



RESEARCH ARTICLE

DEVELOPMENT OF MEASUREMENT SCALE FOR PERSONALIZED RECOMMENDED PRODUCT ACCEPTANCE (PRPA-SCALE)

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ABSTRACT

A personalized recommendation (PR) system has been established to enhance consumers' experience by suggesting products for consumers. Research in PR mostly focuses on the PR "system" acceptance but not the "actual product" acceptance. Therefore, this research aims to develop an instrument that measures the indicators of personalized product recommended acceptance. The sample size for the study was made up of (N=521) consumers from various accessible online marketplaces in Ghana (jumia, kikuu, tonaton, Jiji, amazon, eBay, aliexpress, Alibaba, and other platforms) who represent the end-users of the e-tailers recommendation system. In an attempt to evaluate the Personalized Recommended Product Acceptance Scale (PRPA-SCALE), an instrument was developed and then submitted to 1 psychologist, 2 Marketing experts, and 2 consumer behavior researchers to test and rate items developed for the study. The EFA and CFA were performed to validate the instrument. The finding indicated significant content validity and further provides evidence of a good model fit for the five factors extracted constructs ((Price consciousness (5 items), Product Review factor (6 items), Brand Influence (5 items), Perceived Quality (6 items) and E-tailers Promotional Factor (8 items)). To the best of our knowledge, the PRPA scale is the first scale robustly developed to measure personalized product recommendation acceptance. This also set the foundation for future research in the area of consumers' purchase decision processes toward recommended products.

KEYWORDS

Price consciousness, Product review stimuli, Brand Influence, Perceived Quality, Promotion.

1. INTRODUCTION


The 21st century has seen a significant change in marketing strategies and technological advancement which aims at improving consumer's purchases experience by optimizing and leveraging on consumers' purchases pattern/histories to arrive at an informed product recommendation for the consumer (Meime and Chiwei, 2018; Jiang et al., 2015). Almost all products and services sold in the traditional marketplace can be found on e-marketplaces, and e-retailers regularly engage in marketing activities to attract and maintain new and existing consumers. Many e-stores in the 21st century use automated recommendation algorithm that endeavors to examine consumers' purchasing history and generates products that a potential consumer may purchase if the e-tailer were to bring the product to the consumer's attention (Bodapati, 2008). For example, online market platforms like Amazon, alibaba, and eBay rely fairly on recommendation tools to suggest or recommend products to it consumers daily to enhance consumers' purchases experience. Online Recommendation System (defines in this study as a decision-assisted technology that explores and examines consumers' earlier online purchases behavior and activities and based on these purchases behavior and activities, recommends products /services that fit the desires of the customer, collect data on consumers online behavior (purchases and other activities) and extract significant information to understand shoppers' predilections and proceed to recommend a products/services most likely to be bought by the consumer (Liang et al., 2007; Jiang et al., 2011).

Although numerous types of research have already been carried out in the area of personalized recommendation, the majority of these researches focused on the "recommendation system acceptance" but not the actual "products recommended" by the recommendation system (Baier and Stüber, 2010). Furthermore, there is a static deficiency of good measurement instruments to evaluate personalized recommended product acceptance since most of the available constructs used to assess consumer purchases behavior concerning product acceptance were not thoroughly and rigorous experimented methodologically nor fully validated (Rexfelt and Viktor, 2009; Stummer et al., 2015). Therefore, it is essential to construct a valid measurement scale that is robust and adaptive enough to consumer cognitive indicators, regarding consumers' acceptance of the personalized recommended product. In line with this, the main objective of this study was to advance a Consumer-psychometric exploratory instrument (C-PEI) to assess consumer psychometric purchase indicators towards the acceptance of recommended products from e-tailers' recommendation system, thus look at factors that influence consumers to accept and purchase recommended product suggested by a recommendation system.

2. MATERIAL AND METHODS

2.1 Literature Review

The objective of this phase was to find researches and other studies that have been carried out previously on the subject matter and also familiarize

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with existing tools and methodologies for this study. A literature exploration was carried out through prominent journal houses which have been hosted on indexing platforms such as the web of science, Scopus, PubMed, and other platforms including semantic and Google Scholar.

2.2 Development of Personalized Recommendation Product Acceptance Instrument

This instrument called the Personalized Recommended Product Acceptance scale (PRPA-SCALE) was constructed as a questionnaire and incorporated the following dimensions: Price consciousness, Product Review factor, Brand influence factor, perceived Quality, and E-tailers Promotional factor. The suggested instrument measures the psychometric element that may influence consumers to accept recommended products suggested by the e-tailers recommendation system. The underlining definitions were espoused for the construct: Price consciousness (PxCon), which assesses the basic magnitude to which the consumer focuses completely on the price of the recommended product before accepting to make a purchase or purchase decision on the recommended product.

Product Review factor (ProRF); evaluates the magnitude to which the consumers are influenced by the perceptions and opinions of other consumers who have already purchased and used the recommended product before accepting to buy or making purchase decisions, as reviews generate a reputation for the product and the e-tailer. Brand influence (BRANDInF), which evaluates the level of recommended product brand love and loyalty of the consumers, thus this dimension measures if consumers are influenced to purchase a recommended product associated with the brand they love or are loyal to. Perceived Quality (PerQ); which underlines the consumer perceived judgment about a recommended product's general excellence or pre-eminence, and finally, E-tailers discount Promotional factor (EPromF); which evaluates if discounted promotional recommended products influence consumers to indulge in or purchase a recommended product.

