

## Brand Scale Development: A Review of Practices

Shahriar Azizi<sup>a\*</sup>

<sup>a</sup>. Associate Professor of Marketing, Faculty of Management, Shahid Beheshti University, Tehran, Iran

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### Abstract

Brand related scale development is growing and evolving trend in marketing. Using established and scientific procedure to develop sound measurement scale play crucial role in brand research academically and practically. This paper seeks to review the patterns in current brand scale development studies from recently published papers in academic journals or books. This study has three important objectives: first, to help brand researchers to judge about quality of the targeted construct to employ in their study, second, assist them if they want to develop a sound scales and three, support reviewers to assess the quality of received paper for being considered to publish in academic journals.

**Keywords:** marketing, brand management, scale development, brand dimensions, measurement, modeling.

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### 1. Introduction

Brand has the enormously growth in marketing literature in past decade. To further advancement of branding knowledge, researchers need to provide new constructs by borrowing other relate discipline such as psychology and sociology or invented original brand constructs. These constructs measure attitudes, feeling, opinions, behaviors and other aspects of brands. A new construct opens a door for researchers to study different related topics such as: measuring new construct in different context, construct antecedents, consequences, moderators, mediators and relationships with other constructs. So, we can consider the process of developing new constructs as an engine for advancing body of knowledge.

Measurement is a critical stage in any scientific activity (DeVellis,2016; Netemeyer, 2003). the new brand constructs production process should be matched with approved and established scale development procedures. Hence the sound developed scale is necessary for brand literature. There are several procedures for developing and measuring new constructs such as: churchil,1979; DeVellis,1991,2003,2012; Nunnally&Bernstein,1994; Gerbing&Anderson,1988; Hinkin,1995; Malhotra,1981; Netemeyer et.al,2003; Rossiter,2002. Essentially scale development papers are among high cited papers. These types of papers are difficult and time consuming compared to other papers (Schmitt & Klimoski, 1991).

Applying well-grounded scale development procedure results in standardized measure which in turn yields objectivity, quantification, communication, economy, and scientific generalization in behavioral research (Nunnally and Bernstein,1994, p. 6-8). Using brand constructs that measured according to sound scale development procedures increase quality and validity of study. Bearden et.al, 2012 in their influential book (Handbook of Marketing Scales, third edition, Sage) cited five criteria for scale inclusion (P.2):

- the scale measure had a reasonable theoretical base and/or conceptual definition;

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\* Corresponding author.

E-mail address: [s-azizi@sbu.ac.ir](mailto:s-azizi@sbu.ac.ir) (S.Azizi)

Received 10 February 2023; Received in revised form 24 May 2023; Accepted 1 June 2023

- the scale measure was composed of several (i.e., two or more) items or questions;
- the scale measure was developed within the marketing or consumer behavior literature, or was used in or relevant to the marketing or consumer behavior literature;
- at least some scaling procedures were employed in scale development; and
- estimates of reliability and validity existed.

This paper seeks to review the patterns in current brand scale development studies from recently published papers in academic journals or books. This study has three important objectives: first, to help brand researchers to judge about quality of the targeted construct to employ in their study, second, assist them if they want to develop a sound scales and three, support reviewers to assess the quality of received paper for being considered to publish in academic journals.

## 2. Scale Development Procedures

Several procedures provided for scale development. Some these frameworks are detailed and specially designed to scale development and other use scale development as a part of another study. Although steps and procedures for scale developing vary from author to author based on the goals and purposes of the measurement but, most writings do share a common set of guidelines for scale development (Netemeyer et.al,2003: 14). In this section I summarized some of the best-known scale development procedures employed in brand scale development era.

### 2.1. Churchill's Procedure

One of the seminal works on scale development in marketing provide by Gilbert A. Churchill in journal of marketing research. Churchill's procedure portrayed in eight stage (Fig.1). Specify Domain of Construct as a first step is based of literature review. A pool of items generated through literature search, Experience survey, insight stimulating examples, critical incidents and Focus Groups. Measure purification could be done by calculating Cronbach's alpha and factor analysis. scales reliability assesses by Cronbach's alpha and split-half reliability indices. Scale validity calculated by multitrait-multimethod matrix and criterion validity. Final step (develop norms) executed by using average and other statistics summarizing distribution of score.

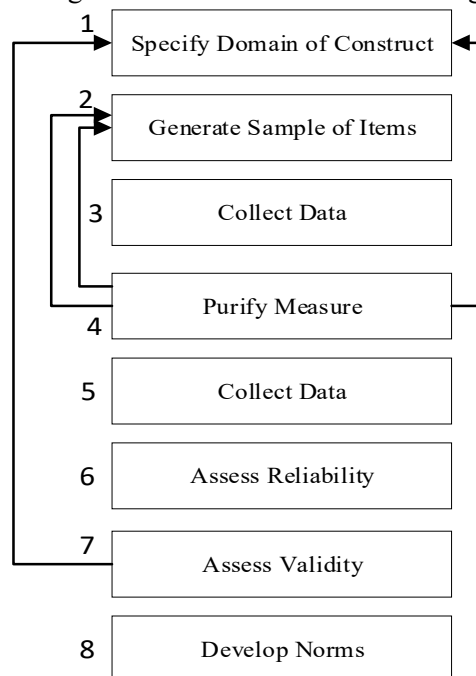


Fig 1. Churchill's Procedure for scale development

### 2.2. Netemeyer, Bearden and Sharma Procedure

Richard G. Netemeyer, William O. Bearden and Subhash Sharma provide a detail procedure for sale development as textbook. they contend that their four-step approach is consistent with much of the extant scale development literature.

**Table 1. Netemeyer, Bearden and Sharma scale development procedure**

Stage	Issues to Consider
1. Construct Definition and Content Domain	(a) The importance of clear construct definition, content domain, and the role of theory (b) The focus on “effect” items/indicators vs. “formative” items/indicators (c) Construct dimensionality: unidimensional, multidimensional, or a higher-order construct?
2. Generating and Judging Measurement Items	(a) Theoretical assumptions about items (e.g., domain sampling) (b) Generating potential items and determining the response format How many items as an initial pool Dichotomous vs. multichotomous response formats item wording issues (c) The focus on “content” validity in relation to theoretical dimensionality (d) Item judging (expert and layperson)—the focus on “content” and “face” validity
3. Designing and Conducting Studies to Develop and Refine the Scale	(a) Pilot testing as an item-trimming procedure (b) The use of several samples from relevant populations for scale development (c) Designing the studies to test psychometric properties (d) Initial item analyses via exploratory factor analyses (EFAs) (e) Initial item analyses and internal consistency estimates (f) Initial estimates of validity (g) Retaining items for the next set of studies
4. Finalizing the Scale	(a) The importance of several samples from relevant populations (b) Designing the studies to test the various types of validity (c) Item analyses via EFA (1) The importance of EFA consistency from Step 3 to Step 4 (2) Deriving an initial factor structure—dimensionality and theory (d) Item analyses and confirmatory factor analyses (CFAs) (1) Testing the theoretical factor structure and model specification (2) Evaluating CFA measurement models (3) Factor model invariance across studies (i.e., multiple-group analyses) (e) Additional item analyses via internal consistency estimates (f) Additional estimates of validity (g) Establishing norms across studies (h) Applying G-Theory

