

# **How Does Technology Revolutionize Recycling? The Active Contribution of Smart Label in The Ecological Process and Human Resources**

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## **Abstract**

Technology not only contributes to the recycling of products but also to the ecological consciousness of people and the quality of their daily lives. According to current research, this work studies that packaging technology contributes actively to food waste reduction, support citizens playing a role to recycling, equating user's weaknesses in their daily lives, strengthening their ecological consciousness and the autonomy of their living. Presenting paradigms of companies that are in search of ways to optimize services by making effective use of customer interface diversified by the prevalence of digital devices, as the digital change of consumer behavior accelerated rapidly, major attention is being focused on intelligent packaging equipped with ID devices such as NFC tags and QR code, which can be scanned using smartphones to simplify interactive communication with customers. Solutions provided from the American Food and Drug Administration (FDA), with low cost IoT sensor tags, attached as stickers to products or integrated during the manufacturing process, in combination with shipment visibility and verification technologies provide end to end traceability. According to Rfid journal, the global market for RFID tags, readers and software is expected to reach \$10.7 billion this year and expand to \$17.4 billion by 2026. Pilot programs run for 2021-2022 aiming to build, diversity and protect exports by developing producer to consumer traceability. Labels carry international traceability data, based on GS1, such as time and temperature logging, captured through product cloud database. Packages printed with invisible digital watermarks or barcodes but viewed from cameras at the recycling centers, support machines to sort items more efficiently. The cameras view them as if they are covered in barcodes although they are not clear to the human eye. This idea makes recycling less confusing at home. Many of us struggle to figure out which items can be recycled while sorting our rubbish at home. Machines in sorting plants can have the same problem. This prevents many countries from achieving the recycling rates they would like. Smart bins also contribute by saving the 20% of the ingredients that commercial kitchens are supplied. Smart labels connected to smart devices inform consumers about which products expire in their refrigerators, which lose their freshness, and remind users to follow their recycling. In this way, recycling enters the education of people, mainly helps the population with access problems and normalizes problems in their daily life.

**Keywords:** Technology, Smart Labels, Food Waste, Recycling, Human Aspect