2.2.1 Semantic Analysis

To confirm and substantiate the conception and the understanding of the items, a semantic analysis was carried out, involving a targeted population size of $n=37$, Gender ($Male_{gender}=21$, $Female_{gender}=16$), and Age range between 16 and 60 years from various social and academic background. Participants were carefully selected, thus based on their age, educational level, rate of online purchases/activities, and online product search experience. This was done to avoid bias and to reach wider participatory audiences. Interviews were piloted one-one, in some cases in groups of not more than 5 participants. The items under study were read to the participant(s) and they were asked to evaluate the items based on their articulacy, expressiveness, clarity, and rationality. Participants were further encouraged to sign a Participatory Consent Form (PCF). Participants were rewarded with a gift after submitting the form.

2.2.2 Item Raters Analysis (Expert Panel Analysis)

Following the procedures of other scale development methodology, a valuation form were attached to the PRPA- instrument and succumbed to semantic analysis and confirmation by 5 professionals as follows: Psychologist ($n=1$), E-Marketing professionals ($n=2$) and consumer behavior researchers ($n=2$). To analyze the Raters, a form covering the description and explanation of the constructs, the suggested items, and the instructions for onward analysis was made available. The assessment of the items comprised the appropriateness, relevance, suitability, adequacy correctness, and intelligibility of each item to the related dimension. A space was also provided for Raters' comments and suggestions. Additionally, the data were analyzed with much consideration to the suggestions and comments on the assessed items for item reconstruction/reformulation purposes. Furthermore, the threshold and the condition for maintaining an item in the scale was to obtain an I-CVI of not less than 0.80 (80%) agreement among the raters in each item evaluation. Items that do not meet this condition are omitted/deleted and marked as unintelligible.

2.3 Participants

Quantitative data were solicited from Ghanaian consumers from various e-market platforms (jumia, kikuu, tonaton, Jiji, amazon, e-bay, aliexpress, Alibaba, and other platforms). A total of $n=739$ were initially received. Through data screening, 211 participants reported that they have not indulged in or purchased recommended products before, hence data from the 211 participants were deleted leaving a total sample of $n=528$. A further screening shows that 7 responses were incomplete. These incomplete responses were also omitted, bringing the total number of participants to $n=521$.

2.4 Data Collect

The data were collected through a web base questionnaire; moreover, a QR code for the web-based questionnaire was extracted for some participants to scan in some cases. To assess the psychometric purchase behavior of consumers towards recommended product acceptance, a Likert scale agreement questionnaire was employed. The scale offered five preferences of response for each item, extending from strongly disagree (1), disagree (2), can't say (3), agree (4), and strongly agree (5). Additionally, the demographic data of participants were captured in the questionnaire.

2.5 Statistical Procedure

The data collected were evaluated and validated through a statistical procedure. The analysis and validation of the data offered results and solution stratagems for the problems acknowledged and identified. Evidence of cogency of items was verified by employing the exploratory factorial analysis (EFA) to measure the psychometric value of the instrument. A reliability test was also executed to assess the internal reliability/consistency of the instrument. Additionally, Structural Equation Modeling (SEM) was carried out to estimate the factor structure of the instrument. These statistical tests were performed using SPSS version 27, and IBM Amos 24.

3. RESULTS

3.1 Respondent Demographics Characteristics

Table 1: Frequency of Demographic Variables of Participants (N=521)

Demographic Variable	Frequency	% of Total
Gender		
Female	295	56.6 %
Male	226	43.4 %
Age		
less than 18yrs	35	6.7 %
18years - 25years	110	21.1 %
26years - 35years	169	32.4 %
36years - 45years	136	26.1 %
46years - 55years	62	11.9 %
Above 55 years	9	1.7 %
Educational Level		
Jnr High School	24	4.6 %
Senior High School	78	15.0 %
Undergraduate	198	38.0 %
Graduate (Masters, M.Phil, Msc. M.Ed...etc)	137	26.3 %
Post-Graduate (PhD)	84	16.1 %
Relationship Status		
In a Relationship (e.g., Married, Engaged, Concubine)	369	70.8 %
Not in a Relationship	152	29.2 %
Recommended Product Purchase Plan		
Very Likely	139	26.7 %
Likely	382	73.3 %
Eshop mostly visited		
Jumia	147	28.2 %
Jiji	90	17.3 %
kikuu	102	19.6 %
Tonaton	37	7.1 %
aliexpress	44	8.4 %
alibaba.com	49	9.4 %
E-bay	29	5.6 %
amazon	23	4.4 %

Quantitative data were collected from Ghanaian consumers who shop at major e-shop platforms accessible in Ghana. Out of the total sample

($n=739$), 218 were deleted/omitted due to incomplete data ($n=7$) and non-purchase of recommended product ($n=211$), resulting in a sample size ($n=521$, response rate=70.5%). The gender distribution consist of Male_{gender}43.4% (226) and Female_{gender} 56.6% (295). The age range of the female participants was between less than 18 years to 45 years, while the ages of male participants range from 18 years to 55 years. The educational level of the participants indicates that the majority of the participants were 1st-degree holders (38%), followed by Graduates 26.3%, while 16.1% were Ph.D. Junior High school and Senior High school make the 4.6% and 15% of the participants. Additionally, 369 (70.8%) are in a relationship while 152(29.2%) are not in any relationship. Participants were asked to report the most visited e-shops where they bought the recommended product. The results shows that 28.2% mostly buy from Jumia.com, 17.3% buys from jiji.com, 19.6% from kikuu.com, tonaton.com 7.1%, aliexpress 8.4%, alibaba.com 9.4%, e-bay 5.6% and amazon.com 4.4%, (See Table 1).

3.2 Construction of PRPA-SCALE

The initial version of the personalized recommended product acceptance scale (PRPA-Scale) contained 98 items that were expounded based on validated literature and empirical studies (IAEA, 2001; Jiang and Yezheng, 2012; Bambauer-Sachse and Mangold, 2013; Yoon et al., 2013; Menfors and Fernstedt, 2015; Jiang et al., 2015; Olbrich et al., 2016; Kim et al., 2017; Jiang et al., 2018; Book et al., 2018; Junaid et al., 2019; Schreiner et al., 2019; Fetscherin et al., 2019; Yasri et al., 2020; Büyükdä et al., 2020; Narwal and Nayak, 2020; Septianto et al., 2021; Gao et al., 2021). Five dimensions were hypothetically identified: Price consciousness (PxCon; 19 items), Product Review factor (ProRF; 21 items), Brand influence (BRANDInF; 20 items), Perceived Quality (PerQ; 18 items), and E-tailer Promotional factor (EPromF; 20 items).

