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The effect of retail assortment size on perceptions, choice, and sales: Review and research directions

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Abstract

We perform a meta-analytic review of the effect of retail assortment size on consumer perceptions, choice, and retail sales/share using a database comprising of 177 studies obtained from 95 academic papers published during 1970–2021. We define assortment size broadly as the total number of distinct alternatives (options) available to the consumer when he/she makes a choice in a product category. This number of alternatives manifest in the form of a number of brands, number of stock-keeping-units (SKUs), or simply number of items such as different colors or packaging. An increase in assortment size can lead to beneficial effects such as assortment preference, perceived choice satisfaction, confidence, freedom, purchase incidence, sales, and profits, as well as negative consequences such as information overload, increased cognitive effort, choice uncertainty, choice difficulty, and hence choice avoidance. Numerous researchers have reported the effect of assortment size on one or more of these factors. We summarize these effects using a metric called assortment size (net) benefit elasticity by positively valuing the beneficial effects and negatively valuing the harmful effects. Assortment size benefit elasticity is defined as the percent change in net benefit for a 1% change in assortment size. Our meta-analysis reveals that the mean assortment size benefit elasticity across 1936 valid elasticity observations is .082, and this effect is moderated by many study design and environmental factors. We also explore nonlinearity in assortment size effect and whether the effect is different for online vs. offline purchasing. Based on these findings, we list 30 characteristics conducive for assortment addition/deletion and specify several directions for future research.

Keywords: Retail assortment; Retail strategy; Meta analysis.

Introduction

Roggeveen and Sethuraman (2018) define retailing as any activity involved in the transfer of goods and services from the manufacturer/supplier to the consumer/end-user. In this broadened perspective, a retailer performs multiple roles, such as the middleman, bulk breaker, power broker, match maker, and agglomerator. While fulfilling these roles, what earns sales, revenues, profits is an additional, important role the retailer serves-as a *real estate agent*! In this role, the real estate owned by the retailer is the shelf space in a physical outlet or the digital space in online retailing. The retailer stocks the shelves with items (called stock keeping units or SKUs) that are made available to consumers for purchase. The number of SKUs carried by a store varies according to the focus and format of the retailer. For instance, a supermarket grocery store typically carries 33,000 SKUs, while a warehouse store carries 22,000 SKUs and a drug store carries 18,000 SKUs, although the number of SKUs carried by a store may vary across retail chains within a format and across stores within a chain.

Regardless of the nature and format, to decide on what items to stock, a retailer typically first decides on the product categories to sell in different departments of the store, such as bakery, deli, food, or cosmetics. Then, within each product category, the retailer decides on how many SKUs or distinct alternatives to carry (called assortment size) and what items – brands, packages, sizes, SKUs to carry (called assortment composition). This research pertains to assortment size, defined as the number of distinct alternatives (options) the retailer makes available to the consumer for making a choice in a product category. This number of alternatives manifests in

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the form of the number of brands, number of stock-keeping units (SKUs), or simply number of items such as different colors, sizes, or packaging within a product category.

In the 1990s, the Food Marketing Institute (FMI) conducted several studies that showed that retailers can cut costs and increase profits by strategically reducing assortment size (number of items carried) without sacrificing sales. They called this process of strategic assortment reduction Efficient Assortment Planning (EAP) and encouraged more research in this area (FMI, 1993). This call spurred a significant amount of academic research on the assortment size effect.

Recently, motivated by the cost reduction incentive, there has been a growing trend among retailers to reduce their assortment size (Gázquez-Abad, Martínez-López and Sethuraman, 2021). However, such assortment reduction strategies can backfire if they are not implemented strategically. For example, during 2010, both global retail leader Walmart and the leading Spanish retail chain Mercadona resorted to assortment reduction only to face customer resistance, sales loss, and damage to their store image, forcing them to reverse course (Dass and Kumar, 2012; Gázquez-Abad et al., 2015). These two incidents suggest that assortment size decreases and increases have to be implemented selectively, strategically, and judiciously. With the advent of multichannel and online retailing in the 21st century, the issue of assortment planning has gained even greater importance but has become more difficult (Mantrala et al.. 2009). The importance of this topic combined with the availability of rich extant research has given rise to the need for a formal review of academic research on the assortment size effect to guide retail practice and suggest directions for future research.

In this research, we quantitatively summarize the findings on the assortment size effect from 95 academic papers published in the last 52 years (1970–2021) comprising 177 studies and 1936 assortment size effects, and we address the following questions:

(i) What is the main effect of assortment size on consumer perceptions, choice, and sales?
(ii) What are the study and environmental factors that moderate the main effect?
(iii) Are there nonlinearities in the assortment size main effect?
(iv) Is the assortment size effect different for online buying vs. offline buying?

Our review and analysis yield numerous interesting results and insights, which allow us to present 30 characteristics that are conducive to assortment addition and assortment deletion and to also suggest several directions for future research.

The rest of the paper is organized as follows. First, we present the procedure for compiling the data from past studies. Second, we compute an assortment size effect measure that is comparable across studies. Then, we analyze the effect, estimate its mean, and identify its moderating factors. Finally, we summarize the results and their implications for retail practice and discuss directions for future research.

Data compilation

For this review, we searched for articles published in marketing and related journals in the last 52 years, from 1970-2021, as well as published working papers and book chapters. We used Google Scholar and Web of Science search engines with the following keywords: *retail assortment, store choice, store image, retail brand proliferation, retail margins, and retailer profits*. After identifying relevant articles from this search, we obtained more publications based on citations referenced in these articles. Then, we filtered those publications that had qualitative and/or quantitative information on the effect of retail assortment size. Our database thus consists of 95 publications (listed in Web Appendix 1).

Some of the 95 publications had one study, and others had multiple studies in one publication, identified by the authors, resulting in 177 studies in total. We define a study as a piece of research that addresses a particular problem(s) or hypothesis(es) using a particular dataset.

The 177 studies varied by seven relevant, codable study factors:

S1. Publication journal;
S2. Publication/Data year;
S3. Data region;
S4. Category type;
S5. Type of assortment size effect;
S6. Type of shopping – online or offline; and
S7. Method of research – experimental or non-experimental.

Analysis of these factors helps determine the scope of the research and its generalizability.

Figs. 1–7 present the distribution of the studies based on these study factors (S1–S7).

Analysis of data by study factors

S1. Publication journal (Fig. 1)

The top marketing journals, including the Journal of Consumer Research (JCR), Journal of Marketing (JM), Journal

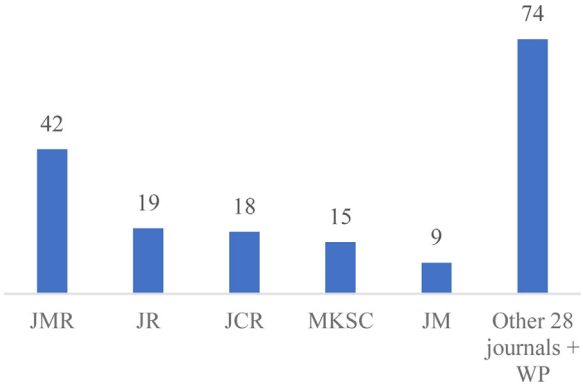

Fig. 1. Distribution of publishing journals (S1).

of Marketing Research (JMR), Journal of Retailing (JR), and Marketing Science (MKSC), account for 103/177 or 58% of the studies. This finding shows not only that the studies on assortment size effects are important but also that the data and findings for the review come from high-quality publications.

S2. Publication/data year (Fig. 2)

We reviewed studies for the past 52 years (1970–2021) and captured both publication year and data year. Publication year is simply the year of publication of the article in the journal or year of the working paper. Interestingly, 169 (95%) of the 177 studies were published in the last 22 years, with approximately half of them or 88 (49.8%) published in the last 12 years (2010–2021). This finding suggests that the topic of the assortment size effect is current and important.

We also captured data year as the year(s) of data that was analyzed in these publications. Only a few studies (40/177) explicitly provided the year of the data analyzed. If the data pertained to a single year (e.g., 2004), then we indicated that number as the data year. If the data pertained to a range of years (e.g., 2004–2006), then we used the midpoint (2005) as the data year.[1] For the remaining 137 (mostly experimental) studies that did not report the year data were collected, we simply lagged the publication year by 4 to represent the data year. For example, for a 2018 publication with no reported data year, we used 2014 as the data year. The rationale was that it took two years to publish the paper (from submission to publication) and two years to write the paper (from data collection to data analysis and manuscript submission). This approach to representing data years is somewhat arbitrary but appears most reasonable. Fig. 2 shows that nearly 84% of the publications were based on data in the last 22 years, reflecting the recent nature of the findings.

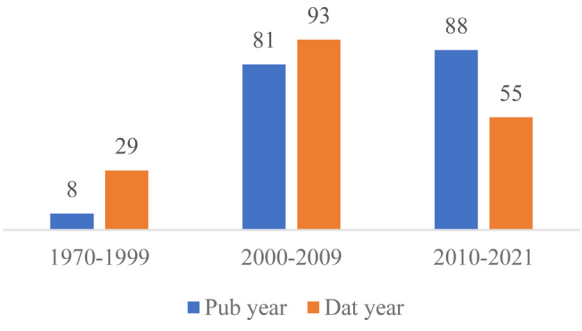

Fig. 2. Distribution of studies by publication and data year (S2).

S3. Data region (Fig. 3)

The region of data collection could be obtained or inferred for all the studies in the review. The USA accounts for a majority (58% or 103/177) of the studies on retail assortment size based on a data region, with Europe accounting for 46 (26%) of the studies. Asia, and, in particular, Australia and Africa, are relatively underrepresented, with just 28 (16%) of 177 studies analyzing data from these regions.

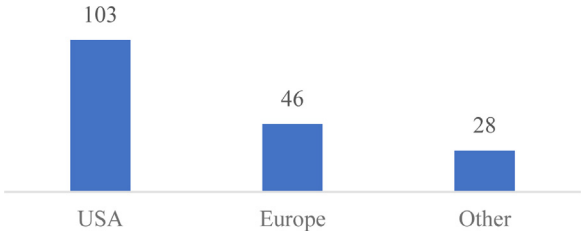

Fig. 3. Distribution of studies by data region (S3).

S4. Category types (Fig. 4)

Assortment size effects have been estimated across a wide range of products and services. For ease of analysis, we classify them into four broad category types, as shown below:

Grocery: Chocolate, Yogurt, Beer, Wine, Energy drink, Jam, Tea, Coffee, Margarine, Snacks, Fruits, Ice cream, Pizza, Beer, Water, Popcorn, Mouth freshener, Detergent, Towel, Bath products, Flowers.
Durable: CD, Videogames, Wallpaper, Microwave, Pens, New Homes.
Service: Movies, Travel, Hotel, Financial.
Other: Multi products or products not identified or stated.

