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The Construction Portuguese Industry Seems to Ignore the Deconstruction Method

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ABSTRACT

Deconstructing a building is the careful dismantling of that building so as to make possible the recovery of construction materials and components, promoting reuse and recycling. The concept arose as a consequence of the rapid increase in the number of demolished buildings and the evolution of environmental concerns within society at large.

The deconstruction is a process unusual in Portugal; traditional demolition is yet the preferred method when it is necessary to dismantling a building. However there are studies under way whose purpose is to lessen the quantity of debris that are by-products of the construction process.

The aim of this document is to present the current state of national research, implementation and viability of deconstruction as an innovative technique in the process of rehabilitation, thereby contributing towards the economic sustainability of said process. The research projects which authors are involved are also discussed.

Keywords: Deconstruction, Rehabilitation, Construction Sustainability

1. INTRODUCTION

There are now over 5 million houses in Portugal. 3 and a half million are inhabited, 1 million is comprised of second or holiday homes and half a million are empty. Yet the construction industry is reluctant to adapt. From 1999 through 2002, 106,000 houses were built per year, and municipal zoning plans anticipate, in the north region of the country alone, houses enough for 15 million residents when the population is only about 3 and a

half millions. Considering population density, Portugal has the most houses per resident in Europe and still is the country where more homes are built.

The 2001 census listed 5,019,425 buildings, of which 1,222,280 were built before 1960 and constitute about one fourth of the total (Entrepreneurs Council for Sustainable Development, 2004).

There is, then, this enormous patrimony that is waiting to be rehabilitated, as many of these buildings are sorely in need of interventions. Paradoxically enough, very little rehabilitation takes place in our country — indeed it is under 10%, whereas in other European countries it climbs to about 50%.

The lack of interest in rehabilitation underpins behaviours that do not allow for sustainability in the construction sector. Partly, the attitude is connected to the fact that building rehabilitation involves knowledge of building materials and techniques that have been superseded. More often than not, rehabilitation of a building will stop at the preservation or restoration of the facade, disregarding the reuse of the materials inside, even though in some cases it can be recovered and employed in the new intervention. No-holds barred demolition produces an enormous quantity of debris which will, in most cases, only add to the pile of material to be used for landfills. Due to community concerns over potential impacts to the environment in developed areas, it is becoming more and more difficult to have landfills at such sites. On the other hand, having landfills in areas further away from human activity raises transport and power costs. An alternative to packing off these materials and constructive materials to a landfill is to choose deconstruction over the more common habit of demolition.

Deconstruction is a concept that emerged due to the rapid increase of demolitions and growing environmental concerns expressed throughout society. Yet deconstruction processes are still perceived as interesting way to cut down on the production of debris but one that fails to garner general understanding and acceptance. For this to come about, environmental rules and regulations must be promoted. Deconstruction processes and techniques need to be developed and promoted.

2. THE IMPORTANCE OF DECONSTRUCTION

2.1 DECONSTRUCTION ADVANTAGES

Deconstruction represents advantages, in environmental terms, since they allow to revalue by-products and to observe more efficiently the by-product/debris value hierarchy as applied to the construction industry. The following scheme depicts this function in a concise manner (Kibert and Chini, 2000).