In the semantic analysis stage, 35 items were deleted due to repetition, vagueness, complexity, and unclear meaning associated with those items, thus, from the 98 items originally proposed, 63 items stayed unaffected and 35 items were rejected. The omitted items were as follows: Price consciousness (6 items), Product Review factor (8 items), Brand influence (7 items), Perceived Quality (5 items) and finally, Promotional factor (EPromF; 9 items). Furthermore, in the expert panel analysis stage (Item raters analysis), additional 21 items was deleted/omitted because of poor I-CVI score (<0.80), thus the 21 items did not meet the condition for item acceptance, hence was omitted/deleted and marked as unintelligible. The omitted items in this stage were as follows: Price consciousness (5 items), Product Review factor (4 items), Brand influence (5 items), Perceived Quality (3 items) and finally, Promotional factor (EPromF; 4 items). This brought the total unaffected items to 42 ((Price consciousness (PxCon; 8 items), Product Review factor (ProRF; 7 items), Brand influence (BRANDInF; 8 items), Perceived Quality (PerQ; 8 items), Promotional factor (EPromF; 11 items)).

3.3 Exploratory Analysis of Data

3.3.1 Data Analysis Assumptions

Firstly, an exploratory analysis was executed to improve and give a better understanding of the data characteristics, and also to detect probable missing data and outliers within the data set. Descriptive analyses were executed and participants with missing data on the instruments were omitted from the data analysis. Again, 11 univariate outliers were found and used to analyze assumptions. Additionally, 19 multivariate outliers were detected through the Mahalanobis distance technique (MDT), allowing for $p<0.001$ and significant observations rendering to the Leverage measures. Furthermore, the Cook distance method (CDM) did not return any significant value greater than 1, signifying that the outliers observed did not substantively influence the outcome of the analysis. Considering the exploratory factorial analysis robustness, as the outliers will not have any significant impact on the outcomes, a decision was made to retain the multivariate outliers detected and this led to a total population sample of $n= 521$ cases for the data analysis.

Moreover, the analysis reported a normal distribution as the Skewness, kurtosis and the Shapiro-Wilk test showed normal distribution. Likewise, as the assumption of the univariate detected showed normality, it is presumed that the multivariate normality was also met. Whereas univariate normality does not guarantee multivariate normality, if all the instrument fulfills the normality condition, then the deviations from multivariate normality could be considered harmless (Hair et al., 2010). The assumption of linearity was analyzed by examining the residues. The results indicated a randomized distributed point around 0, affirming that the assumption of linearity can be presumed. Besides, the assumption of singularity was analyzed through VIF and tolerance. It was observed that

the dimensions met the VIF condition of less than 5 and the tolerance level greater than 0.1, which supports the concept of dimensional uniqueness/distinctiveness as stipulated by (Hair et al., 2010; Hair et al., 2020).

3.3.2 Exploratory Factor Analysis

The key objective of performing the exploratory factor analysis (EFA) was to ascertain the causative structure among the instruments. When all participants are pinched from a single population with commonly shared characteristics, factor constancy and generalizability may be produced even with a large population sample (Worthington and Whittaker, 2006). In this regard, with emphasis on the appropriateness of the sizes of the relationships in the matrixes, two statistical instruments were tested. First, Bartlett's Test of Sphericity was significant ($p < 0.001$), indicating a matrix factorability. Secondly, the Kaiser Meyer Olkin -KMO measurement of sample adequacy, reported a KMO value of 0.940 ($p<.001$) (see Table 4), which is above the minimum statistical threshold of 0.60 for good factor analysis (Tabachnick and Fidell, 2007). The overall model fit measure show goodness of fit data, tolerating for EFA, $(X^2)/(df) = 633/295 = 2.15$, $p < 0.001$; RMSEA (90% CI) = 0.047 ($0.042, 0.052$); CFI = 0.94 ; TLI = 0.95 ; BIC = 1212 , and $X^2/df = 26.06$, $p < 0.001$ (Dziuban and Shirkey, 1974).

Based on the EFA, five factors are retained with the majority of the items loaded on its proposed dimensional factors, signifying confirmation of construct validity. Furthermore, convergent validity was achieved as factor loadings of items assessing its intentional dimension factors exceed the 0.4 thresholds. The principal component analysis (PCA) was also performed and the result shows no extreme values, demonstrating that there are no complications in the factor matrix. Regarding the results achieved in the principal component analysis, the PROMAX rotation was used for extraction and rotation of the key factors. PROMAX rotation was adopted because it was observed that the factors were inter-correlated, demonstrating that the factors are transverse and oblique. Items with loading <0.40 were omitted from the study. Table 3 shows the pattern for the extraction of the five-dimensional factors, and the correlation among the factors.

3.3.3 Reliability Test

A reliability test was conducted to assess the internal consistency of the items associated with each dimension. The results of the reliability test indicated a Cronbach's $\alpha=0.89$ for Price Consciousness (PxCon), $\alpha=0.82$ for Product Review factor (ProRF), $\alpha=0.91$ for Brand Influence Factor (BRANDInF), $\alpha=0.91$ for Perceived Quality (PerQ) of recommended product and finally, $\alpha=0.95$ for E-tailers Promotional factors (EPromF). Additionally, using the McDonald's ω reliability tool, we performed the McDonald's ω test for reliability to support and confirm the internal consistency of the items. The results indicated $\omega=0.89$ for Price Consciousness (PxCon), $\omega=0.82$ for Product Review factor (ProRF), $\omega=0.91$ for Brand Influence Factor (BRANDInF), $\omega=0.92$ for Perceived Quality (PerQ) of recommended product and finally, $\omega=0.95$ for E-tailers Promotional factors (EPromF). In both tests (Cronbach's α and McDonald's ω reliability test), the values were above the accepted statistical threshold of 0.70 as stipulated by an indication of sufficient reliability with the data (See Table 2) (Nunnally and Bernstein, 1994).

