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Adopting circular economy principles in the built environment sector

The circular economy requires that materials are retained within the value chain for as long as possible. For the construction sector, this requires a radical re-thinking of the way that projects are managed and how materials and services are procured.

The transition towards a circular economy (CE) in the built environment will require traceability (identification, tracking of products and materials throughout their entire lifecycle). This is extremely challenging and despite the intention to move the whole sector in this direction, there are currently a limited number of frameworks and guidelines which allow for the implementation of circularity.

Traceability involves the ability to track and trace the history, location, use and transportation of materials, products or systems from their point of origin to the point of final fate. This requires the provision of detailed information about transformation processes, intermediaries and actors in all the stages of the life cycle value chain.

These concepts have been explored and adopted in various industrial sectors, including aerospace, food industry, software engineering, where various frameworks and models already exist. The development of a new paradigm following CE principles means that the needs of all stakeholders in the whole life cycle value chain have to be taken into account. This will require the adoption of innovative decision-making tools, such as probabilistic fuzzy analytic network processes. There will also increasingly be movement towards a high level of digitalisation and automation (Industry 4.0), including the use of IT tools such as digital threads, materials passports (MPs) and collaborative platforms.

MPs are digital documents that contain data about the materials composition, environmental impact and provenance of building materials and products.

There has been exploration of the use of MPs in the BAMB and MADASTER EU projects and by some architectural practices (e.g., 3XN Architects, Copenhagen). In addition, some organisations have developed guidelines for tracing building materials and products (e.g., BRE). In 2014, the BRE introduced the BES 6001 standard to ensure that building products are responsibly sourced. This requires construction companies to demonstrate the traceability of their products by identifying the origin of the raw materials and suppliers involved in the production and delivery of the products. This also includes the identification of potential environmental and social risks.

It is essential that the correct information is embedded within the new decision-making tools that will be developed in the future. Procurement will increasingly take account of environmental and sustainability impact information. Digital materials passports will be the preferred method for embedding such information within building information modelling (BIM) software and these will contain environmental impact information obtained from environmental product declarations (EPD).

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