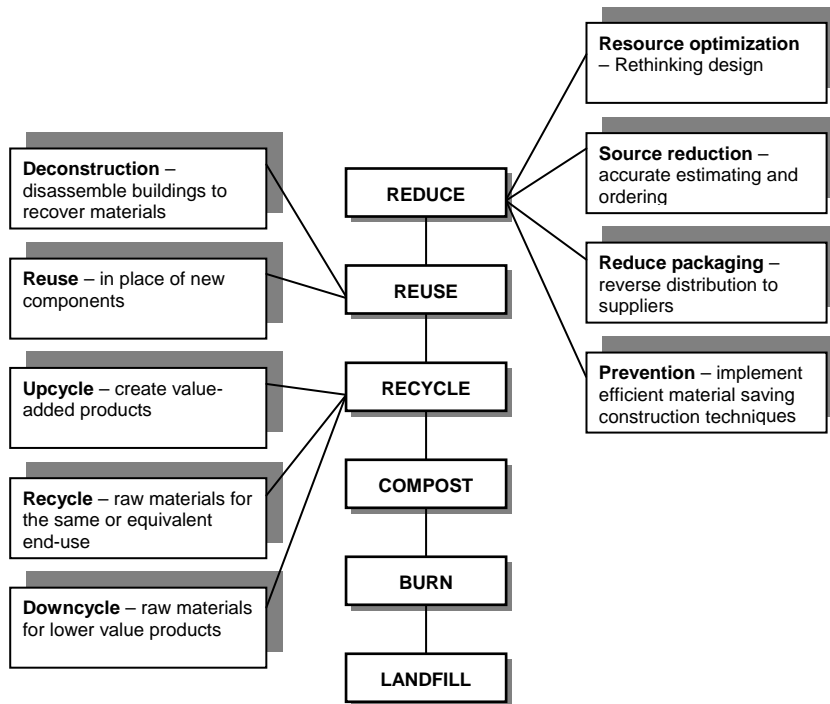


Figure 1.1 Hierarchy for by-product/debris management in demolition and construction operations

Source: Charles J. Kibert and Abdol R. Chini, 2000

Ignore deconstruction means create a pile of debris that can't be viably reuse. The following figure attempts to depict this situation; to demolish a build without resorting to procedures that enable separation and recovery of debris and by-products.



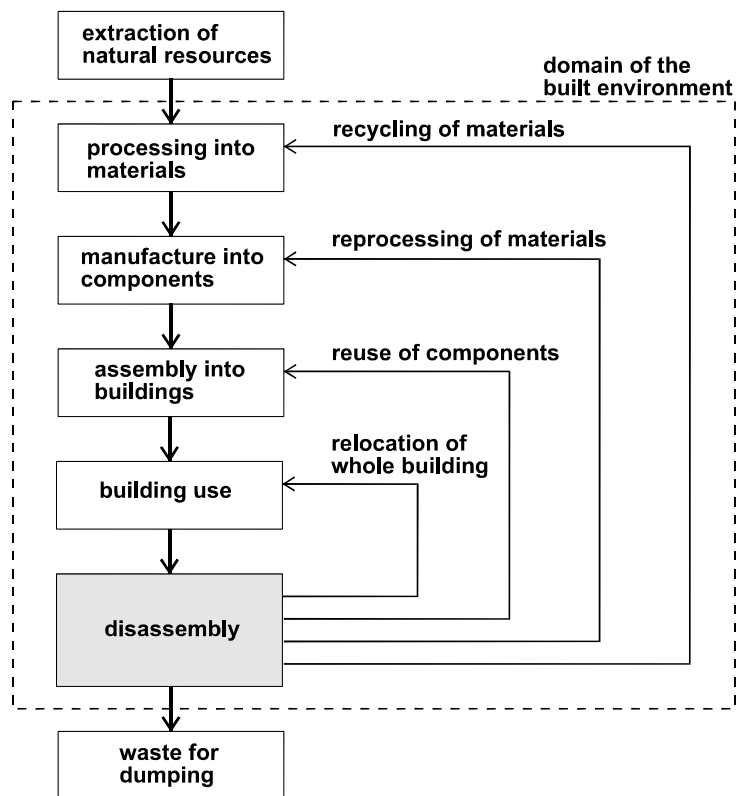
Figure 1.2 Undifferentiated demolition

Source: Fernando Pinto, 2000

Deconstruction allows to:

- reuse materials;
- recycle materials;
- resort to innovation and technology;
- promote sustainable construction;
- foster the growth of a new market — used materials;
- garner economic and environmental benefits.

According Crowther there are 4 possible recovery scenarios for recovery of materials (see figure 1.3), which are presented hierarchically. Reuse is preferred over reprocessing or recycling (Crowther, 2000) (Crowther, 2001).