3.3.4 Structural Equation Modeling (SEM)

For analysis of the confirmation of instrument validity, centered on the outcomes from the Exploratory Factor Analysis (EFA) and the consistency of the reliability test results of the instrument, the Structural Equation Modeling (ESEM) was also performed. The results from the SEM indicated that the overall model fit the data well, $X^2/df = 1091.96/395 = 2.76$, $P < 0.001$, $RMSEA = 0.05$, $SRMR = 0.051$, $CFI = 0.938$, $TLI = 0.931$, $NFI = 0.906$, $PNFI = 0.823$, $IFI = 0.938$, $GFI = 0.9$ (See figure 1). Additionally, we assess the differences in the factors among male and female participants. The independent sample t-test was performed. The results revealed significant differences ($p < 0.001$) among male ($M = 17.2$, $SD = 3.56$, $SE = 0.237$) and female ($M = 20.6$, $SD = 2.82$, $SE = 0.164$) with respect to price consciousness (PxCon).

A significant differences ($p < 0.001$) was also revealed among males ($M = 22.3$, $SD = 4.05$, $SE = 0.269$) and females ($M = 16.9$, $SD = 5.18$, $SE = 0.302$) with regards to Product Review (ProRF), also a significant differences ($p < 0.001$) was also revealed among males ($M = 14.3$, $SD = 4.18$, $SE = 0.278$) and females ($M = 20.7$, $SD = 2.38$, $SE = 0.139$) with regards to Brand Influence (BRANDInF), likewise, there was significant differences ($p < 0.001$) between male ($M = 26.3$, $SD = 2.91$, $SE = 0.194$) and female ($M = 20.3$, $SD = 4.36$, $SE = 0.254$) towards Perceived Quality (PerQ). Moreover, male ($M = 25.1$, $SD = 3.71$, $SE = 0.247$) and female ($M = 33.9$, $SD = 3.92$, $SE = 0.228$) perception towards E-tailers Promotional Factor (EPromF) was also significantly

difference ($p < 0.001$). Thus males were showing high concern towards price and brand than females while the females were showing high

concern towards sales promotion, product reviews, and quality of the recommended product.

Table 2: Item Reliability Statistics

							if Item Dropped	
		Mean	SD	Cronbach's α	McDonald's ω	Item-Rest Correlation	Cronbach's α	McDonald's ω
	PxCon	3.83	0.72	0.89	0.89			
PxCon6						0.70	0.88	0.88
PxCon9						0.74	0.87	0.87
PxCon10						0.72	0.87	0.88
PxCon15						0.81	0.85	0.86
PxCon19						0.72	0.87	0.88
	ProRF	3.20	0.91	0.82	0.82			
ProRF1						0.58	0.79	0.79
ProRF3						0.57	0.79	0.79
ProRF7						0.62	0.78	0.78
ProRF10						0.58	0.79	0.79
ProRF11						0.53	0.80	0.80
ProRF12						0.60	0.78	0.78
BRANDInF2	BRANDInF	3.58	0.92	0.91	0.91	0.84	0.88	0.88
BRANDInF4						0.78	0.89	0.89
BRANDInF5						0.76	0.90	0.90
BRANDInF11						0.72	0.90	0.90
BRANDInF16						0.79	0.89	0.89
	PerQ	3.82	0.80	0.91	0.92			
PerQ1						0.78	0.89	0.90
PerQ2						0.53	0.92	0.93
PerQ3						0.74	0.89	0.91
PerQ8						0.84	0.88	0.89
PerQ11						0.81	0.88	0.89
PerQ13						0.82	0.88	0.89
	EPromF	3.76	0.73	0.95	0.95			
EPromF2						0.84	0.95	0.95
EPromF3						0.87	0.94	0.94
EPromF5						0.79	0.94	0.95
EPromF9						0.79	0.95	0.95
EPromF10						0.77	0.95	0.95
EPromF12						0.82	0.94	0.95
EPromF15						0.86	0.94	0.94
EPromF17						0.85	0.94	0.95

Table 1: Inter Factor Correlation Matrix

Inter-Factor Correlations					
	EPromF	PerQ	BRANDInF	PxCon	ProRF
EPromF	-	-0.356	0.599	0.187	-0.536
PerQ		-	-0.499	-0.160	0.384
BRANDInF			-	0.340	-0.451
PxCon				-	-0.234
ProRF					-

Note: PxCon=Price Consciousness, ProRF=Product Review factor, BRANDInF=Brand Influence factor, PerQ=Recommended product quality, EPromF= E-tailers promotional factor.

Rotation method: Promax with Kaiser Normalization. All presented correlations are significant ($p < .001$).

Table 4: Descriptive and Exploratory Factor Analyses of The PPRA Scale using PROMAX Rotation.