Grocery was the major category, with 107 (60%) of 177 studies analyzing products in that category. Chocolate is the most commonly analyzed product, probably because it is branded, easy to show to subjects in an experiment, and used by early and leading researchers in this field, including Iyengar and Lepper (2000) and Chernev (2003).

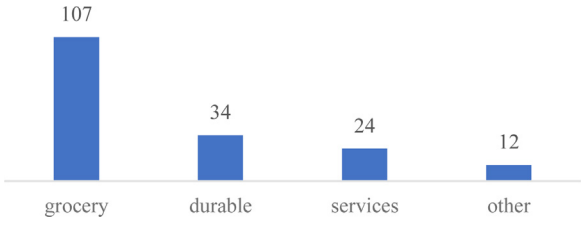

Fig. 4. Distribution of studies by category type (S4).

S5. Assortment size effect (Fig. 5)

The studies vary considerably in the nature of the effects investigated. As many as 25 assortment size effects have been investigated, ranging from search time to information overload to assortment satisfaction to choice to sales to share of wallet at the brand/category/store/chain levels. Investigating each individual effect would not be meaningful, as the effect results are reported only in one or, at most, a few studies and do not lend themselves to generalization. Furthermore, many of these

[1] If the range was say 2004–2007, we used the year corresponding to the central month. If month data were not provided, we used the earlier of the two mid- point years.

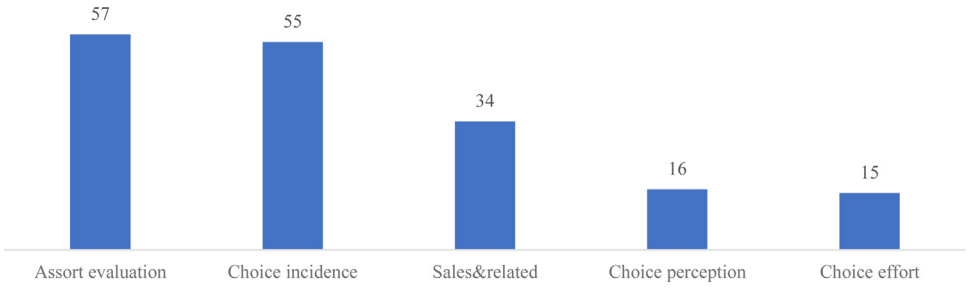

Fig. 5. Distribution of studies by assortment size effect (S5).

effects are interrelated, and it would be difficult to separate them. For example, choice uncertainty and choice confidence are two ways of expressing the same effect related to choice certainty. Therefore, we consolidate the effects as explained below.

Theories of assortment suggest that larger assortments may lead to more positive assortment evaluation in terms of assortment satisfaction, liking, and preference, leading to a favorable perception of the resulting choice in the form of choice freedom, confidence, and certainty, on account of which consumers make a choice or purchase, increasing the share of wallet, sales, and possibly profits for the retailer in the category. On the negative cost side, a larger assortment leads to information overload (too many choices), resulting in nonoptimal choice, choice inaccuracy, choice uncertainty/deferral, search/choice difficulty, and complexity, or more broadly poorer choice quality. The former effect is called the *more-is-better* effect, and the latter effect is called the *cognitive overload* effect (Gao and Simonson, 2016). Based on the above discussion, we divide these assortment size effects into five effect classes:[2].

Assortment evaluation: This evaluation includes assortment preference, assortment liking, and assortment satisfaction, which are related to the perception of the assortment itself.

Choice perception: Perception includes perceived choice quality, choice accuracy, choice confidence, choice certainty, choice uncertainty (-), and choice freedom, reflecting the perception of choice made.

Choice effort: Ease of choice, choice difficulty (-), choice complexity (-), and information overload (-) indicate ease or difficulty of making the choice decision.

Choice incidence: This includes making a choice, choice deferral (-), choice switching, intention to buy, and purchase incidence, relating to behavioral aspect of choice at the individual level.

Sales and related: This variable includes physical or monetary sales, market share, the share of wallet, and profits, generally at the aggregate level, resulting from the change in assortment size.

The distribution of effects in Fig. 5 reveals that the effect of assortment size on assortment evaluation was most studied (by 57 of 177 studies), followed by behavioral aspects such as choice incidence (55 studies) and sales (36 studies). Choice effort and choice perception have been investigated in relatively few studies.

S6. Offline vs. online shopping (Fig. 6)

Less than 10% (16/177) of assortment size effect studies deal with online shopping. Most research has been conducted in the physical (nondigital) space, probably because online shopping is more recent, and assortment has generally been conceptualized and operationalized as a physical entity.

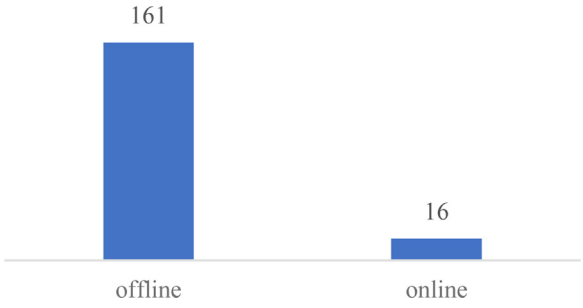

Fig. 6. Distribution of studies by offline vs. online (S6).

S7. Research method (Fig. 7)

The studies differed by whether they adopted an experimental method or a nonexperimental method. Experimental studies are defined as those studies that manipulated assortment size (treatment) either in a lab or in the field and observed changes in the desired variable (effect). Nonexperimental studies are generally conducted using actual sales (scanner) data where the assortment sizes are not explicitly manipulated. Changes in assortment size occurred naturally due to delistings, stockouts, or store realignment. Because most of the studies were theory-driven or wanted to explore the

[2] Note that when classifying assortment size effects, negative consequences or potential harmful effects are indicated with a minus (-) sign to show that they are reverse coded when computing the beneficial effect of assortment size. Studies investigating some neutral effects such as search direction or number of attributes inspected were not included as they did not assess the beneficial or harmful effect of changes in assortment size.

effect of moderators on assortment size effects, experiments accounted for 129 (73%) of the total 177 studies.

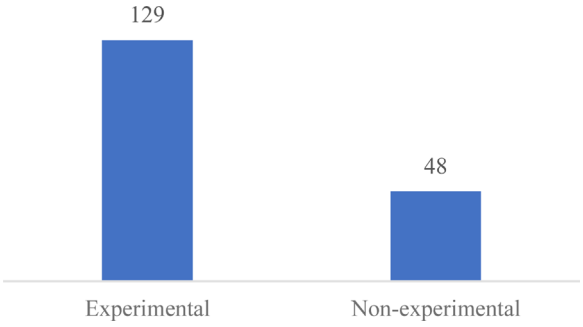

Fig. 7. Distribution of studies by research method (S7).

Assessing the distribution of experimental design factors helps in understanding the scope of assortment size experimental research as well as investigating whether there are systematic differences in effects due to these characteristics. The distributions are given in Figs. 7a–d.

Among experimental studies, lab experiments, in which the treatments (assortment size) were manipulated in a controlled ("lab") setting, were the dominant research method, accounting for over 90% (120) of 129 experimental studies (Fig. 7a). The remaining nine studies were conducted using field experiments in which the treatments were manipulated in the field or real-world setting, such as retailer shelves in a store. The popularity of lab studies can be attributed to behavioral researchers' interest in identifying moderators of the assortment size effect, which required a controlled lab setting to ensure internal validity. In addition, such research often required multiple lab studies to test robustness and deeper exploration.

Experiments also differ by type of design (between vs. within-subjects), subjects used, and assortment display. In the between-subjects (bs) design, different assortment sizes are assigned to subjects in different (generally randomly assigned) groups. The effect variable is then measured for each group, and the difference is assessed as the effect magnitude. In the within-subjects (ws) design, the same group is exposed to the different assortment sizes over time, and the effect is measured as the difference in the variables between assortment size conditions – pre and post.

In assortment size experiments, between-subjects (bs) designs dominate within-subjects (ws) design (Fig. 7b), perhaps because it is difficult to change the assortment size over time for a given consumer and follow his or her behavior or perceptions and/or perhaps to avoid study bias (demand effect) that could occur if the same person is exposed to two different assortments in a short period of time. Furthermore, most experiments were conducted using students (71/129) and with assortments shown in print form such as in a brochure or flyer (68/129) – Figs. 7c and d.

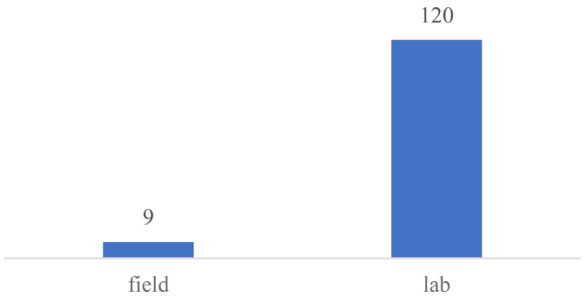

Fig. 7a. Distribution of field and lab experiments.

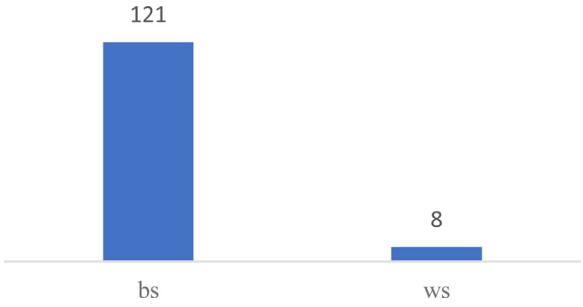

Fig. 7b. Distribution of between-subject (bs) and within-subjects (ws) design.

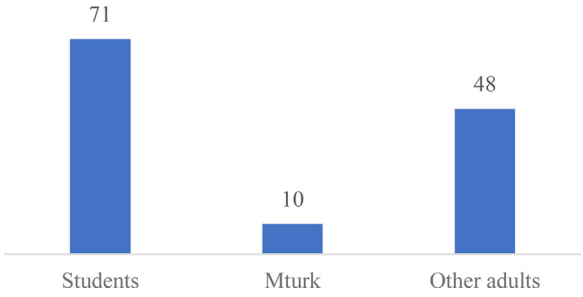

Fig. 7c. Distribution of experimental subjects.

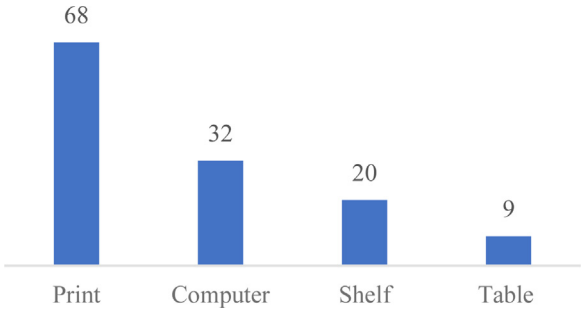

Fig. 7d. Distribution of assortment display.

