Regenerated Cellulose Fibers (RCF) for Future Apparel Sustainability: Insights from the U.S. Consumers

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Introduction and Literature Review. Approximately 13 million tons of textile waste is currently incinerated or put in landfill in the U.S. every year. Today, less than 1% of apparel is recycled into new fibers for apparel production, representing a loss of more than \$100 billion worth of materials each year. As a major cellulose fiber, more than 95% of cotton is utilized for consumer goods, such as apparel and home textiles (Friedman, 2018). The amount of post-consumer cotton waste generated has been accelerating with the increased cotton product consumption. Similar to regenerated polyester from plastic bottles that has been widely used in the sportswear industry, an increasing number of textile and apparel companies are inventing novel green technologies to produce regenerated cellulose fibers (RCF) out of pre- and post-consumer textile waste. It is anticipated that there will be a potential big market for RCF like we have witnessed for regenerated polyester (Chen, 2015; Friedman, 2018). RCF could significantly reduce virgin cotton production and decrease textile waste in incineration and landfill.

However, our knowledge on U.S. consumers' willingness to purchase apparel made of this novel sustainable fiber is still limited given its newness. To address the gap in the literature, this study aimed to identify the factors significantly influencing the U.S. consumers' purchase intention toward RCF made apparel. Specifically, the objectives of this research were fourfold. First, a research model building on the Theory of Planned Behavior (TPB) was proposed. Second, the psychometric properties of the proposed model were examined using the gathered survey data. Third, the effects of significant factors on U.S. consumers' purchase intention toward RCF made apparel were identified. Finally, some implications were provided for academia and industrial practitioners. Figure 1 illustrates the developed model with the proposed hypotheses.

Methodology. The scales for purchase intention (PI), attitude (AT), and subjective norm (SN) were adapted from Chi et al. (2019). The scales for perceived behavioral control (PBC) and

perceived consumer effectiveness (PCE) were adapted from Zheng and Chi (2015). The scale for past environmental behavior (EB) was adapted from Fraj and Martinez (2006). Table 1 lists all the constructs and their corresponding measurement scales. A five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) was applied for all adapted scales. The demographic variables including gender, age, education level and income

Figure 1. Proposed Enhanced TPB Model

level were included as control factors. The primary data were collected by a Qualtrics survey of U.S. consumers. The professional survey website used was Amazon MTurk, which enabled to reach a wide range of eligible consumers (Chi & Zheng, 2016; Goodman et al., 2013). 544 eligible responses were gathered for data analysis and hypothesis testing. Unidimensionality, reliability, and validity of the investigated constructs were first tested for proving model adequacy (Byrne, 1998). The statistical assumptions including normality, multicollinearity, and correlations were examined. Multiple regression method was applied for determining the proposed statistical relationships (hypotheses) using SPSS 26.

Findings and Discussion. Table 1 presents the testing results of all the hypotheses. Among six hypotheses, four of them (H1, H4, H5 and H6) were statically significant at the $p < 0.05$ level. H2 and H3 were found to be insignificant. Attitude, perceived consumer effectiveness (PCE), and past environmental behavior (PEB) positively affect U.S. consumer purchase intention towards RCF made apparel while the effect of subjective norms (SN) and perceived behavior control (PBC) are insignificant. Past environmental behavior (PEB) also positively affects the attitude of U.S. consumer towards RCF made apparel. Attitude plays a partial mediating role between PEB and purchase intention towards RCF made apparel. A higher level of consumer environmental behavior leads to a more positive attitude towards environmentally friendly apparel as well as a greater likelihood to purchase RCF made apparel. Among the demographic variables, U.S. consumers with higher education level and income level are more likely to form positive attitudes toward and intentions to purchase RCF made apparel. The proposed research model exhibits a good explanatory power, accounting for 64.8% of variance in U.S. consumers' purchase intention towards RCF made apparel.

Table 1. Results of Hypothesis Testing

Hyp.	DV	IDV	Std. Coef. (β)	t-value	Sig. at $p < .05$	Control variable	Std. Coef. (β)	t-value	Sig. at $p < .05$	Total R^2	Sig. at $p < .05$
	PI	Constant		-.975	.338	Age	-.011	-.092	.927	.648	<.000
H1	Y	AT	.307	5.892	.000	Gender	-.060	-.423	.676	$F=$	
H2	N	SN	.052	.323	.749	Education	.215	2.096	.003		5.318
H3	N	PBC	.054	.321	.751	Income	.234	2.152	.002		(9/26)
H4	Y	PCE	.280	2.478	.02						
H6	Y	PEB	.360	2.608	.001						
	AT	Constant		1.288	.208	Age	.048	.271	.788	.276	<.000
H5	Y	PEB	.385	3.338	.000	Gender	.188	1.045	.304	$F=$	
						Education	.249	2.789	.001		3.766
						Income	.296	3.038	.001		(5/30)

Note: Y- Hypothesis supported; N- Hypothesis not supported; Std. Coef.=Standardized Coefficients, DV: Dependent variable. IDV: Independent variable.

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