Items	Items Descriptive Statistics		Factor Loading ^a (λ)						K.M.0=.940, p<.001 MSA>0.5
	Mean ± SD	Skew (Kurt)	1 ^b	2 ^c	3 ^d	4 ^e	5 ^f	Uniqueness	
Factor 1 - Price consciousness (PxCon)									
When it comes to choosing a recommended product, I rely heavily on price	3.88±0.82	-0.76(0.70)	0.74					0.45	0.892
I will consider the lowest priced recommended product—that suits my needs.	3.99±0.78	-0.87(1.55)	0.72					0.38	0.909
I usually compare prices of other e-tailers before I purchase recommended product	3.75±0.86	-0.71(0.40)	0.83					0.33	0.868
I am attracted to low priced recommended product, but I expect quality	3.78±0.84	-0.61(0.52)	0.85					0.22	0.891
I see myself as a price-conscious e-shopper	3.77± 0.98	-0.70(0.01)	0.79					0.37	0.861
Factor 2 - Product Review Stimuli (ProRF)									
I consider Reviews of recommended product from other customers more credible	3.26±1.26	-0.18(1.06)		0.66				0.59	0.934
Recommended product reviews are very informative to me	3.20± 1.24	0.01(-1.13)		0.65				0.61	0.926
Online product reviews are helpful for my purchase decision	3.12± 1.26	0.04(-1.08)		0.64				0.49	0.958
Online product reviews make me confident in purchasing a recommended product	3.32± 1.28	-0.20(-1.10)		0.66				0.56	0.935
Product reviews are a great way to discover good things about a products recommended	3.22± 1.24	-0.04(-1.08)		0.6				0.64	0.941
Online review can confirm if I'm buying good or a bad recommended product	3.09± 1.24	-0.02(-1.07)		0.65				0.54	0.942
Factor 3 - Brand influence (BRANDInF)									
I take certain brands into consideration when it comes to recommended product	3.53± 1.16	-0.18(-1.07)			0.82			0.19	0.951
If a recommended product brand reflects my personal lifestyle, I get attracted	3.43± 1.15	-0.02(-1.14)			0.78			0.28	0.951
I will not buy any other recommended product apart from my favorite brand of products	3.67± 1.01	-0.27(-0.77)			0.83			0.34	0.927
I will definitely re-recommend the branded recommended product to friends	3.55± 1.00	-0.04(-0.85)			0.71			0.43	0.964
In all I feel attached to certain brands	3.74± 1.00	-0.44(-0.53)			0.87			0.3	0.924
Factor 4 - Perceived Quality (PerQ)									
In general, I prefer recommended products that match my preferences	3.81± 0.89	-0.78(0.76)				0.9		0.26	0.914
In general, I prefer recommended product that are of good quality	3.83± 1.00	-0.44(-0.88)				0.49		0.68	0.941
In general, I prefer recommended product that are prestigious	3.59± 1.19	-0.74(-0.20)				0.7		0.4	0.957
I get attracted to recommended products that are visually attractive.	3.91± 0.91	-0.79(0.56)				0.91		0.21	0.919
I consider recommended products from the e-shop that have superiority.	3.89± 0.96	-0.70(0.16)				0.86		0.25	0.937
In all, I find the recommended products the online shops exhibit remarkable	3.91± 0.87	-0.70(0.55)				0.91		0.23	0.927
Factor 5 - E-tailers discount Promotional (EPromF)									
I save money when I buy discounted recommended product	3.60± 1.11	-0.49(-0.66)					0.76	0.24	0.952
I prefer to buy discounted/promotional products	3.67± 0.98	-0.59(-0.14)					0.79	0.19	0.954
If recommended Products have bundle offers (e.g .Buy one, get one free) I get attracted.	3.81± 0.79	-0.72(0.99)					0.82	0.33	0.969
I mostly look out for recommended promotional product	3.75± 0.70	-0.67(0.81)					0.82	0.32	0.962
Discount promotion product is very helpful to me	3.94± 0.72	-0.41(0.55)					0.81	0.36	0.953
I look out for sale promotion goods even if I have a particular product in mind	3.74± 0.78	-0.35(-0.05)					0.8	0.28	0.961
Promotional recommended product is a good buy	3.78± 0.82	-0.47(0.59)					0.89	0.21	0.955
Generally, I am attracted to discounted/promotional sales	3.79± 0.78	-0.44(0.46)					0.89	0.23	0.946
Eigenvalues			10.8	3.31	3.15	2.12	1.52		
% of Variance			35.99	11.02	10.5	7.07	5.08		

Note. 'Maximum likelihood' extraction method was used in combination with a 'Promax' rotation. Loadings below < 0.40 are omitted

Table 5: SEM- Parameter Estimates								
Factor	Indicator	R ²	SE	95% Confidence Interval		Z	p	Stand. Estimate
				Lower	Upper			
PxCon	PxCon6	0.60	0.03	0.55	0.67	19.20	<.001	0.75
	PxCon9	0.56	0.03	0.56	0.67	20.80	<.001	0.79
	PxCon10	0.62	0.03	0.59	0.72	20.00	<.001	0.77
	PxCon15	0.59	0.03	0.68	0.80	24.50	<.001	0.88
	PxCon19	0.77	0.04	0.69	0.83	20.40	<.001	0.78
ProRF	ProRF1	0.41	0.05	0.70	0.91	15.10	<.001	0.64
	ProRF3	0.39	0.05	0.67	0.88	14.60	<.001	0.63
	ProRF7	0.52	0.05	0.80	1.01	17.40	<.001	0.72
	ProRF10	0.43	0.05	0.73	0.95	15.40	<.001	0.65
	ProRF11	0.36	0.05	0.64	0.84	13.90	<.001	0.60
BRANDInF	BRANDInF2	0.81	0.04	0.96	1.12	25.90	<.001	0.90
	BRANDInF4	0.70	0.04	0.88	1.05	23.10	<.001	0.84
	BRANDInF5	0.63	0.04	0.73	0.88	21.30	<.001	0.80
	BRANDInF11	0.57	0.04	0.68	0.83	19.80	<.001	0.76
	BRANDInF16	0.66	0.04	0.74	0.89	21.90	<.001	0.81
PerQ	PerQ1	0.72	0.03	0.69	0.81	23.70	<.001	0.85
	PerQ2	0.29	0.04	0.46	0.62	13.00	<.001	0.54
	PerQ3	0.59	0.04	0.82	1.00	20.30	<.001	0.77
	PerQ8	0.79	0.03	0.74	0.86	25.50	<.001	0.89
	PerQ11	0.75	0.03	0.76	0.89	24.60	<.001	0.87
EPromF	EPromF2	0.75	0.04	0.88	1.03	24.70	<.001	0.87
	EPromF3	0.80	0.03	0.81	0.94	26.00	<.001	0.89
	EPromF5	0.65	0.03	0.58	0.69	22.20	<.001	0.81
	EPromF9	0.66	0.03	0.52	0.62	22.40	<.001	0.81
	EPromF10	0.62	0.03	0.51	0.62	21.40	<.001	0.79
EPromF	EPromF12	0.71	0.03	0.60	0.71	23.50	<.001	0.84
	EPromF15	0.78	0.03	0.67	0.78	25.60	<.001	0.89
EPromF	EPromF17	0.76	0.03	0.63	0.74	25.00	<.001	0.87

