Advanced Topics in Science and Technology of Concrete
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Recycled concrete aggregates market: problems and prospects - Part 1

Hello all, welcome to this lecture on Market Issues for Recycled Aggregates. I am Ram. I did my PhD at IIT Madras in the area of Construction and Demolition Waste Management. Since my PhD, I am pursuing my postdoctoral research at the University of Sheffield recently. In the series of lectures before, you would have heard about technical and technological aspects of recycling and recycled aggregates. Today, we are going to talk about the market issues.

You might wonder about the market is actually is because it is a market in which the real execution happens. Unless the recycled aggregates that are being produced is sold in the market, the real benefits of recycling and therefore, it is imperative that each one of us understand the market issues so that we can develop the technologies in a much better way. In today's lecture, we are going to cover the definition of market, the role of market in affecting recycling facilities, the usage of recycled aggregates and delivering the real benefits of recycling as well. We can also cover some of the unintended consequences of market recycling as well.

So, with that background, let me jump on to a formal definition of market in the context of economics. So, here it is defined as the institutions that exist to facilitate exchange of goods or services. They exist to reduce the cost of carrying out exchange transactions. So, just put a casual definition. So, the market is the place where the parties can gather to facilitate the exchange of goods or services.

We all have some idea of what a market is because on a regular basis, we have actually been to several markets such as a flower market, grocery market, electronics market and so on. So, there are three important features of a market that we must be aware of. So, these are the arena or space. So, this can either be a physical or it can be a virtual marketplace. For instance, in terms of physical, grocery stores, supermarket stores that we have been in our day to day lives.

In terms of virtual marketplace, Amazon is again one of the very popular market place all over the world. This is something which is very important because this is the space in which the exchange happens. That's number one. The second is the buyers and the sellers. So, these are the entities who interact with the market. So, unless there is a buyer and a seller for a product, the market doesn't exist at all. So, they are crucial. The third feature is a commodity that is being sold. So, in our case, it is basically the recycle aggregates. Take for an example.

So, that is a commodity being sold or exchanged between the buyers and the sellers. These three important features. Now, if you look at, we have also used a word called institutions. So, what does this mean is the market has certain written and unwritten rules in which they operate in whatever region they be. So, it depends upon, for instance, you have to pay for the products or the goods or services that you get from the seller.

So, that is kind of an unwritten rule as well. And there are certain rules that kind of guide the competition that is existing within the market. And there are some minimum prices and regulations that operate in different regions and different ways. So, those are some of the written and underdone rules that kind of govern market. But the markets are also kind of subjected to several beliefs and value systems of particular region as well.

So, for instance, in some part of the place, there are certain goods that are not being sold at all. It is because the people in that region believe that there should not be traded. And therefore, markets for that particular products in that particular region may not exist. So, thus, markets are governed by a set of written and underdone rules, as well as the beliefs and values of the people in that region. And it's an interesting play where the markets basically facilitate the price discovery of the transactions that happen.

How does the market do that? The market establish prices of goods and services based on supply and demand. And this is actually a very typical curve of law of supply and law of demand from the economics textbook. And let me just quickly explain what is this. So, on the x-axis, you have the quantity in terms of units. And on the y-axis, you have the prices where it is low and high. So, the law of demand states that at higher prices, the quantity demanded by the people will always be low, which means quantity demanded and the prices actually share an inverse relationship with each other. And if the prices are low, the quantity demanded will be high. This is very intuitive because we would tend to buy more of a

product when the prices are low. And when the prices are high, we probably tend to buy less of it. And the law of supply is the direct opposite of it.

So, suppliers would want to sell more when the prices are high and would want to sell less when the prices are low. So, which means price and the supply, they share a direct relationship here. In the market, there is always an equilibrium situation that prevails because the quantity of suppliers and the quantity demanded by the consumers, they keep interacting with the market. And this is a very dynamic situation. And depending upon the supply and the demand in the market, the prices keep readjusting itself to a different equilibrium, depending upon a number of factors.

With that background, let me put the question of what do you think is the status of the market, if any, for recycle aggregates at present state. So, I am sure, recycle aggregates is still again a very new concept and therefore, the market for recycle aggregates is not completely mature yet. And that is why several steps are being taken to push that. Let me give a brief background on the barriers that actually affect recycling as well as the usage of recycled products. So, we all know that the prevalent practice in today's situation is a disposal practice.

Whatever the waste that kind of gets generated in construction sites are being just disposed either in landfills or just being thrown away in all over the places in all unauthorized, leading to unauthorized dumping. Why does that happen? For instance, there is a significant lack of awareness being reported in the literature among the construction industry participants. And this poor awareness kind of scales in different points. For instance, data on quantum of waste generation itself is actually lacking. And why it is important? Because any recycler who wants to set up a recycling facility would want to know the quantity of waste getting generated in a system so that he can plan the downstream infrastructure that are required to collect the waste, to recycle the waste, as well as to kind of make calculations on return on investments that he could make from recycling operations and so on and so forth.