We now proceed to the analysis of assortment size effects by first developing a common measure of the assortment size effect across studies, which we call assortment size benefit elasticity. We then analyze the magnitude of this elasticity effect and identify its moderators.

Development of assortment size effect measure

The effect of assortment size is measured as the change in effect variable for a change in assortment size. Because different studies use different variables such as sales and perceptions to measure assortment size effects, to have uniformity in effect measurement across observations, we adopt the elasticity measure commonly used in meta-analysis of marketing effects (e.g., Sethuraman and Tellis, 1991). Assortment size elasticity is measured as the change in effect variable for a 1% change in assortment size.

For approximately 30% of assortment size observations in the database, the magnitude of the assortment size effect was directly reported either as regression coefficients or in other ways that enabled us to directly compute assortment size elasticity. For the remaining mostly experimental observations, the effect was reported corresponding to each assortment size. In these cases, the assortment size elasticity was computed using the following steps:

Step 1: For each study, first, we arranged the assortment sizes in ascending order – as1, as2, as3. such that as1< as2 < as3.

Step 2: Then, we obtained the corresponding assortment size effects – ae1, ae2, ae3...

Step 3: We paired the assortment size observations (e.g., as1-as2; as1-as3; as2-as3) such that the lower assortment size (as-low) appeared first and the higher assortment size (as-high) appeared next. For a study with n assortment sizes, there are n_c2 pairs – for 3 assortment sizes, there are 3 (3_c2) pairs, and for 10 assortment sizes, there are 45 (10_c2) pairs.

Step 4: We obtained the corresponding paired assortment size effects (e.g., ae1-ae2; ae1-ae3; ae2-ae3). More generally, the corresponding assortment size effect pairs were ae-low and ae-high for as-low and as-high assortment sizes, respectively.

Step 5: We computed the assortment size effect as [(ae2-ae1)/ae1]/[(as2-as1)/as1] and so on.

More generally, the formula used for computing elasticity after pairing is:

$$\textit{assortment size elasticity} = \eta = \frac{\{[(\text{ae}-\text{high})-(\text{ae}-\text{low})]/(\text{ae}-\text{low})\}}{\{[(\text{as}-\text{high})-(\text{as}-\text{low})]/(\text{as}-\text{low})\}}, \text{ where}$$

as-low (ae-low) is the lower assortment size (effect) in the pair, and as-high (ae-high) is the higher assortment size (effect).

The numerator in the formula in Step 5 is the percent increase in the assortment size effect, and the denominator is the percent increase in the assortment size. Thus, the formula represents the percent increase in the assortment size effect for a 1% increase in assortment size.

To consolidate the effect sizes, we also needed to change the sign of some effect variables. Most effect variables, such as variety, freedom, satisfaction, preference, choice incidence, sales, share, and profit, are benefit factors such that higher numbers on the variable indicated more positivity or greater benefit. They were retained as such. However, a few variables, such as choice uncertainty, store switching, choice complexity/difficulty, risk, overload, and deferral, were deemed harmful effects such that higher numbers of these factors were deemed more negative. For these negative effect variables, we switched the sign of the effect magnitude or assortment size elasticity to reflect negative harm or positive benefit. For example, for two effect observations with assortment size elasticity on choice uncertainty of +.1 and -.1, the former observation is more harmful (leads to more uncertainty) than the latter. Therefore, we reverse the sign to make it assortment size elasticity of certainty -.1 and +.1 so that higher elasticity implies a relatively higher benefit. After this recoding of negative variables, all observations in the analysis are such that higher numbers imply more benefit or less harm; lower numbers mean less benefit or more harm. Therefore, we call the elasticity after recoding *assortment size benefit elasticity* (*asbe*), defined as the percent increase in (net) benefit for a 1% increase in assortment size and denote the same as eta (η). Based on this pairing and compilation, we obtained a total of 2024 observations from 95 publications and 177 studies that permit us to analyze the effect of retail assortment size.

Estimation of assortment size effect magnitude

We use assortment size benefit elasticity (η) as the metric for analyzing the effect of assortment size. First, we identify and eliminate extreme values of η and then estimate the overall mean assortment size benefit elasticity.

Elimination of extreme values and estimation of overall mean

The mean assortment size benefit elasticity (η) for all 2,024 observations in the dataset is .242 (sd = 6.195), and the range of η is -130.3 to +72. Given that the mean η is less than 1, values such as – 130 and +72 appear too high (extreme values). Therefore, we adopted the 3-sigma rule and eliminated (28) observations that were at least 3 standard deviations away on either side of the mean, retaining 1,996 observations with -18.34 $\leq \eta \leq$ 18.82. Then, we inspected the distribution of η in this dataset, as shown in Fig. 8.

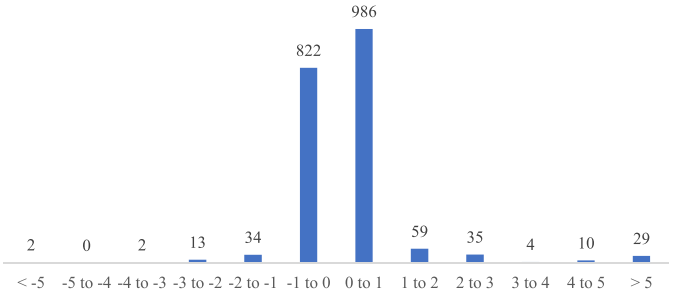

Fig. 8. Distribution of assortment size benefit elasticity (n=1996).

Fig. 8 reveals that the distribution of η is slightly skewed to the right (positive) side, with nearly 98% of the η observations between -3 and +3 and 91% between -1 and 1. Accordingly, we considered the following four datasets for the meta-analysis to be devoid of extreme values:

D1 ($-1 \leq \eta \leq +1$), n = 1808, mean (η) = .016; std. dev (η) = .249.
D2 ($-2 \leq \eta \leq +2$), n = 1901, mean (η) = .036; std. dev (η) = .406.
D3 ($-2 \leq \eta \leq +3$), n = 1936, mean (η) = .082; std. dev (η) = .531.
D4 ($-3 \leq \eta \leq +3$), n = 1949, mean (η) = .065; std. dev (η) = .573.

We conducted a meta-analysis by estimating Eq. (1) presented below using each of the datasets D1 to D4. We found that the qualitative nature of the results (reported in Web Appendix 2) are quite similar among studies. However, for reporting in the main text, we considered D3 and D4 as they were more inclusive and had larger observations. Between the two datasets, D3 generally had a lower standard error of estimates and higher overall explanatory power; for example, the R^2 for the model in Eq. (1) below is .135 for D3 and .078 for D4. Data D3 is also consistent with including more positive η values to reflect the distribution in Fig. 8. Therefore, we report results only from dataset D3 (with 1,936 observations) in the main text.

The mean assortment size benefit elasticity (η) across 1,936 observations is .082. The finding indicates that, on aggregate, within the range of assortment sizes studied in the literature, an increase in assortment size is beneficial. In particular, a 1% increase in assortment size increases benefits by .082%. The magnitude of the elasticity is in line with, although slightly lower than, elasticity for other marketing elements/investments. The mean advertising elasticity is .12 (Sethuraman, Tellis, and Briesch, 2011); the mean personal selling elasticity is .34 (Albers, Mantrala, and Sridhar, 2010); and the mean pharmaceutical detailing elasticity is .21 (Sridhar, Mantrala, and Albers, 2014).

Study factors moderating assortment size effect

The purpose of this analysis is to identify which of the study factors influence assortment size benefit elasticity (η). We used multivariate regression analysis with η as the dependent variable and study factors as independent variables. Among the seven study factors (S1–S7) we have listed in Figs. 1–7, we did not include publication journal (S1) as an independent variable because we did not think the effect magnitude will (should) be different simply because an article is published in (say) the Journal of Marketing vs. the Journal of Retailing.

Eq. (1) presents the regression model we estimate to identify the study factors that moderate the assortment size effect.

$$\eta = a + b(\text{data year}) + c(\text{data region}) + d(\text{category type}) + e(\text{effect type}) + f(\text{online}) + g(\text{research method}) + \text{error}, \quad (1)$$

where coefficient a represents the intercept term and coefficients b to h represent the influencing effects of the respective study factors. We estimate the regression using the general linear model (GLM), report the results in Table 1, and interpret them below.

Intercept

The intercept term in Eq. (1) can be interpreted as the value of the dependent variable when all independent variables are zero (baseline dummies). Accordingly, based on Model (1) results in Table 1, the estimated assortment size sales elasticity for grocery products sold in physical (offline) stores in the recent period (2010-2021) in the USA using nonexperimental data is 0.178, i.e., a 1% increase in assortment size yields a .178% increase in average sales.

S2. Data year

After accounting for other study factors, assortment size benefit elasticity (h) is higher in more recent years (2010-2021) than in prior years (1970-2009). In other words, larger assortments appear more beneficial from consumer evaluation/perception and retail sales standpoints in recent times. Univariate means analysis (Fig. 9) also reflects this pattern. The mean η for the 2010-2019 data year is .326, which is higher than the mean η of .108 for the 2000–2009 data year, which is higher than the mean η of .046 for the 1970-1999 data year. This finding of higher elasticity in more recent times may be due to manufacturers' ability to provide more options now to suit the heterogeneous taste of consumers. Consumers also have come to expect and are in a position to process larger assortments through advances in search technology (Roggeveen and Sethuraman 2020a). The implication is that retailers have to view a larger assortment size as being generally beneficial to consumers, more so in the present time than 30 years ago, and, conversely, be cautious about resorting to assortment reduction by delisting brands.

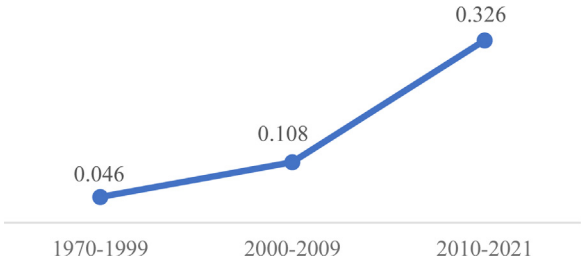

Fig. 9. Assortment size benefit elastcity by data year.

Table 1
Regression results of study factors (Model 1).