### 2.3. C-OAR-SE Procedure

John R. Rossiter provided C-OAR-SE procedure in 2002. Rossiter (2002) contented that there is need to new scale development procedure in marketing. He provided new procedure for developing scale in marketing domain in six steps acronymically summarized as C-OAR-SE. Rossiter argued that Churchill’s procedure is a subset of C-OAR-SE.

**Table 2. C-OAR-SE procedure scale development Framework**

1. Construct definition. Write an initial definition of the construct in terms of object, attribute, and rater entity.
2. Object Classification
2.1. Open-ended interviews with sample of target raters
2.2. Classify objects as concrete singular, or abstract collective, or abstract formed
2.3. Generate items parts to represent the object (one if concrete singular, multiple if abstract collective or abstract formed:
3. Attribute classification
3.1. Open-ended interview with sample of target raters
3.2. Classify attribute as concrete, or formed, or eliciting
3.3. Generate item parts to represent the attribute (one if concrete, multiple if formed or eliciting)

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↳Back to stage1: construct definition. Add to construct definition, if necessary; object constituents or components, and attribute components.

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4. Rater identification
  - 4.1. Identify the provider of the object-on-attribute judgment (rater entity) as the individual, or set of expert judges, or a sample of consumers
  - 4.2. Determine whether reliability estimates are needed across rates, and across attribute item parts if eliciting attribute.

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5. Scale formation
  - 5.1. Combine object and attribute item parts as items for the scale
  - 5.2. Select appropriate rating scales (answer categories) for the items, preferably with input from the open-ended interview.
  - 5.3. Pre-test each item for comprehension with a pre-test sample of raters.
  - 5.4. If the attribute is eliciting, additionally pre-test the attribute items for unidimensionality.
  - 5.5. Randomize the order of multiple items across object constituents or components and attribute components.

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6. Enumeration
  - 6.1. When applying the scale, use indexes and averages, as appropriate, to derive the total scale score.
  - 6.2. Transform score to a meaningful range (0-10 for an index, 0-10 for a unipolar attribute, -5 to +5 for a bipolar attribute)
  - 6.3. Report an estimate of the precision (reliability of the scale score for this application)

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**2.4. Devellis’s Procedure**

Devellis provided a complete scale development procedure in sequence of time: 1991,2003,2012,2016. He stated that “regrettably, not all item composites are developed carefully (Devellis,2016). For many, assembly may be a more appropriate term than development”. He proposed an eight-steps procedure for scale developing.

**Table 3. Devellis scale development Framework**

Stage	Issues to be Considered
Determine clearly what it is you want to measure	Theory as an aid to clarity Specificity as an aid clarity
Generate an Item Pool	Choose items that reflect the scale’s purpose Redundancy Number of items Beginning the process of writing items Characteristics of good and bad items Positively and negatively worded items
Determine the format for measurement	Types of scales (Likert, semantic differential,) How many response categories
Have initial item pool review by experts	
Consider inclusion of validation items	
Administer items to a development sample	
Evaluate the items	Initial examination of items’ performance Reverse scoring Item-scale correlation Item Variances Item means Dimensionality (factor analysis” Reliability
Optimize scale length	Effect of scale length on reliability Effects of dropping bad items Tinkering the scale length Split samples

**2.5. Malhotra Procedure**

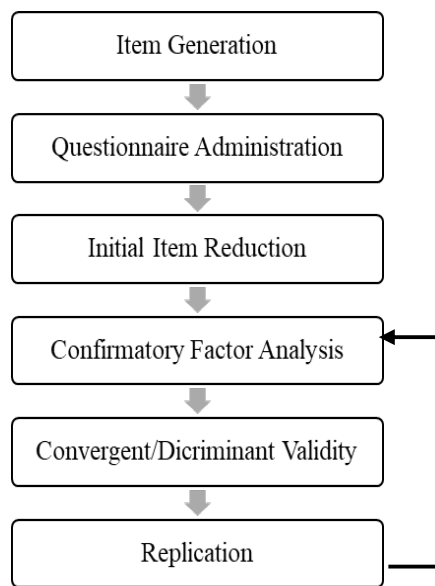
Naresh Kumar Malhotra in 1981 in a paper entitle “A Scale to Measure Self-Concepts, Person Concepts, and Product Concepts” provided -steps for scale development.

**Table 4. Malhotra scale development Framework**

Stage	
Theoretical Consideration	Selecting appropriate measuring scale (in this paper he applied semantic differential) Generation initial pool of items
Initial item selection	Pretest to identify the relevant items Panel of judges
Item analysis	Reducing and selection of final scale items Factor analysis Cluster analysis Reduced Space Regression Fitting
Reliability and Validity assessment	

**2.6. Hinkin Procedure**

Timothy Hinkin in 1998 based on his experience on review of Scale Development Practices in the Study of Organizations provided a straightforward procedure for scale developing in organizational research in six steps.



**Fig 2. Hinkin, 1998 Procedure for scale development**

In replication stage, researcher should repeat study with independent sample and exert the process from stage four to six.

**2.7. Malhotra et.al Procedure**

Malhotra et.al (2012) review the extant literature to summarize various arguments in favour of (or against) multi-item and single-item measures, respectively. They proposed a useful, detailed and an integrated framework for developing a new scale, reducing long multi-item scales to shorter multi-item measures or to single-item measures, or to expand an existing short (single-item) scale.