So, the first point is lack of data on waste generation itself that is prevailing in the market. And there is another in terms of the knowledge on severity of this waste stream is also lacking in the society. For instance, if you talk to the construction industry participants, they'll tell you that these are all brick and soil and earth that we get from the environment and therefore there is nothing wrong in just disposing them back there. So, it had some sense, but

the kind of materials that we are actually using in these days, the kind of harmful chemicals that exist in the paints that have been used in our walls and increasing complexities of the materials that are being used. It actually has a big impact in the contaminants that could enter the earth as well as even contaminate the water table if it is disposed in all low lying areas.

So, therefore there's a significant lack of knowledge on severity of this waste stream on the environment as well. And the third point probably is the kind of lack of awareness on recycling possibilities of this waste stream itself. And even there is a lack of knowledge on the recycling techniques that are available. And even the construction industry participants are not even aware of the kind of proper waste management practices that they could adopt to actually minimize waste generation in their sites. So, poor awareness becomes one of the fundamental reasons why we see a negligible amount of recycling in most of the countries.

And this kind of leads to a significant number of downstream issues. For instance, because there is a poor awareness, it leads to low priority being given to this waste stream as well as an unfavourable attitude being developed towards this. What is this? So, what we mean by unfavourable attitude is, for instance, there is a kind of cultural resistance to the concept of recycling. And people are generally reluctant to use recycled products because they think that it is inferior to a pristine aggregate or a primary product. It is just their mental construct and that's why we call this as an unfavourable attitude.

There is also an attitude that waste management is actually not something of priority or something which they believe as not something that might give them more value. For instance, construction industry personnel will believe that if they conduct proper waste management, what is the benefit that I am going to get from this? So, that is a kind of attitude with which people look at waste management and that has several downstream issues as well. And because of these kind of poor awareness and low priority and unfavourable attitudes, what we see is the specifications do not actually talk very much about recycled aggregates which is a significant barrier to usage of recycled aggregates in construction industry. Because construction industry works on contracts and whatever is being agreed on the contract and the specifications documents will only have a say in terms of the real practice. And therefore, it is highly imperative that these specifications need to actually start putting in recycled aggregates explicitly which is highly lacking in these days and therefore, we only see a significant amount of disposal practice being happening.

And we also see that the kind of practices that these site engineers adopt or the construction industry participants in project sites, we do not see the source segregation happening in most of the sites. And on-site sorting and waste management plans are also not being put in place in most of the sites because of which that has an effect on the kind of waste being delivered to a recycling plant and the quality of products that could be produced from recycling. What it funnels again is the cascading effect of poor acceptance by the end users because they again it is their belief that it is inferior product and because of the kind of commingled products being coming into the recycling plants, the quality of the output is not at least matchable with pristine aggregates and therefore, there is a significant amount of resistance to use recycled aggregates from the customer's point of view. There is also a number of systemic incentives that kind of affect recycled products. What are they? For instance, it is very difficult when you do not have any data in terms of overall waste generation to kind of forecast the incoming supply of recycled waste or debris into the plant as well as create production plans for recycling by a recycler.

So because of this inability to forecast supply and demand properly, the operational planning for recycling becomes difficult and similar such systemic incentives, lack of systemic incentives exist in the market because of which recyclers are not able to plan their infrastructure. When we look at the regulations, in most of the times even they do not help because there is either a lack of clarity or a lack of focus in terms of clear-cut instructions with respect to recycling in most of the regions and the lack of data as well does not help in terms of creating a proper enforcement regime in the regulations as well. Another important aspect which actually affects recycling is the kind of coordination issues that exist between various departments. For instance, when a construction industry applies for a permit, they apply to a separate agency and whenever they would like to get their waste disposal permit, they apply to a different agency and similarly there are different agencies that exist which has different jurisdictions and responsibilities and many times there is a lot of coordination issues as well as collaboration issues that kind of affect the setting up of recycling facilities and streamlining waste flow in a jurisdiction. So, to summarize, if we look at the problems are either in terms of regulatory either rules or regulations concerning recycling and recycled aggregate production or the problems can be in terms of the practices that the construction industry participants adopt such as disposal practices, lack of on-site sorting and so on or the

problems can be in terms of a cognitive barrier where there is an unfavourable attitude towards recycling, there is a low priority being given to the waste management and so on.

So, these three broad set of barriers affect recycling. Okay, so now that there is a lot of barriers, we understand that there needs to be some policies to overcome these barriers and whenever we talk about any policy, it requires the investment of public money because for instance, any kind of incentive or a subsidy for recycling or even policing to kind of mitigate illegal dumping or channelize waste properly to recycling plants, it requires investment of public money. What is the rationale for investing public money? So, that becomes a question.