Factor	Levels	# of obsns.	Coefficient (s.e.)
Intercept	Intercept		.178 (.061)**
S2. Data year[1]	1970 – 1999	828	-.245 (.061)***
	2000 - 2009	747	-.149 (.042)***
	2010 – 2021 (base)	361	0
S3. Data region	Other	193	-.123 (.048)*
	Europe	610	-.094 (.042)*
	USA (base)	1133	0
S4. Category type	Durable	605	-.152 (.030)***
	Other	110	.048 (.066)
	Service	140	-.288 (.049)***
	Grocery (base)	1081	0
S5. Effect Type	Assort evaluation	366	.555 (.114)***
	Choice perception	827	.335 (.123)***
	Choice effort	126	.110 (.125)
	Choice incidence	227	.404 (.111)***
	Sales (base)	390	0
S6. Shopping type	Online	350	.019 (.078)
	Offline (base)	1586	0
S7. Research Method	Experimental	1533	-.138 (.110)
	Non-experimental (base)	403	0
Total	R^2 (F)	1936	.135 ($F_{13,1922}$ = 23.1***)

***p < .001; **p < .01; *p < .05; s.e. = standard error.

S3. Data region

After accounting for other factors, assortment size benefit elasticities are higher in the USA (mean η = .214) than in Europe (mean η = .098) or other (Asian/Australian/African) countries – mean η = .004) – see Fig. 10. This result may be partly attributed to the nature of the economy, nature of technology, nature of marketing, nature of retailing, and private label phenomenon. Consumers are more discriminating and desire a larger assortment in a rich country such as the USA (Gázquez-Abad et al., 2021), and technology is more advanced and can be deployed to handle larger assortments both in the backend of retailing and at the front end (Roggeveen and Sethuraman 2020a). The use of marketing to promote niche brands and thus larger assortment is more prevalent in the USA. In addition, private labels are less well entrenched in the USA than in Europe (Gielens et al., 2021), resulting in a preference for larger assortments that include a wide range of national and regional brands. Retailers in the USA should be cognizant of the higher assortment size benefit elasticity and should be more prone to carrying larger assortments and less prone to delisting than in countries in other parts of the world.

S4. Category type

Grocery products have higher assortment size benefit elasticity than service goods and durable goods (Table 1 and Fig. 11). A possible explanation for why larger assortments are more preferred in grocery products is as follows. Between groceries and durables, durable goods are generally higher priced, less frequently purchased, and occupy more space at home and at the retail outlet. Purchases of durable goods are more involved, and consumers prefer to deeply inspect fewer alternatives before arriving at their choice, whereas groceries are lower-priced, frequently purchased, low-involvement purchase items and consumers may want to inspect a wide range of alternatives either to arrive at the best choice for the purchase occasion and/or to seek variety. Between groceries and service goods, service products are generally intangible, and the attributes are harder to compare and evaluate, possibly requiring the help of a sales consultant. Therefore, fewer alternatives may be sufficient in the assortment for service goods compared to grocery products.

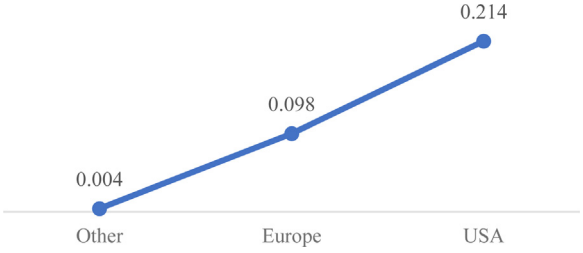

Fig. 10. Assortment size benefit elasticity by data region.

Fig. 11. Assortment size benefit elasticity by category type.

S5. Assortment size effect type

It is possible that the nature of the effect can influence the size of the assortment size effect. In the regression model, assortment size benefit elasticity is higher for assortment evaluation and lower for other effect types, including sales (Table 1 and Fig. 12). It is likely that a larger assortment size enhances the evaluation and perception of the assortment itself – in terms of satisfaction, liking, preference – but a larger assortment size does not necessarily translate into a commensurate percent increase in retailer outcomes such as choice perception, incidence and sales.

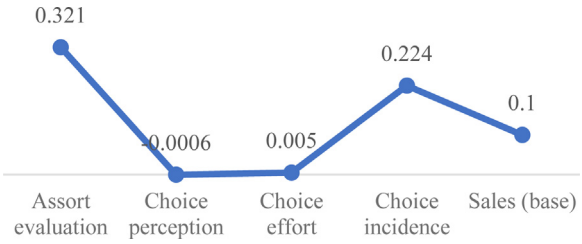

Fig. 12. Assortment size benefit elasticity by effect type.

S6. Shopping type

Our meta-analysis indicates with limited online shopping data that assortment size elasticity is slightly higher for online shopping than for offline shopping but not significantly different from each other (Table 1 and Fig. 13). This finding, along with prior literature, is discussed in a separate section titled *Offline vs. Online Assortment Size Effect*.

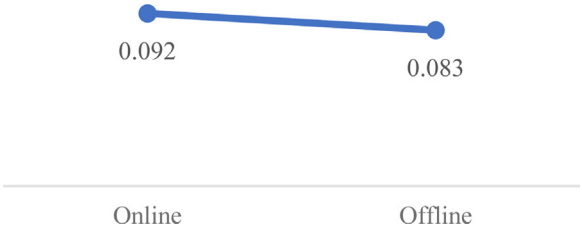

Fig. 13. Assortment size benefit elasticity by shopping type.

S7. Research method

Although not statistically significantly different, we find that assortment size elasticities using nonexperimental data are slightly higher than those computed from experiments (Table 1 and Fig. 14).

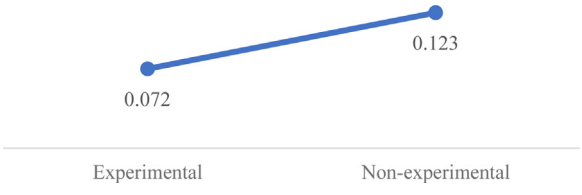

Fig. 14. Assortment size benefit elasticity by research method.

Experimental design factors moderating assortment size effect

Within the experimental research method, we want to determine if any experimental design factors such as (i) research setting (lab vs. field), (ii) research design (between- vs. within-subjects design, (iii) nature of assortment display (in print or on the computer, etc.), and (iv) the type of experimental subjects (such as MTurk or students) have a systematic bias in assortment size benefit elasticity. For this assessment, we ran the following regression model (2) only for the 1533 observations conducted using experimental data. Though not shown in Model (2) equation and its results for parsimony, when estimating Model (2), we also included study factors (S2 to S6) just as in Model (1).

$$\eta = a' + b'(\textit{Research method}) + c'(\textit{Data participant}) + d'(\textit{Research design}) + e'(\textit{Assortment display}) \quad (2)$$

The results are provided in Table 2.

The R^2 for regression Model (2) is .195, which implies that the four experimental designs explain a somewhat significant portion of the variance in assortment size benefit elasticity estimated using experimental studies. Three of the four experimental design factors show significant effects. In particular, estimates obtained from student and MTurk subjects tended to be on the higher side compared to adult/consumers, and estimates obtained from the between-subjects design have higher mean elasticity than estimates from the within-subjects design. However, elasticities based on showing assortments in print, computer, or table elicited smaller effects than those shown on actual or mock shelves. These results indicate that when experiments are designed for identifying moderating effects, it may be fine to use design factors of convenience, such as student subjects or printed assortment, so long as the same design factor is used for treatment and control groups and the biases are likely to cancel each other. However, if the experiments are conducted to obtain an estimate of the assortment size effect, given the biases in estimates due to design factors, we recommend experiments that are closer to reality – namely, field experiments and within-subjects design with real consumers being shown assortments in real or mock shelves.

Offline vs. online assortment size effect

Prior to the COVID pandemic, offline sales in brick-and-mortar physical retail outlets accounted for nearly 90% of sales. However, online shopping is growing at a faster rate than offline shopping, especially accelerated by the pandemic (Roggeveen and Sethuraman 2020b). It is of interest to know whether assortment size elasticities are higher or lower for online shopping. On the one hand, some researchers and practitioners believe that because of consumers' ability to use search engines and filters in online shopping to focus on what they want, assortment size is not a crucial element in their choice or search. Therefore, we should see lower assortment size elasticity and retailers can stock fewer items (lower as-

Table 2
Regression results of experimental design factors (Model 2).

Factor	Levels	# of obs.	Coefficient (s.e.)
Research method	Field	771	-.049 (.052)
	Lab (base)	762	0
Data participant	Student / Staff	788	.508 (.073)***
	MTurk / Mixed	63	.162 (.053)**
	Adult / Consumers (base)	682	0
Research design	Between Subjects	1085	.093 (.038)*
	Within subjects (base)	448	0
Assortment display	Computer	210	-.952 (.063)***
	Table	70	-.981 (.054)***
	Print	1150	-1.03 (.088)***
	Mock shelf (base)	103	0
Total	R^2 (F)	1533	.195 ($F_{7,\ 1525} = 52.8^{***}$)

***p < .001; **p < .01; *p < .05; s.e. = standard error.

sortment size). On the other hand, some feel for the very same reason that consumers can use search engines, they may be prone to inspect several items due to the ease of search. Therefore, assortment size elasticity may be higher with retailers having to stock more items (carry larger assortments).

Our meta-analysis indicates with limited online shopping data that assortment size elasticity is slightly higher for online shopping than for offline shopping but not significantly different from each other (Table 1 and Fig. 13). As a robustness check for the nonsignificant result obtained from the meta-analysis, we matched the 16 online shopping studies with 16 "equivalent" offline shopping studies based on similarity in the five study design factors – data year, data region, category type, assortment effect type, and research method. In several cases, we could not find an exact match on more than three of the five factors. Nevertheless, we tried to identify the closest offline study that matched each of the 16 online studies. Then, we performed a t test of the assortment size benefit elasticity for the 322 observations in the online shopping studies with the 158 observations in the 16 matched offline shopping studies. The mean assortment size benefit elasticity for online shopping is .130 (std. err. = .011) is slightly higher than the mean elasticity for offline shopping of .095 (std. err. = .031). However, the difference is not statistically significant ($t_{478} = 1.2$, $p = .23$).

This lack of significant difference appears to be supported by some individual studies. Four studies explicitly compared the assortment size effect in online vs. offline shopping. Essentially, they find that consumers expect to see a similar assortment in the form of matched or aligned products in both online and offline shopping. That is, they do not desire a larger assortment in online or offline shopping, a finding that broadly supports the meta-analytic result.

However, these and other studies provide the following nuanced insights with respect to assortment size and online shopping: (i) Consumers familiar with the product would like to see more alternatives in online shopping; (ii) Consumers will buy the category in the channel (online or offline) that offers greater choice; (iii) Having the same or similar alternatives in both online and offline retailing is more important than having a large number of alternatives; (iv) including niche brands in the online catalog, and ones that cannot find space in the physical catalog, can actually increase sales of both main products and the niche products.

In summary, there is no evidence to suggest that assortment size elasticity is higher or lower offline than online shopping or that retailers can (or should) carry larger assortments online. What appears to be evident from the literature is that the assortment should be similar or matched online and offline in terms of the main products carried but that web retailers can carry niche items that cannot be easily accommodated in physical retailing.

