

Is the fashion industry ready for a change toward a circular economy (FashionReady4CE)? Development of IRT-based FashionReady4CE scales

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A linear economy (LE) refers to the “take-make-use-dispose” system where resources are collected, transformed into products, that are used a few times by consumers, after which they are disposed of in incineration and landfills (Ormazabal et al., 2018). Under this extractive LE system, apparel accounts for more than 92 million tons of textile waste every year. To solve the adverse effects of the LE, governments and business leaders alike are increasingly acknowledging that now is the time to embrace a fundamental change to move away from a LE in favor of a circular economy (CE). A CE operates on a “take-make-use-reuse again and again” system that is less dependent on raw materials and aims at zero waste, resilience, and a sustainable growth. *But is the fashion industry ready for a change toward a CE?*

Organizational readiness for change (ORC) theory (Weiner, 2009) argues that businesses 1) confront unexpected, yet critical/continuous change; 2) must embrace the change (e.g., toward a CE) to survive; and hence 3) must be in a continuous state of *change readiness*. Change readiness refers to how ready a company is for change and includes two conceptions: 1) *change commitment* (a state of being “psychologically prepared” to respond to change; whether an organization believes the change is important) and 2) *change efficacy* (a state of being “behaviorally prepared” to respond to change; whether an organization has the resources necessary to implement the change). ORC further suggests that change readiness results in two outcomes: *change-related efforts* and *implementation effectiveness*. The greater an organization is *ready* to implement a change, the greater change-related efforts will be made. These efforts may result in implementation effectiveness (how effective the implementation of the change has been).

Despite these theoretical statements, there are yet no scales to measure the constructs proposed by ORC and assess fashion business’s change readiness toward a CE. We address this gap in the literature by developing an IRT-based item bank for *FashionReady4CE*, i.e., developing the scales of fashion business’s *change commitment* and *change efficacy toward a CE*, following the six steps guided by the Item Response Theory (IRT) (Revicki et al, 2014). Noting that China is at the forefront of both research and practical implementation of the CE, we validated and evaluated the scales in the context of Chinese Textile and Apparel (T&A) business. Table 1 shows the procedure of our scale development and Table 2 shows the final scales.

Table 1. Scale development procedure outline suggested by IRT

Steps, methods, and results
1. Content map development: Building on ORC and CE literature, we developed the content map in which 47 items were included in the initial item bank of <i>change commitment</i> ; 227 items in that of <i>change efficacy</i> representing five dimensions of (a) financial-, (b) human resource-, (c) knowledge-, (d) operational- and (e) technological- capability.
2. Item refinement: In this stage, items were systematically grouped (binned) and items that are inconsistent with construct definitions or redundant were removed (winnowed). After the binning and winnowing, 27 items of <i>change commitment</i> and 63 items of <i>change efficacy</i> remained.
3. Content expert validation: The aforementioned items were translated from English into Chinese for nine Chinese T&A firm managers, who have authority in the business decision-making of CE adoption, to validate our item bank. This expert validation led to 11 items and 22 items in <i>change commitment</i> and <i>change efficacy</i> , respectively.
4. Item revisions: The research team revised the expert validated scales further into a consistent tone. The response options (five-point Likert scale) for the scale items were also selected.
5. Cognitive interviews and final revision, if necessary: With the findings from step 4, we developed an online survey questionnaire. We recruited 10 Chinese T&A firm managers to join our cognitive interviews and asked them to review the survey questionnaire. They confirmed that the survey design and all the items included in the survey are clear to understand and readable.
6. Quantitative evaluation: We dispatched the online survey in March 2022 and collected 500 responses from Chinese T&A firm managers to assess our scales quantitatively. The graded response model was used to estimate item parameters (Samejima, 1969). Given initial IRT analysis showed that the IRT assumptions of uni-dimensionality and local independence were not met in both two item banks, additional item reduction was performed in each scale. Item pair with the highest local dependence was flagged. The item with poor item parameters was deleted from the item pair. Thereafter, IRT assumptions were checked again. This process was repeated iteratively until all IRT assumptions were met in both item banks, which led to 12 items in the final scale. Overall, IRT parameters ($\alpha > .8$) indicated a good discrimination ability of the final scale. The item fit of each item was acceptable. Reliability test showed that the final scale was reliable for measuring change readiness ranging from 1 standard deviation below and above average level ($\alpha = .72$). Construct validity test showed a significant association between the overall scores of <i>change readiness</i> and <i>change-related effort</i> ($r = .627$, $p < .01$). Test-fairness test showed that the final scale would generate similar results regardless of participants' age, gender, and firm types.

Table 2. Final scale of *FashionReady4CE*

Change commit ment (6)	<p>The firm is committed to implementing a change toward CE.</p> <p>The firm is motivated to implement the principles of CE into our new business ethics.</p> <p>The firm is committed to reducing the consumption of natural resources and materials.</p> <p>The firm has the willingness to recycle waste.</p> <p>The firm has the willingness to minimize waste production.</p> <p>The firm has the willingness to improve the implementation of reuse and remanufacture in the process of managing textile waste.</p>
Change efficacy (6)	<p>The firm has the financial capability to train employees to practice CE.</p> <p>The firm is capable of offerings our employees special training on knowledge and skills about CE.</p> <p>The firm has the environmental compliance and auditing programs to implement CE.</p> <p>The firm has the capability to study the material and energy flows and their application.</p> <p>The firm has technological skills for implementing the change toward CE.</p> <p>The firm has technologies that can optimize resource efficiency and safety.</p>

Note: Due to page limitations, only the English version of the item bank is provided.

This research provides important insights to both theory and practice. By developing the *FashionReady4CE* scale, this study drew attention to “change readiness” as an under-studied construct in the CE literature that holds the potential to support fashion practitioners, researchers, and policymakers in promoting new ideas that would foster the fashion industry’s change toward a CE. Using the *FashionReady4CE* scale, academic researchers would be able to provide empirical evidence about whether fashion businesses are psychologically and/or behaviorally ready to embrace the CE. Further, with the scale, academic researchers can divide businesses into groups based on which stage of change they are situated at. The segmentation would allow policymakers and business leaders to develop more tailored CE promotional strategies for each business group.

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