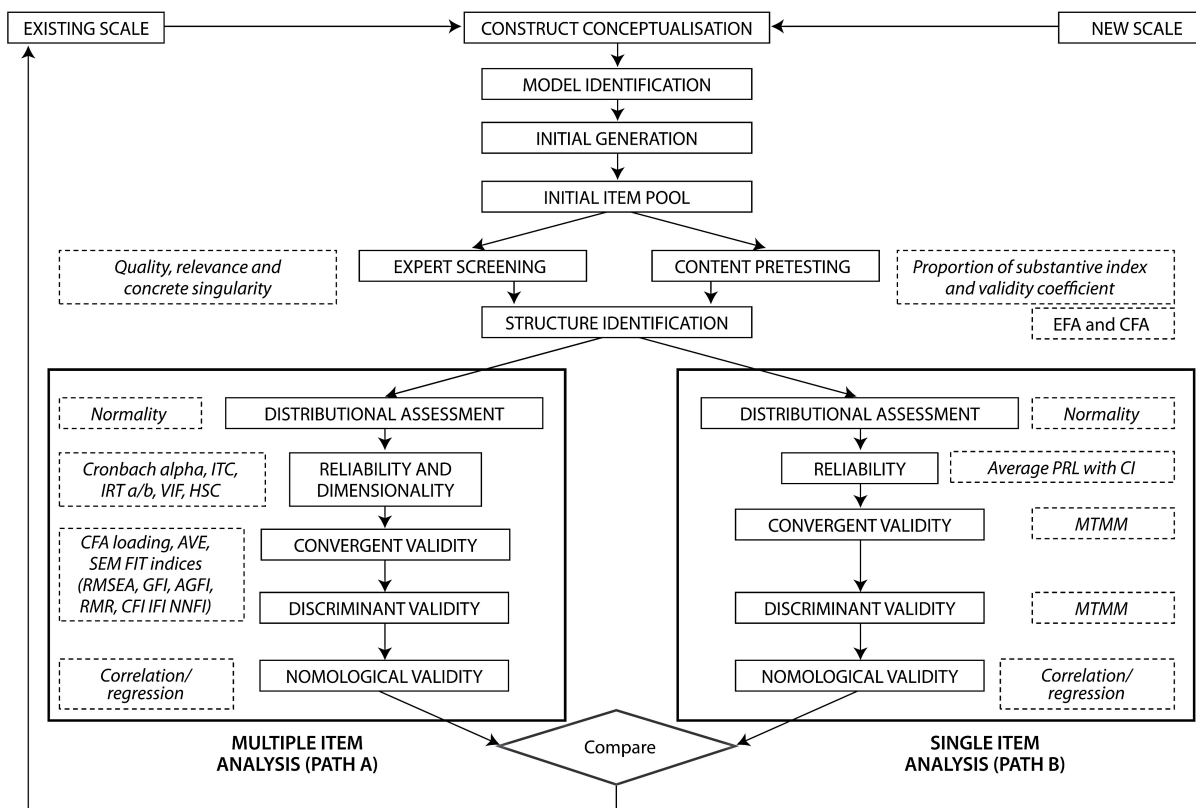


Fig 3. An integrated framework for new scale development (multi-item versus single-item), scale reduction and scale expansion (Malhotra et.al 2012)

2.8. Other procedures

There are minor procedures that mostly bases on established previous procedures. These modified and updated some aspect and stages of current procedures. Gerbing and Anderson (1988) updated Churchill’s procedure by adding unidimensionality assessing. In updated procedure which they called updated paradigm, item-total correlations and EFA employed to provide preliminary scales. The unidimensionality of each scale then is assessed simultaneously with CFA. After unidimensional measurement has been acceptably achieved, the reliability of each scale is assessed. Additional evidence for construct validity beyond the establishment of unidimensionality then can be provided by embedding the unidimensional sets of indicators within a nomological network defined by the complete structural model. Other procedures are: Tian et.al (2001); Nunnally,1978; Nunnally and Bernstein,1994; Spector,1992; Grohmann,2009; Geuens et al,2009; Aaker,1997; Zaichowsky,1985.

Methodology

This paper opposite to Hinkin (1995) which in study of scale developing in organizational researches limited the domain to selected journals, used different databases as below:

- Scientific Databases such as: Emerald insight, ScienceDirect, Springer, Sage,
- Wiley Online Library, EBSCO, ProQuest
- Conferences Proceedings: Association for Consumer Research, European Marketing Academy Conference (EMAC) and Academy of Marketing Science.
- Brand scale related books such as Zarantonello and Pauwels-Delassus (2016) and Bearden et.al (2012), Nsetemeyer et.al,2003.

Similar to Hinkin (1995) this research employed Schwab (1980) three stage framework for reporting findings. These stages are item generation, scale development and scale evaluation.

### 3. Findings

#### 3.1. General Findings

After comprehensive searching 126 scales in were found. Seven scales deleted because of providing single item (Rossister, 2002) or lack of crucial information about the process of scale developing such as Algesheimer et.al (2005); Bartier and Friedman (2014) and Erdem and Swait (1998). Grohman (2009) and Seugner-roth et.al (2006) developed more than one scale. First scale in branding backed to 1995 (Consumer based brand equity of Lassar et.al,1995 and brand trust of Hess,1995). From 1995 to July,2019, totally 119 qualified brand scales gathered. The minimum and maximum number of scales provided respectively in 1996(one scale) and 2012(fourteen scales).

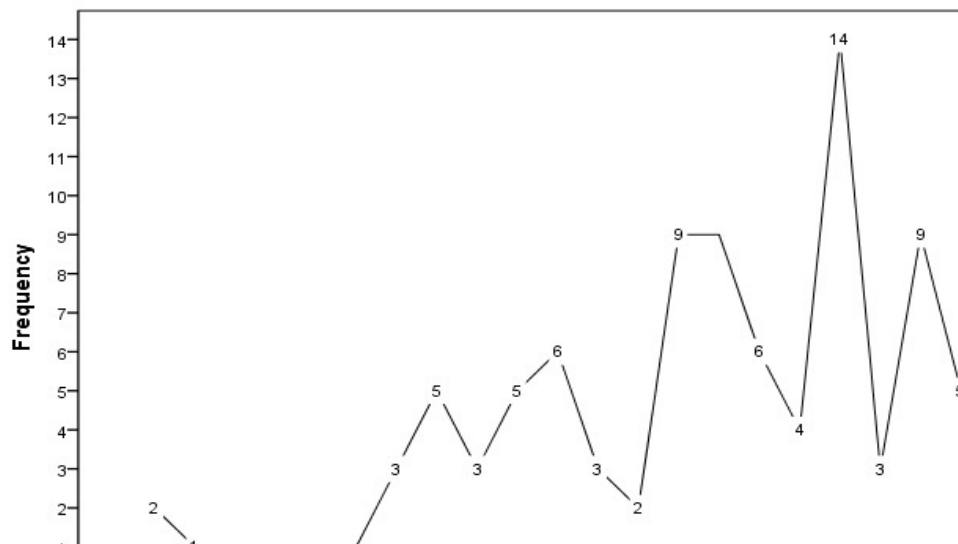


Figure 4. Frequency of Brand scales in timeline

Frequency of source of scales reveals that journal of business research has 10% of brand scales two following journals are Journal of Brand Management and Journal of Product & Brand Management (with equal share,7.6%). Three conference’s proceedings include: association of consumer research (ACR), Academy of Marketing Science and European Marketing Academy Conference (EMAC) have 8.4% share of total brand scales.