Standard Estimate are significant (p<.001- p<0.05)

Table 6: Factor Covariance Estimates								
			Estimate	Std. Error	z-value	p	95% Confidence Interval	
							Lower	Upper
Price Consciousness (PxCon)	↔	Product Review (ProRF)	-0.28	0.05	-5.88	<.001	-0.37	-0.19
Price Consciousness (PxCon)	↔	Brand Influence (BRANDInF)	0.35	0.04	8.29	<.001	0.27	0.44
Price Consciousness (PxCon)	↔	Perceived Quality (PerQ)	-0.17	0.05	-3.56	<.001	-0.26	-0.07
Price Consciousness (PxCon)	↔	E-tailer Promotion (EPromF)	0.22	0.05	4.82	<.001	0.13	0.31
Product Review (ProRF)	↔	Brand Influence (BRANDInF)	-0.48	0.04	-11.92	<.001	-0.56	-0.40
Product Review (ProRF)	↔	Perceived Quality (PerQ)	0.36	0.04	8.19	<.001	0.28	0.45
Product Review (ProRF)	↔	E-tailer Promotion (EPromF)	-0.58	0.04	-16.46	<.001	-0.65	-0.51
Brand Influence (BRANDInF)	↔	Perceived Quality (PerQ)	-0.48	0.04	-12.84	<.001	-0.55	-0.41
Brand Influence (BRANDInF)	↔	E-tailer Promotion (EPromF)	0.67	0.03	24.48	<.001	0.61	0.72
Perceived Quality (PerQ)	↔	E-tailer Promotion (EPromF)	-0.39	0.04	-9.78	<.001	-0.47	-0.31

Factor covariance Estimates are significant (p<.001- p<0.05)

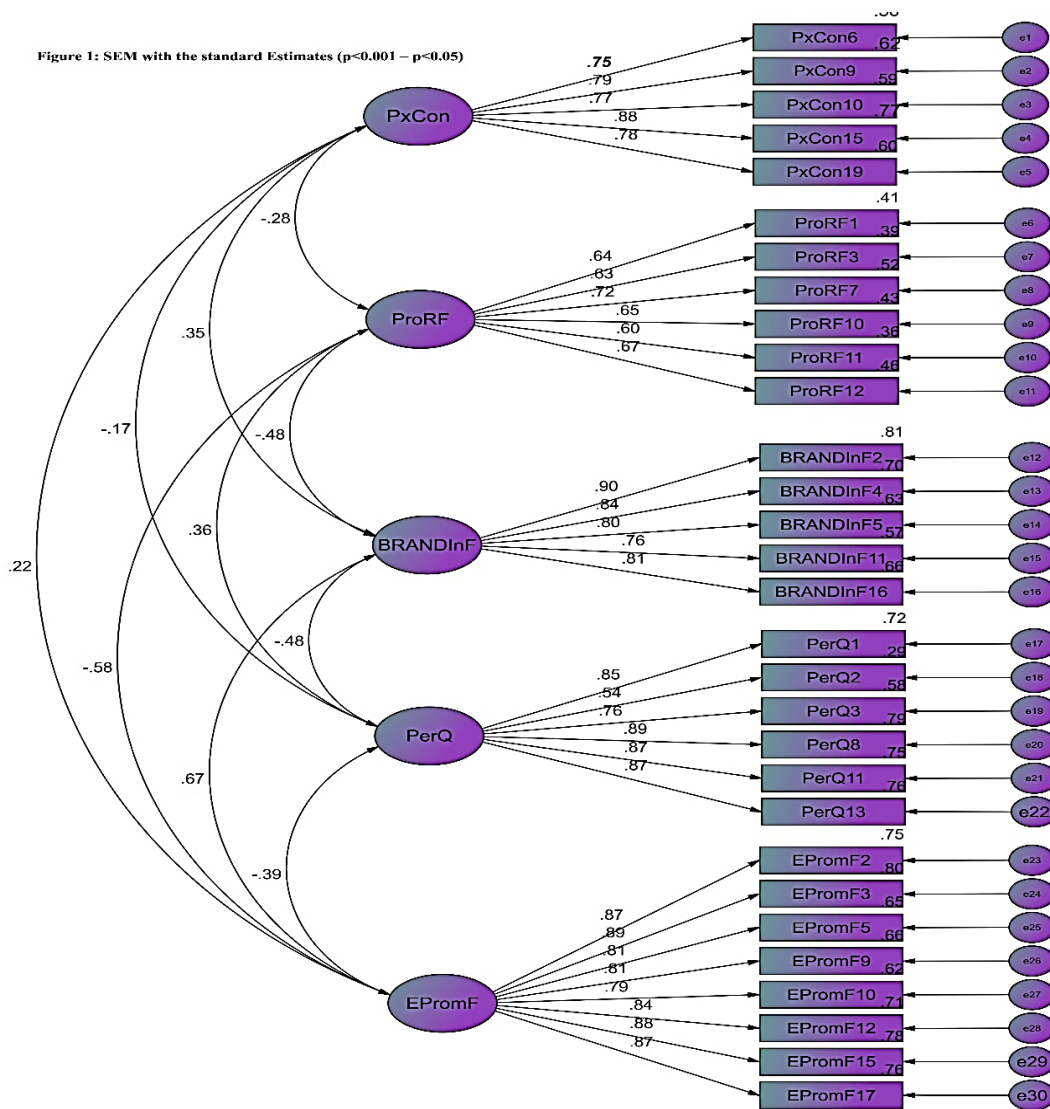


Figure 1: SEM with the standard Estimates (p<0.001-p<0.05)