**Figure 1.3** The 4 scenarios for recovery of materials in a construction environment

Source: Philip Crowther, 2000 and 2001

2.2 DECONSTRUCTION AS A WAY TO REHABILITATION SUSTAINABILITY

Often enough, in order to rehabilitate a building, some of its elements are demolished. Because they are either quite derelict or because new functions demand that elements be replaced. However, little or no reuse of materials and constructive elements has been taking place. Instead, selective demolition is the preferred method. Rehabilitation and deconstruction are concepts that fit the overall framework of sustainability in construction, as they both focus on the valuation of existing resources.

To rehabilitate a building means, basically, restore qualities to it that will allow for safe, comfortable use in a durable building appropriate to the goals in mind. There can be two sides to rehabilitation, whether we are talking about general-purpose contemporary buildings or those that constitute cultural and historic patrimony. In the first case, it seems adequate adhere to the concept by the Royal Institution of Chartered Surveyors where rehabilitation is defined as the extensive repair, renovation and modification of a building to have it suit economic or functional criteria equivalent to those expected of a new building that serves the same purpose. It may involve putting in place installations and service systems, means of access, natural lighting, equipment and finishes, using but the bare bones of the old building (Entrepreneurial Council for Sustainable Development, 2004).

The rehabilitation of buildings clearly dovetails with the concept of sustainable development. By valuing the recovery of existing buildings, the need for new construction is diminished. As a consequence, urban sprawl has less impact on surrounding areas whose environmental, ecological and agricultural value is often considerable. Another aspect of the matter is deconstruction paves the way for the revaluation and reuse of construction materials and elements which would otherwise be treated as worthless debris and removed to storage spaces which are often not legally authorized to hold such materials. Furthermore, by valuing construction materials and elements, procurement of raw material is diminished, as well as the need to process and transport raw materials. The need to manufacture new components and products is also lessened, which has economic and environmental advantages.

2.3 CONTRIBUTION TOWARDS INCREASED COMPETITIVENESS OF CONTRACTORS

As is generally known, the competitiveness of the construction sector relies on the entrepreneurial capabilities of its companies, whose goal it is to provide quality, innovative service. This work aims to foreground knowledge in the fields of rehabilitation and reconstruction, giving companies an edge as far as deconstruction techniques are concerned. These techniques are preferable to undifferentiated demolition and meet legislative demands on reuse and recycling of materials; to which construction companies do not yet pay much heed. The pre-project on construction and demolition by-products and debris proposes implementation of debris and by-product management plans at the project design stage. This seems to be a correct, effective way to foreground the importance of debris management and to get all participants involved, beginning with the design stage and all the way down to implementation.

The plan specifications contemplate an estimate for the debris and by-products resulting from construction work. It then becomes necessary, at the design stage, to be more and more aware of the debris that will be produced. Adequate logging and shipping are also considered in this legislative document. These attitudes do indicate the path to follow.

It is very likely that, in the near future, much as is happening all over Europe now, new technologies for material reuse and recycling will be chosen over old habits. One of this study goal is to bring companies knowledge that will help them adopt environmentally-sound attitudes; they will not only benefit economically but also in terms of their public image. Environmentally-sound positions are a great promotion tool, especially if you consider the many problems the world is going through right now that can be chalked up to our thinking in exclusively economic terms.

3. THE STATE OF ART

In Portugal, new buildings emerge where there used to be constructions that no longer serve their purpose or can't be adjusted to users' demands. More often than not, these older buildings will be demolished, not a thought given to the recovery of construction materials, elements or components. The same is to be verified in rehabilitation operations where the building is gutted, as it were, and only the facade remains standing. Concatenating deconstruction and rehabilitation is a path towards sustainability in construction. Yet the lack of adequate dismantling and recovery methodologies causes construction materials and elements to be discarded when they could well have been reused.

In our country, the construction industry is highly relevant, whether in terms of the employment it provides or the part it plays in our economy. However, environmental mismanagement is rife, namely where discarding construction debris is concerned.

It is quite urgent to change the situation so as to ensure the preservation of natural resources and contribute towards much-needed sustainable development. At a time when the sector's activity dwindles, construction companies must be able to face all the demands involved in

public bids for construction projects, which display an increasing tendency to include an environmental component.