Table 5. Sources of Reported Brand Scales

Journal	Frequency	%	Cumulative %
Journal of Business Research	12	10.1	10.1
Journal of Brand Management	9	7.6	17.6
Journal of Product & Brand Management	9	7.6	25.2
ACR Conferences	6	5.0	30.3
European Journal of Marketing	6	5.0	35.3
Journal of Marketing Management	6	5.0	40.3
Journal of Marketing Research	6	5.0	45.4
International Journal of Research in Marketing	5	4.2	49.6
Journal of Marketing	3	2.5	52.1
Proceedings of the Academy of Marketing Science	3	2.5	54.6
International Journal of Market Research	2	1.7	56.3
Journal of Product & Brand Management	2	1.7	58

Journal	Frequency	%	Cumulative %
European Marketing Academy Conference (EMAC)	2	1.7	59.7
Journal of Consumer Behaviour	2	1.7	61.3
Journal of Consumer Psychology	2	1.7	63
Journal of International Marketing	2	1.7	64.7
Journal of Marketing	2	1.7	66.4
Journal of The Academy of Marketing Science	2	1.7	68.1
Management International Review	2	1.7	69.7
Recherche et Applications en Marketing (English edition)	2	1.7	71.4
The Service Industries Journal	2	1.7	73.1
Other	32	26.9	100
Total	119	100	100

Geographical distribution of brand scales indicated the major share of USA (26.1%), then India and UK each equals 9.2%. Table 6 indicate that top six countries comprise 63% of total brand scales.

**Table 6. Geographical distribution of brand scales**

Country	Frequency	%	Cumulative %
USA	31	26.1	26.1
India	11	9.2	35.3
UK	11	9.2	44.5
France	9	7.6	52.1
Germany	7	5.9	58
Australia	6	5.0	63
Canada	5	4.2	67.2
Spain	5	4.2	71.4
Belgium	3	2.5	73.9
Italy	2	1.7	75.6
Turkey	2	1.7	77.3
Other	13	10.9	88.2
Multiple Country	14	11.8	100.0
Total	119	100	100

Scales developed in different eras. Subject framework offered by Zarantonello and Pauwels-Delassus (2016) used for categorizing scales. Brand personality related scales make 20 of 119 scales or 16.8%. brand equity stands in the second place with 16 of 119 or 13.4% share.

**Table 7. Subjects of Brand Scales**

Subject	Frequency	Percent
Personality	20	16.8
Brand Equity	16	13.4
Emotions toward brand	14	11.8
Brand Identity & Image	12	10.1



Subject	Frequency	Percent
Consumer dispositions toward brands	12	10.1
Brand Relationship	11	9.2
Experiential consumption with brands	8	6.7
Brand authenticity	7	5.9
Perceived brand differentiation	7	5.9
Brand associations	4	3.4
Attitudes toward the brand	4	3.4
Brand orientation	4	3.4
Total	119	100

Scale development is a procedure that made by sequential and interconnected elements. Although there are many researches about elements of scale development such as: criterion validity, construct validity, content validity, reliability, factor analysis but researches that portrayed a comprehensive framework for scale development are a few.

These frameworks are: Churchill,1979; DeVellis (1991,2003,2012); Nunnally (1978); Nunnally& Bernstein (1994); Hinkin,1995; Netemeyer et.al (2003); Rossiter (2002) and Spector,1992. Some researchers for developing scale in certain brand subject specially “brand personality” provide specific techniques and methods including aaker,1997; tian,2001; grohmann,2009; geuens et.al, 2009 and zichkowsky,1985. Totally 70 researches indicated their framework for scale development and 49 researches did not show employed framework. From studies pointed their framework, 45 studies recruited single framework and the remaining used multiple procedures. Churchill scale development framework has lion share equals to 28.57 in single and 15.97 percent in multiple frameworks.

**Table 8. Frequency of Scale Development Frameworks**

Procedure	Single Method		Multiple Method	
	Frequency	% of Total	Frequency	% of Total
Churchill,1979	34	28.57	19	15.97
DeVellis (1991,2003,2012,2016)	3	2.52	9	7.56
Gerbing&Anderson,1988	2	1.68	6	5.04
Nunnally&Bernstein,1994	2	1.68	1	0.84
Hinkin,1995	1	0.84	1	0.84
Malhotra,1981	1	0.84	1	0.84
Netemeyer et.al.2003	1	0.84	6	5.04
C-OAR-SE,2002	1	0.84	3	2.52
Nunnally,1978	0	0	2	1.68
Spector,1992	0	0	1	0.84
Other (Grohmann,2009; Tian et al,2001; Geuens et al,2009; Aaker,1997; Zaichowsky,1985)	0	0	5	4.20
Unspecified		49(41.1%)		
Sum		45(37.8%)		25(21%)

Sample: The sample analysis divided to three layers: nature of product, number of respondents and respondent's affiliation. In first layer of sample results show that goods have a lion share (42.2%), services have 25% share.

**Table 9. frequency of samples based on nature of product**

Product Type	Frequency	%	Valid %
Goods	49	41.2	42.2
Services	29	24.4	25.0
Mixed	27	22.7	23.3
Unspecified	11	9.2	9.5
Total	116	97.5	100.0
Missing	3	2.5	
Total	119	100.0	

In the case of number of respondents, majority of studies have 500 to 1000 respondents that equal 41.5% at the second order studies with <500 respondents stand.

**Table 10. Frequency of samples based on nature of product**

Sample Size	Frequency	%
<500	35	29.7
500-1000	49	41.5
1000-2000	22	18.6
≥2000	12	10.2
Total	118	100

respondent's affiliation revealed that 42% of studies employ consumer, 26.9% employ student, 5% employ organizational respondents (such as: employee, managers) and the remaining gathered the data from mixed sample.

**Table 11. Frequency of samples based on respondent's affiliation**

Affiliation	Frequency	%
Consumer	50	42
Student	32	26.9
Consumer, Student	27	22.7
Organizational	6	5
Consumer, Student, Organizational	2	1.7
Consumer, Organizational	1	0.8
Student, Organizational	1	0.8
Total	119	100

## 3.2. Scale Development Process

### 3.2.1. Item Generation

Printed content including Organizational Documents such as mission/vision statements and Catalogues were treated as deductive approach (including two studies: Herbst&Merz,2011 and Chaudhuri&Holbrook,2001).