4. DISCUSSION

4.1 Evidence of Validity

The main objective of this research was to develop and validate a measurement instrument for assessing the psychometric indicators that influence e-consumers to accept recommended products from the E-tailers recommender systems. It is expected that the proposed measurement instrument will be used by academicians and researchers to contribute methodically and scientifically; to the development of novel strategies for consumer-centric knowledge diffusion in the development of innovative recommender systems that will attract new and potential consumers. According to validity is a cohesive valuation judgment of the degree to which observed evidence and theoretical justifications support the appropriateness of inferences and activities grounded on scientific test results or other methods of assessment (Hair et al., 2019). Accordingly, the validity established in the current study supports the interpretations of test results (Reliability test, EFA, etc.,) derived. The validation procedure includes the accumulation of significant evidence that provides a rigorous scientific and methodical basis for the interpretations of the test results.

PRPA-SCALE items were grounded on the valid, periodical, and associated literature on recommendation systems, consumer behavior, and product acceptance. Additionally, evidence of content validity was presented per the requirements (Hair et al., 2019). The semantic and Raters analysis contributed extensively to the item development process, as its contribution presents significant methodological techniques that can be utilized to develop new measurement instruments. The semantic and raters analysis represent "somatic validity" evidence for content validity. Referencing the agreed threshold, the sample size for the study met the 200 minimum sample size requirements speculated by as the sample size for the study ($n=521$) was above the threshold (Gorsuch, 1983). Moreover, a group reserchers assumptions for linearity, singularity, and normality

were satisfied (Hair et al., 2010).

The value of the $KMO=0.940$ obtained shows that the anti-image/image relation is marvelous; hence the R matrix could be factorized in accordance with such a condition. Kaiser, describes KMO values as follows: 0.90 =marvelous; 0.80 =meritorious; 0.70 =median; 0.60 =mediocre/modest; 0.50 =miserable and; value below 0.50 as unacceptable (Kaiser, 1974). Accordingly, the KMO value ascertain in the current study ($KMO=0.940$) is marvelous and thus allows for factor analysis. The construal of the eigenvalues for the observed matrix authenticates the extraction of 5-factor dimensions of the Factor correlation matrix. Thus, the extraction of the five-dimensional- factors from the observed matrix is acceptable as it contains a great amount of accurate and meticulous information produced from the current study. Additionally, the percentage of the variance (69.66%) indicates that almost 70% of the variance is explained by the model, which is good, but also shows that almost 30% of the variance remains unexplored, thus providing room for further investigation.

The Factor analysis showed that the 30 items used for the development of the PRPA-SCALE measurement can be factorized into five dimensions (factors). The first dimension grouped 5 items as Price Consciousness Factor (PxCon). The second dimension grouped 6 items as Product Review Factors (ProRF). The third dimension grouped 5 items as the Brand Influence factors (BRANDInF). The fourth dimension grouped 6 items as Perceived Quality (PerQ). Then finally, the fifth dimension grouped 8 items as E-tailers' promotional factors (EPromF). Furthermore, the study indicated a significant correlation factor matrix between the five factors. The correlation among the 5 dimensions supports an earlier study that established a relationship between these factors and consumers' intensity to purchase (Janine, 2015; Ahmad et al., 2016; Kim et al., 2017; Konuk, 2018; Fernandes and Moreira, 2019; Mohammed and Murova, 2019; Sudaryanto et al., 2019; Büyükdada et al., 2020)

The interpretation of the internal reliability and consistency analysis as

indicated by the Cronbach alpha and the McDonald's ω reliability test showed good indices for all 5 factors (dimensions) as the values reported by each factor were higher than the threshold of $\alpha = 0.70$ for reliability as stipulated (Nunnally and Bernstein, 1994). This signifies that the five factors are guaranteed to appear in other research studies because the items are allied to each other and are more representative to good dimensions. Additionally, The SEM of the PRPA instrument presented sufficient and substantive coefficients as the Factor Covariance Estimates and the parameter estimates reported significant ($p < 0.001$) indices. All this evidence set the foundation for future research in the area of personalized product recommendation acceptance.

4.2 Theoretical Implications

In the present study, we presented and validated a 5-dimensional personalized recommended product acceptance scale (PRPA-SCALE) which was consistent among e-shoppers. In-depth scrutiny of the five-dimension may assist researchers to explore precursors of each factor effectively so that e-shop managers and marketing stakeholders can improve or advance appropriate recommendation systems capable of suggesting products that best fit consumers' expectations. The PRPA scale may change in the future, thus additional factors may be added in the future as there is the possibility of an increase in consumers' purchase history scope in the future. E.g., it has been established that in the future data for personalized recommendations may not only depend on the purchase history data but also other data such as consumer savings and e-tailers/vendors' profit (Jiang et al., 2011). Hence the current study has set the foundation for future research into the dynamics of personalized product recommendation acceptance.

