Research background

Bar codes, two-dimensional codes (QR codes) and IC tags (RFID), which are called data carriers, are generally used as means for adding digital information to products. Use of this information is effective for streamlining the wood supply chain and due diligence. Currently, Wood-related industries are introducing production management methods using digital information. And are committed to establishing a supply chain directly connected to production, processing and distribution. But because the scope of application is still not large, and the application methods are not yet mature, there are still some problems to be solved in the actual production and application process.

Purpose of research

① To describe the use of digital information in the wood supply chain
② To discuss the issues of digital information utilization in wood supply chain

Results

What is digital information?[8][9][10][11]

<table>
<thead>
<tr>
<th>Type</th>
<th>I C tags (RFID)</th>
<th>Bar codes</th>
<th>Two-dimensional codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum information volume</td>
<td>Several kilobytes</td>
<td>Dozens of bytes</td>
<td>Several kilobytes</td>
</tr>
<tr>
<td>Update / addition information</td>
<td>Possible</td>
<td>Impossible</td>
<td>Impossible</td>
</tr>
<tr>
<td>Communication when shielding</td>
<td>Possible</td>
<td>Impossible</td>
<td>Impossible</td>
</tr>
<tr>
<td>Simultaneous reading</td>
<td>Possible depending on conditions</td>
<td>Possible depending on conditions</td>
<td></td>
</tr>
<tr>
<td>Countertop</td>
<td>Difficult</td>
<td>Easy</td>
<td>Easy</td>
</tr>
<tr>
<td>Size</td>
<td>Large</td>
<td>Small</td>
<td>Extremely small</td>
</tr>
<tr>
<td>Positioning for scanning</td>
<td>Unnecessary</td>
<td>Necessary</td>
<td>Necessary</td>
</tr>
<tr>
<td>Toughness</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Price</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Reading speed</td>
<td>Fast</td>
<td>Slow</td>
<td>Slow</td>
</tr>
<tr>
<td>Range</td>
<td>10m</td>
<td>1m</td>
<td>1m</td>
</tr>
</tbody>
</table>

RFID Radio-Frequency Identification

According to a study by Machina et al. in Spain, the introduction of digital information significantly reduced the average cost of net inventory at each node in the supply chain. The average value of the average order placed, which is more important in the supply chain, has also dropped slightly. These results show that the application of digital information leads to a reduction in the bullwhip effect.

However, the supply chain used in this experiment was a fictitious one built by a computer simulator, and may not match the results in the actual supply chain.

Benefits of a traceability system in a timber supply chain (eg, wooden house)[2][3][4]

① Able to advance the timing and quantity of material distribution synergistically over a long period of time.
② Traceability makes it possible to set the basis for appropriate pricing.
③ Can take the initiative in two pricing.

Discussion and Future Research Agenda

By making the IC tag a small size made of paper without thickness, the data carrier does not interfere with the

Results

Effects of introducing digital information

In previous studies, electronic tags (IC tags) were attached at the stage of standing trees, information such as ID was written and managed on the tags, and when logs were manufactured, electronic tags were attached to each log. Or a two-dimensional barcode (QR code) was attached and another ID was given. At the time of processing, such as sawmills and pre-cut mills, they were removed as needed, replaced, and pasted with information such as QR codes when passing on to the final consumer.

From the viewpoint of reducing the amount of work and ensuring reliability, a data carrier that can be used consistently from upstream to downstream of the distribution is desired, and it has been clarified that a label-like electronic tag is useful.

By adopting a method of starting material tracking from a log market or an intermediate land, or by managing lots, it is possible to minimize the work of attaching tags, etc., and load necessary data on the material.

Wood products also include pulp wood and wood used as fuel for biomass energy. For these wood products, the only information required for shipment is weight. These woods do not require a data carrier for advanced management. The wood should be stored before installation to avoid wasting data carriers and work. In order to select the wood to be tracked, it is necessary to consider the time of installing the data carrier according to the distribution form, which varies depending on the location, quality, etc. of the wood used.

References

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