Nonlinearity in assortment size effect

There is substantial research that suggests that the size of the assortment and the magnitude of the change in assortment can itself influence the assortment size effect or elasticity (η). For instance, given the same change in assortment increase of 5 alternatives, η would be different depending on whether the assortment size change is from 5 to 10 alternatives or 10 to 15. In a similar vein, for the same assortment size base of 5 alternatives, η would be different depending on whether the assortment size change is from 5 to 10 alternatives or 5 to 15 alternatives. Researchers have also alluded to nonlinearity in effect. That is, the assortment size may be beneficial so long as it increases up to a certain point, but beyond that, the benefit from increased assortment may be lower or even be harmful. We investigate the assortment size (linear and nonlinear) effects on η using the 1818 η observations for which corresponding (low and high) assortment sizes (*as-low* and *as-high*) are available in the dataset.

The distribution of assortment sizes for the 1818 observations is given in Fig. 15. Most studies in the data analyzed assortment sizes between 1 and 20, although some considered assortment sizes as high as 60–80. We deleted 12 observations that ranged from 110 to 300 as they were deemed extreme values, resulting in 1806 observations for the analysis. For these observations, we computed the following two assortment size changes (*aschange*):

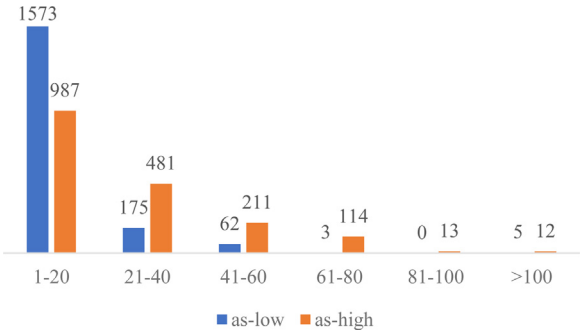

Fig. 15. Distribution of assortment sizes.

Assortment size absolute change :*asabschange*
$= (\text{as} - \text{high}) - (\text{as} - \text{low})$

Assortment size percent change :*aspctchange*
$= [(as - high) - (as - low)] * 100/(as - low)$

We then estimated the following regression models:

$$\eta = a'' + b''(data\ year) + c''(data\ region) + d''(category\ type) + e''(effect\ type) + f''(online) + g''(research\ method) + h''(as - low) + i''(aschange) + j''(aschange)^2 + error. \quad (3)$$

Model (3) is the same as Model (1) with the addition of assortment size variables. We ran Model (3) with aschange as both asabschange and aspctchange and found the results to be quite similar. We report the results for aspctchange in Table 3, as it was a model with a better fit (higher R^2).

The coefficient (*h"*) of assortment size (as-low) and assortment size change (*i"*) represented by aspctchange are positive. The findings suggest that assortment size benefit elasticity is higher for higher assortment size and that it increases with the increase in assortment size gap. In other words, having a large assortment size and increasing the assortment size gap is generally beneficial for consumers/retailers. However, there is a nonlinear effect, as indicated by the negative coefficient (*j"*) of the assortment size change squared term. In other words, the incremental benefit due to increased assortment size decreases as the assortment size increases and can even result in harmful effects due to cognitive overload and choice difficulty, resulting in consumers not making a choice.

Table 3
Regression results of assortment size factors (Model 3) – test of nonlinear effect.

Variable	Coefficient (s.e.)
Assortment size low (as-low)	.012 (.002)***
Assortment size % change (aspctchange)	.0004 (.0002)*
Assortment size % change (aspctchange)^2	-.00000041 (.0000002)*
R^2 (F)	.174 ($F_{16,\ 1788}$ = 23.1***)

Note; The study factors in Table 1 are also included in Table 3 but the results for those variables are not reported here as they are not qualitatively different from the original model in Table 1.

Many researchers have alluded to the presence of a nonlinear effect, even suggesting that the beneficial effect of assortment size may be inverted-U shaped. In particular, Boatwright and Nunes (2001) were among the first to empirically document the nonlinear effect. They analyze the effect of assortment size on sales using grocery retail data. In their empirical model, they include quadratic terms for the number of available items, number of brands, and number of flavors to capture nonlinearity and find the quadratic terms to be negative and significant for many of the variables, indicating nonlinearity.

Along similar lines, Draganska and Jain (2005) note that product proliferation can be counterproductive as market share decreases after a certain line length (number of brand alternatives). In particular, line length has a positive effect on market share. However, each additional flavor has a smaller effect than the one before.

In the service and online space, Du, Li and Wang (2019) find that the number of investment options had a nonlinear effect on the success of funding a project. He, Guo and Chen (2019) find that the number of online sellers has a nonlinear effect on assortment satisfaction and financial (sales) performance.

Taken together, these findings indicate that there is an optimal assortment size and assortment size change. Adding too many alternatives or eliminating too many options will not yield desired benefits for the retailer and may even be harmful.

Robustness checks

Three technical issues arise with the main meta-analytic regression presented in Eq. (1): (i) Multicollinearity, (ii) heteroscedasticity, and (iii) independence of observations. We assessed the extent of multicollinearity through inspection of the correlation matrix, condition index, and variance inflation factor (VIF) and found that multicollinearity was not a problem in this regression. The largest absolute correlation between any two study design factors used as independent variables in Eq. (1) is .56. All condition indices were less than 30, and no two variables shared more than 30% of the variation in a factor.

White's (1980) test of heteroscedasticity rejects the null hypothesis of equality of variance [chi-sq (61) = 797, p < .01], suggesting that heteroscedasticity is present. The use of heteroscedasticity-consistent standard error based on White's procedure did not change the statistical significance of the coefficients.

Elasticities from the same study are likely to be correlated because they share the same setting. Hence, the assumption of independence of observations, implying that the errors in the OLS regression Model (1) are uncorrelated, may not be tenable. Some researchers have proposed/adopted hierarchical linear models that account for

within-study elasticity/error correlations when there are multiple observations from one or more studies used in the meta-analysis (Bijmolt and Pieters, 2001, Edeling and Fischer, 2016). Following Tellis (1988) and Sethuraman, Tellis and Briesch (2011), we use OLS in the original meta-analytic regression (1) for three main reasons. First, OLS is parsimonious, easy to interpret and has been used in prior meta-analytic literature. Second, in the hierarchical linear modeling (HLM)-type procedure, the within-study error correlations are estimated. In highly unbalanced data of the type we have, some studies have just one observation, and some studies have as high as 450 observations. The latter leads to an estimation of over 100,000 within-study correlations, thus reducing degrees of freedom for error and power of the test. Third, OLS more easily facilitates diagnostic testing for collinearity and heteroscedasticity and allows one to perform weighted and stepwise regression. For robustness, we also run the HLM model that allows for within-study error correlations. The results are reported in Web Appendix 2. Again, the key results are similar, although the standard error is almost four times higher for the HLM model than for the OLS model.

To account for multiple observations within a study, we adopt a weighted regression procedure by weighting each observation by the reciprocal of the number of observations in the study as in Sethuraman (1995).[3] The R^2 increased slightly from .135 to .157, but the results (provided in Web Appendix 2) were unchanged.

Environmental factors moderating assortment size effect

Moderators are broadly defined as those variables that are likely to modify (moderate) the nature and magnitude of the main effect of assortment size. In that regard, all study factors, such as year, region, and assortment display, may be regarded as moderators of the assortment size effect. In this review, we distinguish study factors from other moderators in the following way. Study factors, by and large, arise because different researchers (authors) use different settings for their investigation into assortment size. For example, one author conducted research in Europe in the 1980s using scanner panel data in service goods; another author conducted research in the USA in 2000 using controlled lab experiments in food products. The difference in design is not purposeful, and the goal of a meta-analytic review is to ascertain if these time, region, and product factors influence the effect sizes. We call such variables that occur naturally due to the design of the study, *study factors*. All or most studies in the meta-analysis have data on study factors, so it is possible to perform a meta-analysis leading to some generalizations.

On the other hand, there are numerous other (non-study) moderators that have been investigated by researchers on the assortment size effect. Collectively, we call them environmental factors or characteristics. In fact, there were over 80 individual moderators or environmental factors analyzed in the 177 studies, with most moderators being analyzed by one or two studies. It is not desirable for this review paper to address all moderators individually, nor is it feasible to draw a generalizable quantitative estimate of these moderator effects due to the paucity of studies dealing with each individual moderator. Therefore, following the procedure adopted by Sethuraman and Gielens (2014), we focus only on those moderators that are analyzed in at least three studies either independently or when consolidated with other similar moderators. We categorize them into six meaningful moderator classes:

(M1) Brand characteristics,
(M2) Product characteristics,
(M3) Store characteristics,
(M4) Consumer characteristics,
(M5) Task characteristics, and
(M6) Other characteristics.

For each moderator class, we list the key findings that are consistent across studies and the number of supporting studies in Table 4. The individual supporting studies are listed in Web Appendix 3.

M1. Brand characteristics

Key results

Assortment increase is more beneficial when the change involves adding:

(1) Favored brands/items with loyal purchasers and high penetration.
(2) High-priced or more expensive national brands/SKUs.
(3) Unique/niche brands.
(4) National brands with high reputation, quality, equity, strength, penetration.
(5) High-quality private labels.
(6) Options that are aligned (similar attributes across brands).

Conversely, assortment decrease is less harmful or even beneficial when the deletion:

(1) Does not take away the consumers' preferred brand.
(2) Retains brands with high quality and equity/strength.
(3) Minimizes noncomparable alternatives.

Discussion of results

The presence of consumers' favored brand/SKU in the original assortment has been studied by many authors, offering a consistent view that the negative impact of assortment reduction or delisting is attenuated so long as the favored brand is retained in the reduced set. In particular, the pioneering work by Broniarczyk, Hoyer, and McAlister (1998) indicates that assortment reductions of up to 25% can go

[3] That is, if there are 4 observations in a study, we weighted each observation 1/4th and if there are 8 observations in a study, each estimate was weighted 1/8th, so that each study got the same total weight of 1.

Table 4
Moderator effects and count of supporting studies.