Generation items by first hand methods such as: individual in-depth interview, focus group and so on, categorized as inductive method. Inductive item generation make only 8.5% of scales, deductive methods make 35.6% and combination of both of them make 55.9%.

**Table 12. Frequency of Item Generation method**

	Frequency	Valid %
Inductive	10	8.5
Deductive	42	35.6
Inductive and Deductive	66	55.9
Total	118	100
Unspecified	1	

Detailed analysis of inductive method for item generation indicate that focus group and individual in-depth interview are at the top of list with share respectively 66.7% and 55.6%.

**Table 13. Inductive Methods for Item Generation**

Inductive Method	Single		Multiple	
	Frequency	%	Frequency	%
Telephone Interview	1	1.7	0	0.0
Semi-structured depth interview	1	1.7	3	16.7
Open-Ended Survey	12	20.7	4	22.2
Individual In-depth Interview	28	48.3	10	55.6
Free Association Task	4	6.9	3	16.7
Focus Group	11	19.0	12	66.7
Ethnography	1	1.7	0	0.0
Communication Materials	0	0	1	5.6
Interpretative Study	0	0	1	5.6
Authors Judgment	0	0	2	11.1
Brand Concept Map	0	0	1	5.6
Nominal Group	0	0	1	5.6
Total	58	76.3	18	23.7
Unspecified =1				

Number of initial pool of items. Usually number of initial pool of items in scale developing norms are high. analysis indicate initial pool of items have 84 items on average. Results show that 66.4% brand development studies have maximum 70 initial pool of items. Initial pool with more than 70 items has the lion share (33.1%) and studies with 30 to 40 initial pool of items has the second order (14.4%).

**Table 14. Initial pool of items Frequency and statistics**

Number of Initial Items	Frequency	%	Valid %	Cumulative Valid %
≤10	7	6.0%	6.7%	6.70%
<10 to ≤20	13	11.1%	12.5%	19.20%

Number of Initial Items	Frequency	%	Valid %	Cumulative Valid %
<20 to ≤30	8	6.8%	7.7%	26.90%
<30 to ≤40	15	12.8%	14.4%	41.30%
<40 to ≤50	11	9.4%	10.6%	51.90%
<50 to ≤60	9	7.7%	8.7%	60.60%
<60 to ≤70	6	5.1%	5.8%	66.40%
> 70	35	29.9%	33.7%	100.10%
Missing	13	11.1%		
Total	117			
Mean= 84; Median=49; Minimum=4; Maximum=494				

After item generation, scale developer confronts an initial pool of items. Majority of researchers use a filter to screen most related items. Expert and then consumer judge are the most methods to filter the initial pool.

**Table 15. Frequency of filtering method of initial pool**

Filtering method of initial pool	Single		Multiple	
	Frequency	%	Frequency	%
Expert	48	50	23	100.0
Consumer	14	14.58	18	78.3
Theory	3	3.13	0	0
Author	7	7.29	7	30.4
No Judge	11	11.46	0	0
Total	83	78.3	23	21.7
Unspecified=13				

### 3.2.2. Scale Development

Measuring Scale. We found four types of measuring employed in brand scale development studies: Likert, bipolar, semantic differential, and nominal. Data analysis indicate that seven-points Likert have a lion share (49.2%) at the second order is five points Likert stands with 22.9% share. Aggregation analysis show that 85.5% of developed scales employed Likert-type scales.

**Table 16. Frequency of measuring scale**

Measuring Scale	Frequency	%
4-Point Likert	1	0.8
5-Point Likert	27	22.9
6-Point Likert	5	4.2
7-Point Likert	58	49.2
9-Point Likert	4	3.4
10-Point Likert	3	2.5
11-Point Likert	3	2.5
Nominal scale	2	1.7

Measuring Scale	Frequency	%
Bipolar Five Point	2	1.7
Semantic Differential	3	2.5
Unspecified	10	8.5
Missing	1	
Total	119	

Item Deletion Technique. one goal of pilot testing is reduction of items (Netemeyer et.al,2003). there are several techniques to do this job. Results indicate that from 110 scale developed 90.9% scales employed factor loading, 53% employed cross loading and 44% exerted item to total correlation as a criterion for item deletion.

**Table 17. Frequency of item deletion techniques**

Item Deletion Techniques	Single		Multiple	
	Frequency	%	Frequency	%
Factor Loading	16	88.9	84	91.3
Communality	1	5.6	9	9.8
Cross Loading	0	0	53	57.6
Item-to-total correlation	0	0	44	47.8
Inter Item Correlation	1	5.6	7	7.6
Other methods	0	0	6	6.5
Total	18	16.3	92	83.7
Unspecified=9				

Another technique for item deletion in pilot study was face and content validity. These validity indices are qualitative in nature. Results indicate that 26 scale exerted face validity and 62 scale employed content validity to delete unrelated item qualitatively.

Final pool of items. Data analysis indicate brand related scales have 17 items on average. Results show that 44% of developed scales have more than ten to 20 final items and 31.5% have below or equal to ten final items. About 75% of scales in brand body of knowledge have maximum 20 items.

**Table 18. Final pool of items Frequency and statistics**

Number of Final Items	Frequency	%	Valid %	Cumulative Valid %
≤10	37	31.1%	31.4%	31.4%
<10 to ≤20	52	43.7%	44.1%	75.4%
<20 to ≤30	16	13.4%	13.6%	89.0%
<30 to ≤40	6	5.0%	5.1%	94.1%
<40 to ≤50	7	5.9%	5.9%	100.0%
Missing	1	0.8%		
Total	119			
Mean= 17; Median=13; Minimum=4; Maximum=87				

Final to Initial items ratio. One of the indices to analysis the scale developing is Final to Initial items ratio. Usually many of initial items eliminated by researcher through the scale developing process. Analysis displayed that this ratio is 0.382 on average.

**Table 19. Final to Initial items ratio Frequency and statistics**

Final to Initial items ratio	Frequency	%	Valid %
≤0.1	15	12.6%	12.7%
<0.1 to ≤0.2	17	14.3%	14.4%
<0.2 to ≤0.3	23	19.3%	19.5%
<0.3 to ≤0.4	11	9.2%	9.3%
<0.4 to ≤0.5	9	7.6%	7.6%
<0.5	31	26.1%	26.3%
Missing	13		
Total	119		
Mean= 0.382; Median=0.287; Minimum=0.034; Maximum=1			

Factor Detection. Factor detection display the structure of scale.in other hand factor detection shows the number of internal structures of scale. Before factor detection confident to adequacy of data for factor analysis. Two common indices are: Bartlett’s test and Kaiser-Meyer-Olkin (KMO) test. Data display that 71% of developed scales hired KMO and 29% employed combination of KMO and Bartlett’s test.

