition Waste Recycling Process

Report 22: Sustainable Raw Materials: Construction and Demolition Waste – State-of-the-Art Report of RILEM Technical Committee 165-SRM

14. Concrete with construction and demolition wastes (CDW)

Construction and Demolition Waste Management Using Zero-Waste Strategy and Green Entrepreneurship

Incorporating Construction and Demolition Waste Into Non-load Bearing Bricks

End-of-Waste Criteria for Construction & Demolition Waste