Moderator Characteristics	Effect	Supporting studies*
M1. Brand	Assortment increase is more beneficial when the change involves adding brands with high brand loyalty, expensive national brands as also unique, high quality, high penetration, reputable brands that are better aligned in terms of attributes with existing assortment. Assortment decrease (deletion) is less harmful when such brands, especially consumers' preferred brands are not deleted.	14 / 18
M2. Product	Assortment size increase is more beneficial or a larger assortment is preferred for hedonic, risky, niche, stockpilable products but smaller assortment sizes are preferred for utilitarian/functional, less risky, staple products with high purchase frequency and in concentrated categories.	4 / 6
M3. Store	Assortment size increase is more beneficial or a larger assortment is preferred in supermarkets, mass merchandisers, and service-oriented stores while assortment size decrease is less harmful or a smaller assortment is preferred in convenience and price-oriented stores.	1 / 3
M4. Consumer	Assortment size increase is more beneficial or large assortment size is preferred for expert, educated/rich consumers who seek variety, maximize utility, are value-conscious but do not favor private label. It is less harmful, even beneficial, or a smaller assortment is generally preferred for novice, satisficers who are favorable toward private label.	6 / 11
M5. Task	Assortment size increase is more beneficial or a larger assortment is preferred when the consumer is deciding whether to buy (category choice) when the choice takes place here and now (proximal), not time constrained, for planned/ major trips, where the consumer thinks holistically and wants to avoid making a wrong decision; he/she prefers smaller assortment when deciding what to buy (brand choice), for distal purchase at a different time/location, under time pressure, when making unplanned trips, thinks analytically and wants to make the right decision.	8 / 8
M6. Other	Assortment increase is more beneficial when the added brands are displayed; Assortment decrease is less harmful when the remaining brands are promoted or when the shelf space is not reduced.	3 / 3

* aa/bb → Supported by aa studies out of total bb studies.

unnoticed for a low involvement repeat purchase product if a consumer's preferred brand is available in the assortment. Gázquez-Abad et al. (2021) find that a smaller assortment with a preferred brand is even better than a larger assortment without the preferred brand in terms of reducing store switching due to delisting.

Studies on option attractiveness suggest that consumers care more about assortment option attractiveness than assortment size (Chernev and Hamilton 2009, Sloot and Verhoef, 2008). Such option attractiveness can be enhanced by carrying brands with high brand equity, brand strength, and brand popularity. Similarly, the presence of high-quality national brands and private labels and adding expensive national brands increase option attractiveness, which also improve the chances of the consumer finding his or her favored brand (Deleesneyder and Koll, 2012).

With respect to option comparability, when options are aligned (similar attributes across alternatives), cognitive complexity decreases, and assortment size benefits improve (Gourville and Soman, 2005). Finally, de Clerck et al. (2001) found that addition effectiveness is higher (more beneficial) for more unique items and brands with high penetration.

It is equally noteworthy that deletion of promoted brands or private labels did not significantly affect store switching. Such deletions appear to foster brand switching (within the store) rather than store switching.

Implications

In general, when retailers increase assortment size, they should strive to maintain or even enhance option attractiveness. At the same time, when retailers decrease their assortment, they should not compromise assortment option attractiveness. The test of moderators offers insights into which tactics will enable these assortment change strategies. Clearly, retaining the consumers' favored brand is recommended when delisting. Grocery retailers must identify through panel data or other means the favored brands of their large, profitable segments and ensure that they are retained in the pruned assortment. This finding also supports the principles of efficient assortment introduced by the Food Marketing Institute (1993). The retailer will lose little revenue but cut costs and increase profits through the elimination of unattractive, infrequent-selling SKUs, thereby creating an efficient assortment.

Other ways of retaining or enhancing option attractiveness are to keep or introduce high equity, high quality, or high-priced national brands. Delisting private labels, interestingly, may not have a negative effect on assortment attractiveness or store switching, especially if it is of dubious quality. However, the retailer may retain the private label for other strategic reasons.

Furthermore, when increasing assortment size, retailers can avoid unnecessary additions of noncomparable alternatives so that choice complexity is reduced. In other words, they can add aligned alternatives that do not vary significantly on attributes. If they cannot avoid noncomparable alternatives, as such addition (e.g., unique brand) may be the very purpose of assortment increase, then they should take measures to alleviate information overload or reduce choice complexity by providing comparable information and easing search for consumers.

M2. Product characteristics

Assortment size increase is more beneficial or a larger assortment is generally preferred for:

(1) Hedonic (pleasure-inducing) products.
(2) Products with high uncertainty or perceived risk.
(3) Niches and Variety enhancers.
(4) Stockpilable categories.

Conversely, assortment size decrease is less harmful or a smaller assortment is preferred for:

(1) Utilitarian/Functional products.
(2) Products with low uncertainty or perceived risk.
(3) Staple goods.
(4) Concentrated categories.

Discussion of results

Hedonic products provide more experiential consumption, whereas utilitarian products provide primarily instrumental benefits. Argouslidis et al. (2018) argue that in hedonic categories, consumers may view assortment reductions as an attempt to curb their fun; thus, a larger assortment will be more beneficial for hedonic categories than functional categories.

Boyd and Bhan (2009) expect that consumers see a processing benefit with large assortments in high-risk situations because high risk carries uncertainty. Therefore, they expect and find that consumers will prefer larger assortments in high-risk contexts –, e.g., bikes and roller skates. Retailers wanting to reduce assortment in high-risk products such as bikes or roller skates could alter consumers' perceived risk by, say, offering easy return policies.

Dhar, Hoch, and Kumar (2001) found that increasing the variety of assortments (both breadth and depth) has a positive effect on the retailer's benefits for all categories except for staple goods – categories with high penetration and purchase frequency, such as milk. In staples, increasing assortment depth has a negative impact, suggesting that assortments in this kind of category that are too large can be detrimental for the retailer.

Concentrated categories are those where just a few brands dominate the market. Dhar and Hoch (1997) argue that concentrated categories are typically categories with low levels of variety seeking. In this context, increasing assortment size in such categories is unlikely to substantially increase benefits. Stockpiling or buying a greater quantity lengthens the consumption horizon, which leads to uncertainty about preferences at future consumption occasions. Shoppers minimize this uncertainty by broadening the set choice that they select at the time of purchase (Bucklin, Gupta, and Siddarth 1998). De Clerck et al. (2001) include concentration (sum of market shares of three largest brands) and stock pilability (dummy) in their analysis and find their results to be broadly consistent with expectations – larger assortments are better for stockpilable and less concentrated categories.

Implications

In hedonic categories, consumers who are more loyal to the delisted brand will be more inclined to switch stores. Retailers should be particularly careful about delisting brands in hedonic categories. Retailers should also be more accepting of reductions in assortment in categories purchased very frequently (i.e., staples) and concentrated categories. An analysis of purchasing records would lead retailers to rank their categories depending on the level of penetration and purchase frequency and to classify them into staples or nonstaples.

M3. Store characteristics

Assortment size increase is more beneficial or a larger assortment is generally preferred in:

(1) Supermarkets and mass merchandisers
(2) Service-oriented stores

Conversely, assortment size decrease is less harmful or a smaller assortment is preferred in:

(1) Convenience stores
(2) Price-oriented stores

Discussion of results

Looking at differences in terms of store format is logical, as consumers have different expectations and objectives in shopping trips made to different store formats (Fox and Sethuraman, 2006; Jindal et al., 2020). For instance, consumers look for variety at the local grocery store and drugstores but cheaper private labels when they visit a mass store. In the same vein, Fox and Sethuraman (2006) argue that grocery stores differ systematically from other formats in their marketing policies, including assortment strategy. For example, given their proximity to households, convenience stores tend to be smaller in size, with limited shelf space (and assortment length). In contrast, supermarkets and mass merchandisers (which tend to be located farther away from consumers) are substantially larger in size and place greater emphasis on variety, leading to more shelf space (and assortment size). Sloot and Verhoef (2008) argue that service-oriented stores tend to carry a wider and deeper assortment than price-oriented stores. The differences in marketing-mix characteristics across formats also suggest differences in consumers' reactions to assortment size.

Implications

According to Jindal et al. (2020), an explanation for differences in how assortment decisions affect consumer decisions across retail formats could stem mainly from differences in the types of households these formats attract but also from shopping trip types. Retailers should adapt their assortment decisions depending on the format and the type of customers they attract. In particular, smaller assortments are conducive for small-store formats such as convenience stores and neighborhood markets, while larger assortments are conducive for large-store formats such as supermarkets.

M4. Consumer characteristics

Because different types of consumers will perceive the cost and benefit of assortment size differently, the nature of consumers has been studied by many researchers. In particular, the assortment size increase is more beneficial, or a large assortment size is preferred for:

(1) Expert consumers or consumers with prior knowledge or familiarity with the product.
(2) Consumers who seek variety.
(3) Utility maximizers who want the best alternative.
(4) Price & Value Conscious/promotion sensitive consumers.
(5) Consumers with less favorable attitude toward PL.
(6) More educated/richer consumers.

Conversely, assortment size decrease is less harmful or a smaller assortment is preferred for:

(1) Novices or consumers with little knowledge or familiarity with products.
(2) Consumers who do not seek variety or engage in routinized purchasing.
(3) Satisficers who want an acceptable alternative.
(4) Consumers with a more favorable attitude toward PL (in the case of NB delisting).

Discussion of results

Expert or knowledgeable consumers are likely to feel less stressed about dealing with a large number of alternatives. Better educated consumers are expected to have greater shopping expertise and a greater capability to engage in search, basing their choice decisions on extensive information offered by the store (Homburg and Giering, 2001). As a result, these consumers will feel a greater sense of overall choice deprivation when faced with fewer (national) brands or NBs. In this context, Gázquez-Abad, Martínez-López, and Sethuraman (2021) find that smaller assortments (with fewer NBs) will result in greater store switching among more educated consumers than among less-educated consumers.

Chowdhury, Ratneshwar, and Mohanty (2009) suggest that when the assortment size was larger, utility maximizers who wanted the best alternative were more prone to browse among alternatives. In contrast, when the assortment size was smaller, the maximizers vs. satisficers dichotomy was not significantly associated with the individual's propensity to browse. High-income level consumers prefer to spend time on more enjoyable activities and less on shopping (Baltas and Argouslidis, 2007). Therefore, these consumers will make shopping simpler and patronize fewer shops. In contrast, low-income shoppers perceive themselves as having financial constraints, so they need to spend more time shopping looking for the store that offers the lowest prices and the best value for money. This behavior is also typical of price-conscious shoppers. Larger assortments offer the latter group of shoppers a greater efficiency of time and effort involved in identifying the available alternatives in that store. Therefore, Gázquez-Abad, Martínez-López, and Sethuraman (2021) expect that delisting (national) brands in a given assortment would make low-income shoppers feel deprived of low price-high value alternatives and make them shop at other stores. Contrary to their hypothesis, these researchers find a significant positive income effect in the USA, i.e., higher-income consumers are more prone to store switching due to assortment reduction. Nevertheless, in the context of price sensitivity, Zhang and Krishna (2007) find that systemwide SKU reduction caused more changes in brand choice probabilities among consumers of higher price sensitivity.

Argouslidis et al. (2018) show that shoppers with a more favorable PL attitude interpret assortment reduction conditions as less severe threats. In the same vein, Gázquez-Abad, Martínez-López, and Sethuraman (2021) found that the store switching effect due to a smaller assortment is more than offset by consumers' favorable attitude toward private labels.