**Table 20. Frequency of data adequacy for factor analysis**

Data Adequacy for Factor Analysis	Frequency	%
Bartlett's Test	0	0
KMO	22	71
KMO& Bartlett's Test	9	29
Total	31	100

The number of sub-factors and attribution of the items to each sub-factor. Researcher have to option for factor detection: priori and posteriori. In priori option based on the sound theory, researcher can attribute items to the sub factors.in this case he estimates only the factor loading for items. In case of posteriori, researcher apply statistical techniques and procedures. Results demonstrate that 52.1% of scales exerted priori approach and 46.2% employed posteriori approach.

**Table 20. Frequency of factor detection approaches**

	Frequency	%	Valid %
Unspecified	2	1.7	1.7
Posteriori	55	46.2	46.2
Priori	62	52.1	52.1
Total	119	100	100

Factor extraction Technique. Factor extraction is vital elements of modern scale development process. There is different technique for factor extraction with different assumption. Results indicate that 49% of scales employed principal component analysis, 12.7% exerted Maximum likelihood. 26.5% of developed scale did not specified which techniques used and 16 scales did not use any factor extraction.

**Table 21. Frequency of factor extraction techniques**

	Frequency	%
Principal component analysis (PCA)	50	49.0
Maximum Likelihood (ML)	13	12.7
Principal Axis Factoring (PAF)	7	6.9
Confirmatory factor analysis (CFA)	2	2.0
Unspecified	27	26.5
PCA&ML	3	2.9
Total	102	100
No Extraction	16	
Missing	1	

How many factors are in the scale? This is important question. There are different methods to answer this question. Results display that 47.9% scales hired eigenvalue and 30.5% employed literature and prior theories to do this. Some studies use more than one method.

**Table 22. Frequency of method for identifying number of factors in scale**

	Single		Multiple	
	Frequency	%	Frequency	%
Scree Plot	3	3.4	15	48.4
Literature Review	33	37.5	3	9.7
Eigenvalue index	26	29.5	31	100
Total Variance Extracted	6	6.8	10	32.3
Interpretability	0	0	6	19.4
Unrestricted Factor Model	0	0	7	22.6
Parallel method	0	0	2	6.5
Unspecified	19	21.6	0	0
NO	1	1.1	0	0
Total	88	100	31	

Rotation Technique. Factor rotation analysis indicate that 30.3% exploit Varimax, 24.4% employ Oblique. Only one scale hired combination of rotation methods.

**Table 23. Frequency of factor rotation techniques**

	Frequency	Percent	Valid Percent
Unspecified	42	35.3	36.2
Varimax	36	30.3	31
Promax	8	6.7	6.9
Oblique	29	24.4	25
MIXED	1	0.8	0.9
Total	116	97.5	100
Missing	3	2.5	
	119	100	

Nature of relationship between each item and its factor can be divided to two options: reflective and formative or regression like. Analysis display that 94.9% of scales exerted reflective methods and formative method only made 4.2%.

**Table 24. Frequency of methods for relationship between items and factors**

	Frequency	%	Valid %
Reflective	112	94.1	94.9
Formative	5	4.2	4.2
Mixed	1	0.8	0.8
Total	118	99.2	100
Missing	1	0.8	
	119	100	

### 3.2.3. Scale Evaluation

Reliability. The reliability of a measurement is defined as the ratio of the variance of the true score to the variance of the observed score (Netemeyer et.al, 2003: 43). according to Niemeyer et.al (2003) three general types: (a) test-retest reliability; (b) alternative-form reliability; and (c) internal consistency reliability. Internal consistency composed of: Split-Half Reliability and Cronbach’s alpha. Results show that only 11 scales did not employ any type of reliability index and 108 scales exerted minimum one of the reliability indices. Data analysis show that in 108 scales which employed minimum one of the reliability methods, 86% hired Cronbach’s alpha and 11% hired test-retest reliability.

**Table 25. Frequency of reliability assessment methods employed**

Reliability assessment	Frequency	Percent*
Cronbach’s Alpha	105	60%
Test-Retest	14	8%
Parallel Form Test	2	1%
Split-Half	1	1%
Total	122	100

*\*some scales exerted more than one method*

Validity. Coaley (2010, p32) contends the content of any scale for measuring a construct is drawn from a domain of all the knowledge, skills and behavior of possible relevance to it. Face validity represents one aspect of content validity (Nunnally and Bernstein 1994, p. 110). Content validity has to types: face validity and logical validity Rubio et.al (2003). Face validity indicates that the measure appears to be valid, “on its face.” Logical validity indicates a more rigorous process, such as using a panel of experts to evaluate the content validity of a measure. Nunnally and Bernstein (1994) did There is disagreement about classification and types of construct validity (Netemeyer,2003). Known-group validity involves the measure’s ability to distinguish reliably between groups of people that should score high on the trait and low on the trait (Netemeyer,2003, p.14). Nomological validity is the degree to which predictions from a formal theoretical network containing the concept under scrutiny are confirmed (Campbell, 1960). convergent validity is a measure of the degree of shared variance between the latent variables of the model. this type of validity assessed by two Indexes: Average Variance Extracted (AVE) and Composite Reliability (CR).

Results revealed that the top five employed validity assessment methods are: discriminant (29%), Average variance extracted (20%), Composite reliability (14%), Nomological (14%) and predictive validity (13%).



**Table 26. Frequency of Validity assessment methods employed**

Validity assessment	Frequency	Percent*
Discriminant	104	29%
Average variance extracted (Convergence)	72	20%
Composite reliability (Convergence)	52	14%
Nomological validity	49	14%
Predictive validity	47	13%
Convergent (Not specified)	26	7%
Multitrait-Multimethod Matrix (MTMMM)	5	1%
Concurrent validity (Criterion)	5	1%
Total	360	100%

*\*some scales exerted more than one method*

Fit Indices. Although Tucker Lewis Index and Non-normed Fit Index (NNFI) are same but one paper reports these indices differently (Bravo et.al,2010). There are different typologies for fit indices such as Schreiber et.al,2006; Kline,2005, p.144 and Bravo et.al,2010. I used Schreiber et.al,2006 as reference framework. Analysis showed that CFA (70%), chi-square/d.f (67), RMSEA (67%) are the top three fit indices employed by researchers.