Notwithstanding the remarkable concern shown by e-marketing experts, researchers, and practitioners in the personalized recommendation system concept, there is diminutive intellectual research that unequivocally examined the factors that attract consumers to the recommended product. This is owed to the non-existence of a suitable measurement scale for "recommended product acceptance". This study seeks to fill that gap. More precisely, the study seeks to address this gap by (1) constructing and validating multi-item measurement for recommended product acceptance and (2) evaluating its psychometric characteristics through rigorous analysis. Moreover, the notion of personalized product recommendation offers the foundation for the five-dimensional factors of the PRPA scale. The scale construction and validation method employed has resulted in a thrifty, reliable, consistency and valid PRPA scale.

Finally, the study support and give credence to Ehrenberg's repeated-purchase theory which posits that the average consumer purchase decision is affected and influenced by price, quality, brand, promotion, advertisement, packaging, etc (Ehrenberg, 1988). To the consumer, decisions need to be made on a recommended product of interest as to whether to buy, how much to offer, what brand, and at what cost, as there are numerous consumption activities and reactions that engender post-usage contentment and gratification or dissatisfaction which can cause a change in consumers attitude and behavior towards the product recommended and the e-shop. The combining predisposition of the five factors towards recommended product purchase decisions is more or less "a habitual buying behavior" of consumers, instead of the normal variations of buying conditions. Vis-à-vis the psychometric nature of the PRPA- scale, the observed evidence supports the internal consistency and validity of the 5 dimensions extracted, more also, the present study could be improved further with a larger sample size in another population context to make the outcome more consistent and reliable.

4.3 Managerial Implication

The study contributes to the existing literature on the personalized recommended products by proposing a novel scale to measure personalized recommended product acceptance. The new measurement scale can be used to measure personalized recommended product acceptance in an online marketing environment. The evidence validly established not only give credence to the PRPA scale but also, conveys a strong empirical indication vis-à-vis the robustness of the proposed PRPA-scale measurement scale. The current consumers are more powerful and well-informed than ever before as a result of easy access to alternative/varieties of products and information. This has led to high competition among e-tailers. Now there are constant innovations and strategies within the digital marketplace as consumers prefer E-tailers that offer convenient and better shopping experiences. Thus, e-tailers have incorporated technologies such as product recommendation systems as significant tools to enhance co consumers' shopping experiences and also enrich their competitiveness. The results from the study offer a broad

image of measuring personalized recommended product acceptance in the eCommerce environment. To the best of our knowledge, the study is the first constructing and validating measurement instrument developed to measure personalized product recommended acceptance in the Ghanaian context.

Furthermore, the study will be beneficial to e-shop managers, e-tailers, and other marketing stakeholders in the development of new personalized recommendation strategies. The current study offers informative evidence for e-shop managers, e-tailers, and other marketing stakeholders to prudently assess the efficacy and the acceptability of the personalized recommendation and the product suggested to consumers. Thus the measure can be used to assess the attractiveness and possible acceptability of recommended products by existing and new/potential consumers. This assessment can be carried out by surveying e-shoppers/consumers to ascertain their level of acceptability of recommended products in an online environment. In the absence of such proper measurement of recommended product acceptance tool, e-shop managers/owners, e-tailers and other marketing stakeholders will concentrate on a traditional recommendation, such as the word-of-mouth technique (WoMT), which is time-consuming, as it takes a lot of time to convince a consumer to purchase a recommended product. Therefore, the development and validation of the PRPA- scale will serve as a significant tool for e-shop managers/owners, and e-tailers to understand the disposition of consumers on recommended products.

Finally, managers and owners of e-shops should take into consideration the impact of each dimension (i.e., price consciousness, product reviews, Brand Influence, Perceived Quality, and E-tailer's Promotional Factor) on their business and the product suggested by their recommender system. For example., it has been established that many product reviews that consumers rely on to make purchases decision are biased and deceitful (Chua and Banerjee, 2015). This fact could influence and change the study results because some consumers cannot differentiate between helpful recommended product reviews from fake reviews. It is therefore important for e-shop manager/e-tailers, to ensure that reviews on their recommended product are genius as it may help to build trust in their recommendations and further strengthen their reputation. Fake reviews of the recommended products may lead to "seller's switch" on the side of the consumer and may be difficult to win back the consumer, this is because consumers retention costs less than obtaining new consumers or persuading "switched-consumer" (DiMauro and Bulmer, 2014).

5. LIMITATIONS

The sample used for the validation of the PRPA was made up of Ghanaian-based consumers, thus the participants do not reflect consumers' purchase behaviors towards e-tailers recommended products in other countries. Hence the generalization of the results from the study is limited. However, it replicates the opinions of consumers who are experienced in purchasing a recommended products, as these consumers show a better knowledge of recommended product acceptance. Moreover, further studies should be carried out in another contexts (e.g., cultural, language, economic,) to allow comparison of results and confirm the generalization of the current study. Diagonal validation studies from different marketing settings are required to reconnoiter the nature of personalized product acceptance among consumers.

6. CONCLUSION

This research is intended to develop and validate a psychometric scale to assess the consumers' purchase behavior indicators (CPBI) that influence e-consumers to accept personalized recommended products suggested by the e-tailers recommendation systems. The construction of the psychometric scale was possible as the results from the analysis indicated evidence of validity and reliability. Five-dimensional factors were revealed, namely, (1) Price Consciousness -PxCon, (2) Product Review factor -ProRF, (3) Brand Influence factor-BRANDInF, (4) Perceived quality factor -PerQ and, (4) Etailer's Promotional factor -EPromF, representing 36 items with good internal reliability index. The PRPA scale demonstrates adaptability potential in the context of other cultures and languages as being an exceptional measurement instrument to measure consumers' purchases decision indicators towards recommended products. Furthermore, it presents the opportunity for e-commerce stakeholders to understand consumers' product acceptance behavior toward recommended products suggested by the e-tailers recommendation system. The PRPA instrument could assist e-tailers to better strategize the recommendation system to suggest products that fit the consumer.

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