Implications

A straightforward implication relates to product and store segmentation. Retail chains should carry larger assortments in stores with a high concentration of rich, educated consumers on the one hand and price/value-conscious consumers on the other hand – that is perhaps in both richer and poorer neighborhoods. By the same token, retailers can identify experts and variety-seeking consumers and target larger assortments to them. They can also increase preference and loyalty for their store brands to facilitate assortment reductions without incurring significant loss in sales and profits.

M5. Task characteristics

If the decision task is onerous – more complex or difficult — consumers would generally prefer a smaller assortment to deal with cognitive/information overload. In this regard, task difficulty is less and, therefore, assortment size increase is more beneficial or a larger assortment is generally preferred when:

(1) Consumer is deciding whether to buy.
(2) The choice takes place here and now.
(3) The consumer is not time constrained.
(4) Purchase takes place during planned/major trips.
(5) The task involves holistic thinking.
(6) The task goal is to avoid making the wrong decision (prevention focus).

Conversely, assortment size decrease is less harmful or a smaller assortment is preferred when:

(1) Consumer is deciding what to buy.
(2) The choice is made in a different location for a future time.
(3) The consumer faces time pressure.
(4) Purchase takes place during unplanned/fill-in trips.
(5) The task involves analytical thinking.

(6) The task goal is to make the right decision (promotion focus).

Discussion of results

When consumers decide 'whether to buy', the decision task is easier than "what to buy." Therefore, a larger assortment is preferred when the decision focus is on choosing from the assortment than when the focus is on making a choice from the selected assortment. Chernev (2006) shows that an increase in assortment size has a positive influence on consumers' purchase likelihood when the decision is to buy or not buy rather than to choose the right option.

Consumers prefer a larger assortment when the psychological distance (temporal and geographical) is low. Goodman and Malkoc (2012) find preference for larger assortments when the choice takes place here and now; consumers are more likely to prefer small assortments when choices are taken in distant (remote) locations and times. This finding may partly be due to decision tasks for the future seeming more difficult than for the present.

Decision difficulty is also elevated when faced with time pressure, resulting in a preference for a smaller assortment. Haynes (2009) finds that participants given a limited amount of time to choose with a larger assortment stated their decisions to be more difficult and frustrating than did participants with lower time pressure.

A smaller assortment size is preferred for unplanned trips than for planned trips. Jindal et al. (2020) find that preference for smaller assortment is in this order – for unplanned trips, fill-in, and major trips. The urgency associated with unplanned trips makes smaller assortments easier to process and enables faster decision-making.

'Holistic' thinkers tend to see the "whole picture" rather than the components constituting it. In contrast, 'analytic' thinkers are focused on the components instead of the whole view. According to Benoit and Miller (2017), holistic thinkers will be more tolerant of a larger assortment than analytic thinkers, leading to a less negative impact on satisfaction.

Prevention focus (avoiding a bad decision) will lead to a desire for a larger assortment compared to promotion focus (finding the best choice), as, in the former case, consumers want to look at all alternatives, so that a better option is not left out.

Implications

The intuitive time pressure result suggests that for purchase situations under time pressure such as impulse purchases, unplanned trips, and shopping in convenience stores, retailers should stock fewer items. However, for major purchases and in large supermarkets, retailers can stock a larger assortment. Similarly, the psychological distance result suggests that for future or remote purchases such as purchasing a gift for an upcoming Mother's Day at a store in the mother's town or for online purchases for a future period, fewer options are better.

The preference for large vs. smaller assortment in the category purchase decision phase (whether to buy) and brand choice phase (what to buy) suggests that retailers, especially online retailers, should enable consumers to prune the larger assortment size in the former phase to the smaller consideration set through technology. Finally, retailers are better off placing larger assortments in situations where consumers want to avoid regret (e.g., low-risk/low visibility/low-priced/returnable products) but relatively fewer favored items in situations where the consumer wants to make the best choice (high-involvement/high-risk/high visibility purchase).

M6. Other characteristics

Broniarczyk, Hoyer, and McAlister (1998) found that consumer assortment perceptions are significantly affected by the amount of space devoted to the category. These authors show that eliminating half of the items in five categories has little effect on shopper perceptions of the assortment offered as long as category shelf space is held constant.

A related question arises as to whether retailers should engage in promotions of added or remaining brands when they increase or delete assortments, respectively. De Clerck Gijsbrechts, Steenkamp, and Dekimpe (2001) found a significant positive coefficient associated with display support leading to increased sales for added items. This result indicates the need to make people aware of the new SKUs. Zhang and Krishna (2007) found a positive effect of promotion frequency, i.e., after an SKU reduction program, market shares tend to shift toward promoted brands.

Numerous other moderators are analyzed in the literature. However, they are not discussed here because they either provide nonsignificant, inconsistent, or mixed evidence or are analyzed in just one or two publications, precluding our ability to generalize.

Summary of findings, insights, and implications

We conduct a meta-analytic review of the retail assortment size effect based on 177 studies from 95 articles published during 1970-2021. Retail assortment size is defined as the number of distinct items that a retailer carries within a category and makes available to consumers for purchase. The majority of the studies on assortment size effects were published in recent, high-quality marketing journals attesting to data recency and data quality. These research studies are mostly conducted in the USA and Europe and cover a wide range of products (mainly groceries). Data for the analysis come from scanner data as well as from a variety of experimental designs.

We estimate the magnitude of the effect in terms of assortment size benefit elasticity defined as percent change in assortment size (benefit) effect for 1% change in assortment size and investigate what factors influence the effect. The mean assortment size net benefit elasticity across 1,936 valid observations in the dataset is .082, and the magnitude of the elasticity is in line with those for other marketing mix elements such as advertising and personal selling. Numerous factors moderate the assortment size effect, including study/design factors,

brand factors, product factors, store factors, consumer characteristics, and task characteristics.

With respect to study/design factors, assortment size benefit elasticity is higher in more recent times (2000-2021) than in prior years, in the USA than in other countries, in groceries than non-grocery products, and for assortment perception and sales than for effort and choice quality.

With respect to brand moderators, assortment increase is more beneficial when the change involves adding brands with high brand loyalty, expensive national brands and unique, high-quality, reputable brands as well as favored, high penetration brands that are better aligned with existing assortment. Assortment decrease (deletion) is less harmful when such brands, especially favored brands, are not deleted but (low quality) private labels are deleted.

With respect to product moderators, assortment size increase is more beneficial or a larger assortment is preferred for hedonic, risky, niche products and stockpilable categories; however, smaller assortment sizes are preferred for utilitarian/functional, less risky, staple products with high purchase frequency.

With respect to store characteristic moderators, assortment size increase is more beneficial or a larger assortment is generally preferred in supermarkets, mass merchandisers, and service-oriented stores while assortment size decrease is less harmful - even beneficial, or a smaller assortment is generally preferred in convenience and price-oriented stores.

With respect to consumer moderators, assortment size increase is more beneficial, or large assortment size is preferred for expert, educated/rich consumers who seek variety, maximize utility, and are value-conscious but do not have a favorable attitude toward private labels. It is less harmful to novice satisficers and to consumers who are favorable toward private labels.

With respect to task characteristics, assortment size increase is more beneficial or a larger assortment is generally preferred when the consumer is deciding whether to buy (category choice), when the choice takes place here and now (proximal), is not time constrained, or purchase takes place during planned/major trips, and where the consumer thinks holistically and wants to avoid making a wrong decision; the consumers prefer smaller assortment when he or she is deciding what to buy (brand choice), is considering for distal purchase at a different time or location, is under time pressure, is making unplanned/filler trips, thinks analytically, and wants to make the right decision.

The assortment size benefit effect (elasticity) is nonlinear and concave. Given a certain assortment size, a unit increase in assortment size increases benefit elasticity, but this increase decreases as assortment size increases further.

There is no significant difference between online and offline assortment size elasticity based on our limited analysis. However, prior literature suggests that for online retail, adding promising niche items would be preferred, especially in the case of unplanned purchases, as well as for consumers with substantial prior online experience and when making category choices.

These insightful findings enable us to develop 30 country, time, product, brand, store, consumer, and task characteristics that are conducive to maintaining large (small) assortment or resorting to assortment addition (deletion). Table 5 lists those characteristics. Retailers can use this list to conduct an audit of their assortment and decide whether to add or delete items in a category.

In addition, when the retailer adds an item to the existing assortment or sells a category with a large assortment, past literature recommends the following strategies or tactics:

a. Display added brand.
b. Increase shelf space as needed.
c. Manage expectations.
d. Emphasize variety.
e. Ease cognitive overload.

Conversely, when the retailer deletes an item to an existing assortment or sells a category with a small assortment, past literature recommends the following strategies or tactics:

a. Promote remaining brands.
b. Maintain original shelf space.
c. Avoid phantom products (those available only in storage areas not on retail shelves).
d. Promote store image.
e. Emphasize purchase simplicity.

The results also provide us with many directions for future research, which are listed below.

Future research

Future research is needed along three dimensions: research setting, research design, and research analysis/focus. Table 6 lists the specific research directions.

Research setting

Nearly 90% of the studies analyzed in this dataset come from the USA and Europe. There is a need to make the research globally diverse both to assess if assortment size effects are different across regions and to investigate how consumers in other regions such as Asia and Africa view assortments and thus to gain insights specific to their cultures. Along the same lines, most studies on assortment size are confined to one retail setting – grocery supermarkets. We need more studies on retail formats other than supermarkets – especially neighborhood markets and warehouse stores, which have grown recently by tailoring to specific consumer shopping needs. In particular, only 10% of the studies were related to online shopping. Given the growth of online retail across sectors, it is important to understand how assortment size impacts store image, consumer choice, and retail sales in online shopping. In this 'omnichannel era,' the existing tendency of customers to use an increasing number of touchpoints in their decision-making process forces retailers to offer their products

Table 5
Condition conducive for assortment addition and reduction.

