



Textile waste in the concept of circularity

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Introduction



Figure 1: Textile waste management

The global fashion industry is expected to grow in value from 1.5 trillion dollars in 2020 to around 2.25 trillion dollars by 2025, indicating that demand for fashion is increasing. Natural materials must replace plastic fibers, natural colors must replace synthetic colors, and the "buy-and-throw-away philosophy" must be replaced with "buy-less-and-these-are-needed" in order to reduce the fashion industry's environmental footprint. The importance of developing a new business circular model for the fashion industry that has the potential to provide a plethora of economic opportunities within the waste management framework is emphasized.



Figure 2: textile waste management in Greece

Consumer behavior (i.e. compulsive patterns, hoarding, as well as increasing purchases and disposal practices) and disposal mindsets that are directly connected to fast fashion trends have been widely observed as having negative environmental consequences. The fashion industry's volume of production and consumption contributes significantly to people's daily lives and is a critical sector of the global economy as it accounts for more than 2% of the global Gross Domestic Product (GDP), or \$3000 billion dollars.

Results & Discussion

The use of waste as raw materials in the fashion industry has piqued interest as a way to replace natural resources in industrial processes (such as traditional dyeing techniques) with sustainable alternatives (i.e., colorants from ores, plants, insect, microorganisms, food waste and redyeing). Such practices have been found to have fewer negative effects on the environment (i.e. redyeing textiles uses 90 percent and 85 percent less water and energy respectively). Food waste, which accounts for 40% of solid waste globally and 1.3 billion tons annually, is a source of biomaterials that can be used to make the main polymers (such as nylon 66 and nylon 6) used in the fashion industry. Simultaneously, non-biodegradable polymers such as poly-ethylene terephthalate (PET) were upcycled into biodegradable materials.

In the context of waste management, the fashion industry requires the development of a new business circular model. Such a transition necessitates a significant shift in consumer and industry behavior (markets and production line). The new circular business model must include new circularity strategies based on R-strategies (i.e., reuse, recycle, refurbish, remanufacture, repair, reduce, re-think, repurpose, rent, recover etc.). Through motivation, regulatory relief measures, education, promotion, and smart application by the development of a trusted environment, this new mindset will provide the stepping stone for innovation toward a new strategy and vision (i.e., through Key performance Indicators for monitoring circularity, LCA, end-of-waste criteria and quality protocols). Such thinking will lead to the creation of a new eco-design that will benefit everyone.

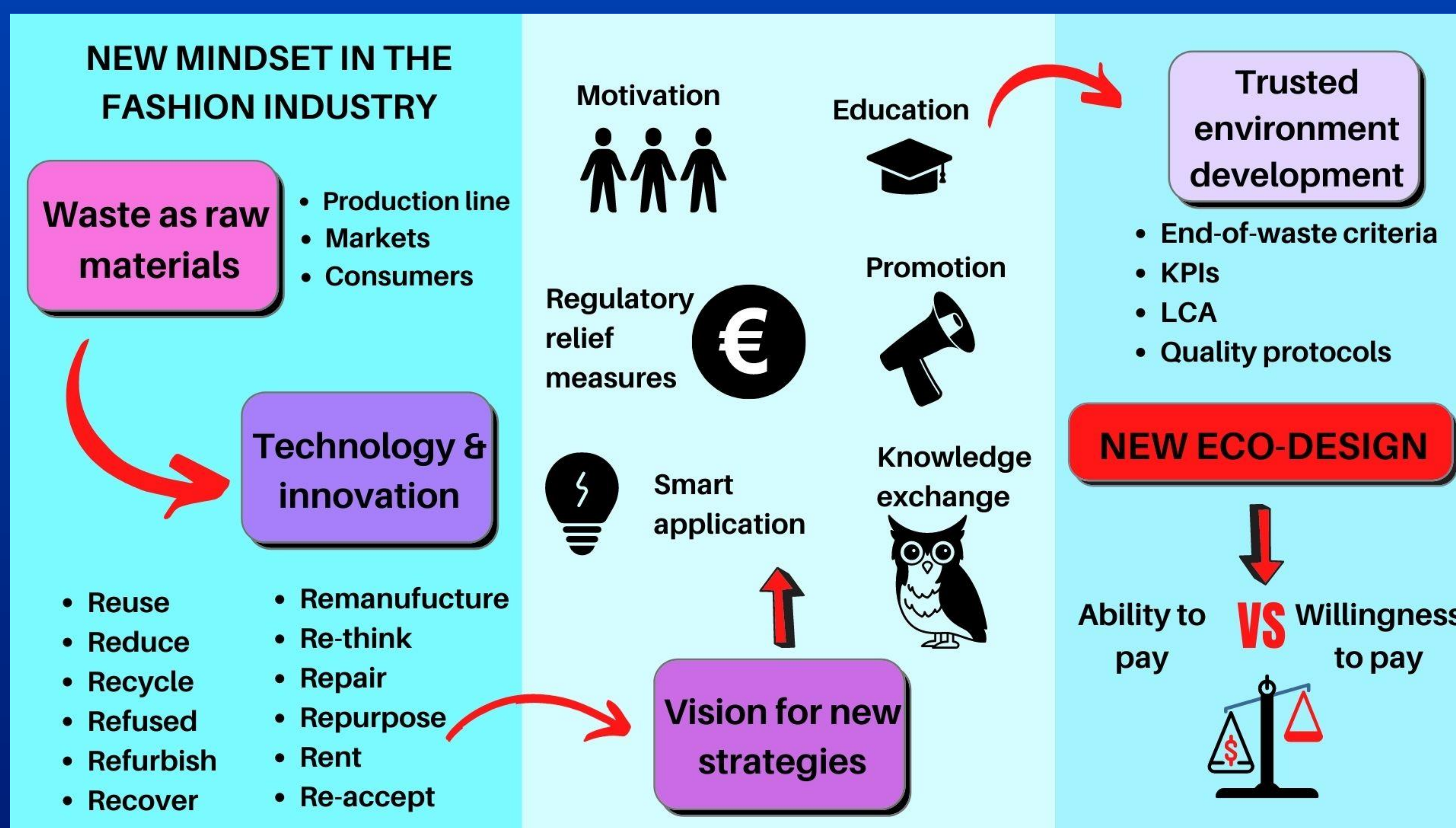


Figure 3: New circular mindset of the fashion industry

Conclusions

The development of a new mindset in tomorrow's fashion industry must be intertwined with R strategies (i.e. refuse, reuse, recycle, etc.) analyzed and closely monitored (i.e. using KPIs, quality protocols, LCA, and end-of-waste criteria). Only with a clear vision of new strategies driven by motivation and smart application, as well as a need to promote circularity to both consumers and businesses through knowledge exchange and education, will this be possible.