**Table 27. Frequency of fit indices**

	Index	Frequency	% of Total	Mean	S.D	Range	MIN	MAX
Absolute/predictive fit	Chi <sup>2</sup> /d.f	80	67%	3.21	2.34	11.81	0.33	12.14
	AIC	1	1%	463.93		0.00	463.93	463.93
	ECVI	2	2%	3.61	3.65	5.16	1.03	6.19
Comparative fit	CFI	83	70%	0.96	0.03	0.13	0.87	1.00
	NFI	39	33%	0.95	0.04	0.21	0.79	1.00
	IFI	14	12%	0.96	0.02	0.11	0.89	1.00
	NNFI/TLI	47	39%	0.95	0.04	0.17	0.82	0.99
	RNI	2	2%	0.92	0.04	0.06	0.89	0.95
Parsimonious fit	PNFI	2	2%	0.64	0.02	0.03	0.63	0.66
	PGFI	1	1%	0.61		0.00	0.61	0.61
Other	GFI	53	45%	0.94	0.04	0.25	0.75	1.00
	AGFI	32	27%	0.91	0.06	0.31	0.69	1.00
	RMSEA	80	67%	0.07	0.07	0.65	0.00	0.65
	RMR	14	12%	0.07	0.04	0.17	0.03	0.20
	SRMR	28	24%	0.06	0.07	0.40	0.02	0.43
	Hoetler.N	2	2%	1010.96	35.42	50.09	985.91	1036.00

#### 4. Discussion and Implications

Brand related scale development is growing and evolving trend in marketing. Using established and scientific procedure to develop sound measurement scale play crucial role in brand research academically and practically. This review tried to identify most and popular practices among brand researchers in brand scale developing

scope. Results showed that majority of scale developed in low context culture (totally almost 66%). This finding can be caution in employing that scales in high context culture. Although there is updated and technically sound scale development procedures but Churchill's procedure dominated. Probably one of the reasons may be the ease of the procedure.

Findings similar to indicate that inductive method usually exerted by individual in-depth-interview is common. Almost 14.5% of scales have initial pool of items maximum to 60-items. Expert judging was common method for dropping items from the initial pool.

In scale developing stage similar to cook et.al (1981) and Hinkin (1995) findings, the most scaling method in brand related scales was Likert-type scales (seven-points=49.2%; five points = 22.9%; Aggregation share = 85.5%). Factor loading and cross loadings were employed in majority of studies for item deletion. Principle component analysis and maximum likelihood were the most exerted methods to factor detection. Almost 89% of final sales have maximum to 30-items. Varimax and oblique methods employed for factor rotation in 56% of scales totally. The nature of relationship between items and to latent construct was reflective (95%) compare to formative (4.2%). Alpha cronbach's coefficient used in 60% of scales. For assessing scale validity, discriminant and then convergence validity were popular. Fit indices showed that the most employed are: chi square to d.f ration, CFI, GFI and RMSEA.

Editorial board members of journals should formulate and publish the standard format for authors who want to submit papers about scale development. For example, Cabrera-Nguyen (2010) published a paper entitled "Author Guidelines for Reporting Scale Development and Validation Results in the Journal of the Society for Social Work and Research" as a standard template for papers submitted to being considered for publishing in Journal of the Society for Social Work and Research.

The most important limitation of this research is limiting the scale to English language. Researchers want to develop scale in brand related concepts advised to use a specific and special procedure. Cross culture or industry is important specially in cases that there are strong evidences for effects of context on measures.

Because of lion share of low context culture of scale developing studies cross validation is crucial. According to a Badenes-Ribera et.al (2020) one of the problems with scale validation is composition of sample which usually dominated by student that can result in low generalizability of the findings even though cross-validation could still be used. So, researchers in different culture should assessing measurement invariance and try to validated national version of the scale.

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## Appendix

Aaker,1997	Journal of Marketing Research	Brand personality
Albert et.al,2009	ACR Conference	Brand Love
Ambroise&Valette-Florence,2010	Recherche et Applications en Marketing	Brand personality
Arai et.al,2013	European Sport Management Quarterly	Brand Image
Azar,2013	Journal of Product & Brand Management	Brand Masculine
Baalbaki&Guzmán,2016	Journal of Brand Management	Consumer Perceived CBBE
Bagozzi et.al,2017	Marketing Letters	Brand Love
Baldus et.al,2015	Journal of Business Research	Online Brand Community Engagement
Batra et.al,2012	Journal of Marketing	Brand Love
Bauer et.al,2005	European Journal of Marketing	CBBE in Team Sport
Baumgarth,2010	European Journal of Marketing	Brand Orientation in B2B
Bobalca et.al,2012	Procedia Economics and Finance	Brand Loyalty

Boo et.al,2009	Tourism Management	CBBE in Destination
Brakus et.al,2009	Journal of Marketing	Brand experiences
Bravo et.al,2010	The Service Industries Journal	Corporate Brand Image in Retail Banking
Bristow,et.al,2002	Journal of Product & Brand Management	Brand Disposition
Bruhn et.al,2012	Book Chapter	Brand Relationship Quality
Bruhn et.al,2012	ACR Conference	Brand Authenticity
Buil et al,2008	Journal of Product & Brand Management	CBBE Cross National
Burton et.al,1998	Journal of The Academy of Marketing Science	Attitude
Chang&Co,2013	Journal of Brand Management	Brand Leadership
Chaudhuri&Holbrook,2001	Journal of Marketing	Brand Trust
Christodoulides et.al,2006	Journal of Marketing Management	Online Brand Equity
Coleman et.al,2011	Industrial Marketing Management	Brand identity
Da Silve et.al,2008	Journal of Brand Management	Online Corporate Brand Image
Das&Mukherjee,2016	Int. Journal of Pharmaceutical and Healthcare Marketing	CBBE Medical Tourism
d'Astous &Boujbel,2007	Journal of Business Research	Brand personality
d'Astous&Le' vesque,2003	Psychology & Marketing	Store Personality
Davis et.al,2004	Corporate Reputation Review	Corporate Character
de Chernatony et.al,2004	The Service Industries Journal	Brand Performance in FIN Service
Derbaix&Leheut,2008	Recherche et Applications en Marketing	Attitude
Dincer&Dincer,2012	Social Responsibility Journal	Brand Social Responsibility
Ekinici&Hosani,2006	Journal of Travel Research	Destination Personality
El-Adly&Elsamen,2018	Journal of Product & Brand Management	Guest-Based Hotel Equity
Ewing&Napoli,2005	Journal of Business Research	Nonprofit Brand Orientation
Fabien et.al,2017	EMAC Conference	Brand Heritage
Ferrandi et.al,2002	ACR Conference	Brand personality
Fischer et.al,2010	Journal of Marketing Research	Brand Relevance in Category (BRiC)
Ford et.al,2018	Journal of Business Research	Brand Evoked Nostalgia
Freling et.al,2011	Journal of The Academy of Marketing Science	Brand personality appeal
Geuens et.al,2009	Intern. J. of Research in Marketing	Brand personality
Godsey et.al,2018	Int.Journal of Pharmaceutical and Healthcare Marketing	Brand image of nursing
Goi et.al,2014	Journal of Marketing for Higher Education	Brand Identity in HigerEducation
Grohmann,2009a	Journal of Marketing Research	Masculine Dimensions of Brand
Grohmann,2009b	Journal of Marketing Research	Feminine Dimensions of Brand
Guèvremont,2019	Journal of Product & Brand Management	Brand hypocrisy
Guido&Peluso,2014	Journal of Brand Management	Brand anthropomorphism
Guizani et.al,2008	ACR Conference	French Consumer Brand Equity
Gurviez&Korchi,2003	EMAC Conference	Brand Trust
Guzman&Sierra,2009	Journal of Brand Management	Political candidate ' s brand image
Hankinson,2012	Journal of Marketing Management	Brand Orientation in Destination
Herbst&Merz,2011	Industrial Marketing Management	Industrial Brand Personality