Characteristic	Smaller assortment /assortment deletion preferred	Larger assortment /assortment addition preferred
Country	C1. In Australia/Asia/Africa..Europe	In the USA
Time	C2. In the past (pre-2000)	In recent times (post 2010)
Brands	When deleting:	When adding:
	C3. Low loyalty/quality brands	High Loyalty / Quality brands
	C4. Cheap brands	Expensive brands
	C5. Low quality private labels	National brands
	C6. Redundant brands	Unique brands
	C7. Unpopular brands	Favored brands
Product	When selling:	When selling:
	C8. Non-grocery products	Grocery products
	C9. Functional / Utilitarian products	Hedonic products
	C10. Less Risky products	Risky products
	C11. Staple products	Niche products
	C12. Frequently purchased	Infrequently purchased
	C13. Non-storable products	Stockpilable products
	C14. Less concentrated products	More concentrated products
	C15. Low penetration products	High penetration products
Store	In:	In:
	C16. Low image stores	High image stores
	C17. Convenience stores	Supermarket/mass merchandiser
	C18. Price-oriented stores	Service-oriented stores
Task	When the task is:	When the task is:
	C19. What to buy (brand choice)	Whether to buy (category choice)
	C20. Distant time / location (distal)	Here and Now (proximal)
	C21. Time constrained (pressure)	C22. Not Time constrained
	C22. Convenience / Fill-in trips	Planned / Major trip
	C23. Analytical/involved choice	Holistic purchase
	C24. Acceptable (satisficing) choice	Wants to make the right choice
Consumer	When catering to:	When catering to:
	C25. Novice / Unfamiliar consumers	Expert / Familiar consumers
	C26. Less Educated consumers	More educated consumers
	C27. Not so rich consumers	Rich (and poor) consumers
	C28. Not Variety-seeking consumers	Variety-seeking consumers
	C29. Not value conscious consumers	Value conscious consumers
	C30. Those favorable toward PL	Those unfavorable toward PL

through many different channels (Rooderkerk and Kök, 2019). Therefore, astute assortment planning is essential in order to provide a seamless experience to customers throughout their journey stages (Verhoef, Kannan and Inman, 2015). Whereas the online context provides the retailer with more opportunities to customize assortment (Rooderkerk and Kök, 2019), the physical store can provide convenience, product quality, value, and better bonding with the retailer (Burke, 2002). In this context, we believe that the cross-channel coordination of the assortment composition is essential, as each channel has a different role and provides different benefits to the retailer. Indeed, several authors (e.g., Fernández, Pérez and Vázquez-Casielles, 2018; van Baal and Dach, 2005) suggest that consumers who use multiple channels seem to purchase more products, spend more, and pay higher prices than single-channel consumers. Therefore, retailers should look at all touchpoints and decide assortment composition based on how customers interact with these in their omnichannel journey.

Research design

Most studies we analyzed used experimental data, especially with student subjects and between-subjects designs. While experimental studies are appropriate and even desirable, to increase internal validity for identifying theoretical moderators of the assortment size effect, the use of real consumers, retail shelves, and actual choice or sales in both experimental and nonexperimental research would enhance external validity.

Research analysis/focus

First, the effect of increasing or decreasing assortment size will depend on what options are available in the remaining assortment. This reliance on other alternatives available for purchase is called the context effect. How the assortment size effect depends on other brands or SKUs in the assortment is worth studying both to determine the optimal assortment size and assortment composition. Second, while there is a rationale for expecting the assortment size effect to be nonlinear, whether the assortment size effect function is indeed U-shaped and, if so, what the inflection point is has not been well established, so more research is needed. Third, our data and subsequent analysis treat assortment size change to be nondirectional and do not distinguish between assortment size increase and assortment size decrease (the latter

Table 6
Future research directions.

Research Type	Future Research Needed
Research Setting	• Countries other than USA / European – Asia, Africa, Australia. • Store formats other than Supermarkets – Warehouse, Convenience stores • Online retail setting
Research Design	• Real consumers as opposed to student subjects • Real or mock shelves instead of tabletop or brochure displays. • Actual choice or sales instead of perception or self-reported behavior • Within-subject field experiments instead of between-subjects lab experiments
Research Analysis / Focus	• Context – study nature of other remaining brands in assortment • Include more mediator and moderators. • Investigate non-linear (U-shaped) assortment effect. • Investigate asymmetric assortment (addition vs. deletion) effect. • Conduct more profitability analysis and identify optimal assortment size and composition.

often achieved through delisting of national brands). Is the assortment size effect symmetric, as we have implicitly assumed? That is, if we *increase* assortment size by a certain number, is the change in benefit the same, but in the opposite direction if we *decrease* assortment size by the same amount? Some researchers have delineated the two effects as addition effectiveness (for increase) and deletion effectiveness (for decrease) in assortment size (De Clerck et al. 2001). Both effects are important in retailing. With the tremendous growth in digital retailing, where retailers have the capacity to add more items, addition effectiveness is important. With a recent trend toward delisting to drive retail efficiency, deletion effectiveness has become paramount. The asymmetry between the assortment addition effect and assortment deletion effect and the factors that influence each effect should be explored further. Fourth, past research has investigated numerous moderators, which we have summarized in Table 4. However, most of these studies have considered one or a few moderators in isolation without an overarching framework that links these moderator constructs. Perhaps there is a scope for developing the theory of assortment size that links the moderators in a coherent manner. Fifth, mediators investigated in the assortment size literature we reviewed include assortment satisfaction, overload, perceived similarity, perceived variety, and so on. These mediators are typically proposed and tested by one or at most two studies. Therefore, they do not lend themselves to generalization and are not analyzed here. Future research can address this limitation by testing relevant mediators and developing insights and implications. Sixth, when determining the optimal assortment size, retailers are focused on maximizing profits. However, most studies have focused on the evaluation, perception, and sales effects of assortment size. Only Jindal et al. (2020) have reported the profitability of assortment size changes. This lack of profit focus may be due to the difficulty of obtaining cost data to compute profitability. Nevertheless, analyzing profits and designing optimal portfolios has been and will continue to be an important topic for future research (Mantrala et al. 2009). All future research directions with respect to research analysis warrant a corresponding change in research design when conducting studies on assortment size.

Finally, with the growth of online retailing and advances in search technology, there is a tendency to believe that assortment management and the attendant topic of assortment size are less important now than before. A large number of items can be stored/displayed on digital shelves, and search technologies can enable consumers to find the "right product" easily. As a result, the notion of endless aisle and infinite assortment are gaining traction, leading one to presume that assortment size is a nonissue. However, in our view, the issue of assortment size and related assortment management will continue to be as important, and if anything, more important than what it has been in the past. We make this assertion based on consumers' implicit cognitive constraints and their desire to process only needed information either due to work, time, or other pressures. It is said that even if there are abundant – say 100 – available alternatives, consumers process a very limited number – say 5 – alternatives in their consideration set. As a result, it would be a waste of personnel and monetary resources for retailers to carry a large assortment even if they can! While the possibilities have expanded with online retail and advanced technology, more competitors are also entering the retail space, thereby increasing the need for seeking efficient assortment, whether online or offline. Our review on assortment size has presented some insights and guidelines based on what we do know. We hope it has also paved the way for more research on what we need to know!

Executive summary

In the late 1980's the Food Marketing Institute (FMI) conducted several experiments and found that it is possible for retailers to decrease their assortment size (the number of options carried by them for offering to consumers for purchase), without incurring significant sales decline. Thus, they believed that retailers can reduce cost of inventory and operations by carrying a smaller assortment size (fewer items) and increase profits, since sales will not be impacted. FMI called this process of strategic assortment reduction as Efficient Assortment Planning (EAP) and encouraged managers and researchers to further explore this opportunity. This call for assortment planning spurred a significant amount of data-based academic research in the 1990's, further accelerated by the advent of online retail and multi-channel retailing in the last two decades. The time is now ripe for summarizing the findings and insights from the abundant academic literature with the goal of providing guidelines to retailers for assort-

ment addition/deletion, as well as offering directions for future research.

This article provides a meta-analysis of 1936 assortment size effects obtained from 95 academic works comprising of 177 studies published during 1970-2021. Assortment size effect is operationalized as assortment size (net) benefit elasticity defined as the percent increase in net benefit (perception, choice, sales) for a 1% increase in assortment size. The meta-analysis involves estimating the mean assortment size elasticity and identifying its study design and environmental moderators.

The key findings / insights are as follows:

- The mean assortment size elasticity across 1936 valid observations in the data set is .082, which is in line with those for other marketing mix elements such as advertising and personal selling. The positive benefit elasticity indicates that, within the assortment size range investigated in academic literature, on average, larger assortment (increasing assortment size) is beneficial to consumers / retailers.
- Assortment size benefit elasticity is higher in more recent times (2000-2020), in the USA, in grocery products, for assortment perception, choice incidence, and sales than for effort and choice quality.
- Assortment increase is more beneficial when brands with high brand loyalty, expensive national brands as also unique, high quality, reputable brands as well as favored, high penetration brands that are better aligned with existing assortment are added and consumers' favored brands are not deleted.
- Larger assortments are preferred for hedonic, risky, niche products and stockpilable categories, especially in supermarkets and mass merchandisers.
- Experts, rich and educated consumers as also value-conscious consumers and holistic thinkers are more prone to processing larger assortment, especially when they are making a planned, major shopping trip and do not have a favorable attitude towards the private label.
- Assortment size benefit effect (elasticity) is nonlinear and concave. Given a certain assortment size, an increase in assortment size increases benefits but this incremental benefit decreases as assortment size increases further, and may even be perceived as harmful by consumers.
- There is no significant difference between online and offline assortment size elasticity, but adding promising niche items in online retailing would be preferred, especially in the case of unplanned purchases and for those consumers with substantial prior online experience.
- Increasing shelf space to accommodate assortment addition can help increase benefit while maintaining shelf space during assortment deletion can minimize harm.
- In similar vein, displaying the added brand can help increase benefits while promoting the favored brand can help offset negative consequences due to assortment reduction.

Based on the above insights, we identify 30 conditions that are conducive for assortment addition and conversely for assortment deletion (see Table 5 of the article). In particular:

- Maintain larger assortment in the USA than in Asian/African countries,
- Assortment increase is best when adding high loyalty, high equity, expensive, unique national brands and those that are favored by consumers.
- High penetration, storable, hedonic grocery products are conducive for assortment addition especially if they are in high-risk and niche categories.
- Stores with high image, supermarkets, and mass merchandisers should carry larger assortment than low-image and convenience stores.
- Larger assortments are recommended for experts, rich and educated consumers as also variety-seeking and value-conscious consumers but who have less favorable attitude to private label.
- These consumers desire larger assortment when deciding whether to buy (category choice) for immediate gratification, when there is no time constraint and they want to make the right decision using holistic thinking in a major, planned trip. Retailer should carry larger assortment in these contexts.
- It is also recommended that the retailer display the added brand and increase shelf space during assortment addition and promote favored brand and maintain shelf space during assortment reduction.

The review also yields many directions for future research:

- Need for globally diverse research on assortment size effect in Asia and Far-East regions.
- Need more non-experimental studies to assess assortment size effect and its moderators.
- Need for separately studying assortment addition effectiveness and deletion effectiveness.
- Need for studying non-linearity (U-shaped function) and identifying optimal assortment size.
- Need for more in-depth study of moderators and mediators of assortment size effect.
- Need for focus on profitability of assortment size change as opposed to perceptions.
- Need for focus on other retail formats besides grocery supermarkets.
- Need for more study of assortment size effects in online and multi-channel shopping

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Supplementary materials

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