Quite often, contract provisions will specify that any environmental offence by the contractor will justify denouncing the contract, which in itself does not cancel payment of fines or sanctions applicable by law. The intention to publish legislation that enforces more restrictive environmental ordinances is also a factor the construction industry in our country must learn to reckon with, namely where the segregation and shipment of by-products and/or debris at construction sites are concerned.

4. SCHEDULED INVESTIGATION PROJECTS

In Portugal, the sustainability of construction has been looked into over the past few years, especially where quality, safety and natural/energetic resource-saving technologies are concerned.

There are studies under way whose purpose it is to lessen the enormous quantity of debris that are by-products of the construction process. Specifically, their aim is to introduce the principles which underlie constructability/deconstructability.

The authors are now participating in research projects on this problem. Our main goals are to (Couto, 2006):

- collect and analyze data on old buildings with strong masonry scattered across urban centres in Portugal, namely, their constructive characteristics and more frequently used construction materials;
- collect and analyze deconstruction techniques that help achieve sustainable rehabilitation of such buildings;
- propose methodologies for the implementation of deconstruction techniques that are adequate to the type of rehabilitation intended, that will allow for valuation of construction materials and elements (components) already in place, so that they are not randomly, indiscriminately or unnecessarily removed, so as to make them reusable;
- follow and conduct building rehabilitation experiments so as to analyze and validate the methodologies proposed for implementing deconstructive techniques; and
- divulge and collect opinions from several participants in the constructive process.

5. FINAL COMMENTS

At this writing, the construction industry is going through a process for the implementation of quality programs. These will surely contribute towards the reduction of debris and by-products created by the sector. However, the quantities produced are not going to plummet overnight. Furthermore,

no matter how effective the changes made to constructive processes with a view to cut back on costs and debris generated, there will always be debris. Add that to demolition debris and by-products and you will still have a sizable amount of waste. On the other hand, work entailing total or partial demolition of buildings tends to occur more and more often in our country as a result of adaptation and improvement of said buildings. They must be refitted to meet new quality and comfort standards. New demands will be placed on older buildings, therefore.

So it is that research into practical solutions for the reuse of materials and components will combat the urban problem created by illegal landfills — bringing environmental improvement — and introduce new materials into the market that have great potential for use.

The production of legal documents that encourage more environmentally-sound behaviour, that is, that raises awareness and indeed makes the construction industry handle its debris and by-products more carefully, is vital to the sector, if it is to contribute at all to sustainable development, an obligation that is shared by everyone. Special mention must be made of the mandatory waste/debris/by-product management plan at the design stage. It seems to be a correct and effective way to highlight the importance of waste management and to get all the participants involved, from the design to the construction stage.

The change, however, must be accompanied by public awareness campaigns. It is not enough to stress that the plan is mandatory. The plan's importance must be addressed. It will be easier to reach our goals if we all know the advantages and importance of such a plan.

6. REFERENCES

- Couto, Armanda Maria F., Couto, João Pedro and Teixeira, J. M. Cardoso, 2006, Desconstrução – Uma ferramenta para a sustentabilidade da construção. NUTAU'2006, *Technological Innovation – Sustainability, VI Brazilian seminary of design management process in building projects*, School of Architecture and Urbanization, University of S. Paulo, October 9-13, São Paulo, Brazil. (Full text and Oral communication).
- Crowther, Philip, 2001, Developing an inclusive model for design for deconstruction. In *proceedings of CIB conference Deconstruction and materials reuse: technology, economics and policy*, New Zealand edited by Abdol R. Chini, University of Florida, 1-26.
- Crowther, Philip, 2000, Building deconstruction in Australia. In *proceedings of CIB conference on Overview of deconstruction in selected countries*, edited by Charles J. Kibert & Abdol R. Chini, University of Florida, 14-44.
- Entrepreneurs Council for Sustainable Development, 2004, Rehabilitation: the best away for sustainable construction, www.bcsdportugal.org.
- Fernando Pinto, 2000, Walls of Old Buildings in Portugal.
- Kibert, Charles and Chini, Abdol, 2000, Introduction: deconstruction as an essential component of sustainable construction. In *Proceedings of CIB conference on Overview of Deconstruction in Selected Countries*, edited

by edited by Charles J. Kibert & Abdol R. Chini, University of Florida, 6-14.