Hess,1995	AMA Educator's Proceedings	Perceived Brand Trust
Hollebeek et.al,2014	Journal of Interactive Marketing	Consumer Brand Engagement in Social Medi
Hsieh,2002	Journal of International Marketing	Brand Image Dimensionality
Ilicic&Webster,2014	Journal of Brand Management	Consumer–Brand Relational Authentici
Kamboj&Samrah,2018	Internet Research	Customer Social Participation in Brand Communities
Kaplanet.al,2010	European Journal of Marketing	Brand personality in City
Khan&Rahman,2016	Journal of Product & Brand Management	Retail Brand Experience
Khan&Rahman,2017	International Journal of Contemporary Hospitality Management	Hotel Brand Experiences
Kim et.al.2005	ACR Conference	Brand Relationship Quality
Kinget.al,2012	Journal of Brand Management	Employee Brand Equity
Lassar et.al,1995	Journal of Consumer Marketing	CBBE
Lehmann et.al,2008	Journal of International Marketing	Brand Performance
Li et.al,2008	International Journal of Market Research	Brand Trust
Low&Lamb Jr, 2000	Journal of Product & Brand Management	Brand Association
Mann&Ghuman,2014	Journal of Brand Management	Corporate Brand Association
Mcalexandwe et.al,2002	Journal of Marketing	Brand Community
Michaelidou et.al,2016	Proceedings of the Academy of Marketing Science	Brand Talkativeness
Michel&Rieunier,2012	Journal of Business Research	Nonprofit brand image
Morhart et.al,2015	Journal of Consumer Psychology	Brand authenticity
Mrad&Chi Cui,2017	European Journal of Marketing	Brand addiction
Muncy,1996	ACR Conference	Perceived Brand Parity
Napoli et.al,2014	Journal of Business Research	Consumer-based Brand Authenticity
Netemeyer et.al,2004	Journal of Business Research	CBBE
Nguyen et.al,2015	International Journal of Market Research	Brand Likeability
Nguyen et.al,2018	Intern. J. of Research in Marketing	Brand Portfolio Coherence
Odin et.al,2001	Journal of Business Research	Brand Loyalty
Park et.al,2010	Journal of Marketing	Brand Attachment
Patwardhan & Balasubramanian,2011	Journal of Product & Brand Management	Brand Romance
Pecheux&Derbaix,1999	Journal of Advertising Research	Attitude
Perrin-Martineng,2004	Journal of Marketing Management	Brand Detachment
Piha&Avlonitis,2018	Journal of Marketing Management	Internal Brand Orientation
Puligadda et.al,2012	Journal of Marketing Research	Brand Schematicity
Raja&Agrawal,2017	Proceedings of the Academy of Marketing Science	Perceived Brand Greenness
Rauschnabel et.al,2016	Journal of Business Research	University Brand Personality
Romani et.al, 2012	Intern. J. of Research in Marketing	Negative emotions toward brands
Ross et.al,2006	Journal of Sport Management	Brand Associations in Professional Sport
Saekar&Sarkar,2017	Journal of Fashion Marketing and Management:An Int. Journal	Centrality of Brand
Sarkar et.al,2012	Journal of Consumer Behaviour	Brand Romance
Schade et.al,2014	Journal of Brand Management	Brand personality of Sport club

Schallehn,et.al,2014	Journal of Product & Brand Management	Brand Authenticity
Schnebelen&Bruhn,2016	Proceedings of the Academy of Marketing Science	Brand Happiness
Shams et.al,2015	European Journal of Marketing	Perceived Brand Innovativeness
Shields&Johnson,2016	Journal of Consumer Behaviour	Childhood Brand Nostalgia
So et.al,2012	Journal of Hospitality & Tourism Research	Brand Engagement in Touri
Sondhi Sondhi,2017	Information Technology and Quantitative Management	Attitude
Spiggle et.al,2012	Journal of Marketing Research	Brand Extension Authenticity
Sprott et.al,2009	Journal of Marketing Research	Brand Engagement
Sreejesh et.al,2016	Journal of Product & Brand Management	Luxury Brand Aspiration
Stokburger-Sauer et.al,2012	Intern. J. of Research in Marketing	Brand Identification
Strizhakova et.al,2008	Intern. J. of Research in Marketing	Branded Product Manings
Sung et.al,2015	Psychology and Marketing	Luxury Brand Personality
Tanwar&Prasad,2017	Personnel Review	Employer Brand
Taute&Sierra,2014	Journal of Product & Brand Management	Brand Tribalism
Thomson et.al,2005	Journal of Consumer Psychology	Emotional Attachment
Thomson et.al,2005	Journalof Consumer Psychology	Emotional Attachment to Brand
Tsaur et.al,2016	Asia Pacific Journal of Tourism Research	Brand Identity
Vázquez et.al,2002	Journal of Marketing Management	CBBE
Veloutsou&Moutinho,2009	Journal of Business Research	Brand Tribalism
Veloutsou,2007	Journal of Marketing Management	Product-Brand and Consumer Relationship
Venable et.al,2005	Journal of the Academy of Marketing Science	Brand personality
Vigneron&Johnson,2004	Journal of Brand Management	Perceptions of Brand Luxury
Walsh et.al,2016	Journal of Business Research	Brand Embarrassment Tendency
Wang et.al,2019	European Journal of Marketing	Perceived Brand Sacredness
Yague-Guillen,2003	International Journal of Market Research	Brand Trust
Yoo&Donthu,2001	Journal of Business Research	CBBE
Zeugner-Roth et.al,2008a	Management International Review	Country Brand Equity
Zeugner-Roth et.al,2008b	Management International Review	Country Image