2.3. Case study 2: Potential and obstruction for inverse supply chain

General publics and policy makers in Japan believe that encouraging of recycling of construction wastes could resolve the problems caused by construction wastes from dismantled buildings. However, there are numbers of examples where ‘recycle products’ are too much supplied beyond the quantity of real demands.

For instance, tip boards made of small slices of waste timbers are now suffered from shortage of market demand compared to the quantity of production in factories. Eventually, the prices of tip boards as well as prices of slices of waste timbers are quite cheap that discourage the recycling of waste timbers by the form of tip boards.

The firms which have the intention to deal with recycled construction wastes need to collect the information on macro balancing between demand and potential supply for establishing good quality of business strategy, though those information is not easily available for those firms. Otherwise, they would have the risk of bankruptcy, that discourage recycling activities in real market place. That is the loss of whole society from the aspect of the necessity to improve resource productivity.

In order to facilitate the healthy growth of recycling industry of construction wastes, the information to represent macro view situation between demand and supply, as is exemplified in Table 2.1.
Table 2.1 Example of potential demand for wooden wastes: Estimated demand for material recycle products compared with 200,000 ton’s wooden wastes generation

<table>
<thead>
<tr>
<th>Material recycle</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Board</td>
<td>16,000</td>
</tr>
<tr>
<td>Wooden pavements</td>
<td>15,000</td>
</tr>
</tbody>
</table>

Estimated demand for chemical recycle

| Utilization as wooden tip’s fuel                      | 230,000|

The table indicates that it is quite significant to establish the business relationship between emitter of wooden wastes and user of energy from wooden wastes. The table suggests that the contribution of energy recycling has more realistic potential to reduce the inappropriate disposal of construction wastes, than material recycling.

If information on mass-balancing of wooden wastes are provided, players in market would take more ‘well-balanced’ decision making on specification and price setting.

In addition, if the information in Table 2.1 is provided to various stakeholders, it would optimize the technological specification and quality respecting on market demands in short run as well as long run.

Information on geographical relation between producers of wastes and recycling industry is also significant to establish effective regional network of recycling activities. Fig 2.6 illustrate the fact that in western Shizuoka prefecture, there exist the firm that need more amount of waste timbers for...
fabricating their products.

Contrarily, in eastern Shizuoka prefecture, producers of wooden waste are now suffering from shortage of recycling plant to which they are able to bring their wastes. If macro view information illustrated in figure 2.6 should be provided to potential stakeholders including trading firms and local authorities, stakeholders would try to make an effort to created business relationship between emitters in east and recyclers in west.

Macro view information on state of art of macro scale stream of construction waste is quite significant to bridge between different industrial sectors which had not have business relationship before.

Figure 2.7 and 2.8 is the example of expected form of information that had the potential to facilitate bridging different industrial sectors for new business opportunity creation.

Figure 2.7 Information supply on regional balance of capacity of recycling facilities and waste generation example by Yamaguchi Prefecture Government
Based on the case studies, the research tries to structure the knowledge and information for use of well-informed decision making. The structuring process is composed of the following steps:

* Step0: Confirmation of requirements to KIH (knowledge and Information Headquarters) as a body of structured knowledge

* Step1: Identification of views of each interested party in decision making process
  - the need of mode of knowledge/information
  - how knowledge/information could be drivers for creative actions

* Step2: Experimental development of prototype of knowledge/information headquarter in electronic cyber space

2.4.1. Step0: Needs to meet with the following requirements

The research identified the requirements to the output of KIH that well-edited information and contextual knowledge could be drawn from the headquarters flexibly respecting on specific concerns and aspects of decision makers. Then it also identifies the requirements to the method of input of KIH; Contents of the headquarters could be easily, or if possible autonomously, revised by
progressed information and knowledge

2.4.2. Step1 Identification by case studies on construction products
The research tries to identify concerns and aspects of decision makers by clarify how information and knowledge are used in decision making process depending on the concerns and aspects. It also tries to identify what kind of concerns and aspects are requested to be involved for well informed ‘appropriate’ decision making.

Based on cased studies, the research develops grouping of information and knowledge on environmental issues. Then it develops contextual structure of the grouping.

2.4.3. Example of need of ‘well-structured’ information
The result of case study suggests that following information is needed for agent of inverse(d) logistics/manufacturers

* Macro balancing of specific recycled resources
* Potential suppliers (Where, How much, what quality, etc.)
* Potential customers
* Potential sink for demand/supply leveling
* Possible contamination and risk
* Lessons from best / worse practices for government agencies

Fig. Information supply on regional balance of capacity of recycling facilities and waste generation example by Yamaguchi Prefecture Government

Information supply on regional balance of capacity of recycling facilities and waste generation example by Yamaguchi Prefecture Government

The result of case study suggests that following information is needed for government agencies

* Quantity and places of waste generation
* Traced flows of disposed, reused, recycled materials
* Obstructive factors for inverse
* Potential environmental risks that require intensive control management
* Potential stakeholders and partnerships
* Lessons from best / worse practices for government agencies

The result of case study suggests that following information is needed for general public

* State of art of macro material flow
* Traced flows of disposed, reused, recycled materials
* Necessity of facilities, industrial activities
* Potential environmental risks that require intensive control management
* ‘Reliability’ of other stakeholders
* Lessons from best / worse practices

Providing of knowledge and information in the well-matched form to their concerns is expected to enhance the public awareness on crisis of global sustainability. It could also facilitate the evolution of macro-scale perspective on direction that modern civilization is moving forward. In addition, it is expected to raise the motivation for actions by citizens toward less-unsustainable society. It is also significant that it has potential to form profound understanding on trade-offs between ‘environmental friendly’ actions based on different priorities of environmental criteria

2.5. Trial for structured knowledge

The research tries to design structured knowledge that is usable for KIH (knowledge and information headquarters). The target of case study is the inverse logistics of construction wastes to recycling facilities.

First, it is expected that the information on geographical distribution of producers of construction wastes as well as those of recycling facilities is structures as it is illustrated in figure 2.9