ORIGINAL ARTICLE



Evaluating the durability of brand alliances using Bayesian methods

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Abstract This study examines the duration of brand alliances (or co-brands), a brand strategy in which two brands are offered as one joint product. Previous research has suggested these alliances are short-lived, but little empirical evidence exists to explore what may drive the longevity of such alliances. The study uses actual market data for 524 brand alliances in 83 product categories of consumer packaged goods during a 13-year period. Controlling for market share, several factors that might influence brand alliance duration are examined: type of alliance, ownership by the same parent company, and the number of relationships. Using a Bayesian hazard model to estimate duration, the results show a brand alliance lasts longer if it is an ingredient brand alliance (rather than licensed) and both brands are owned by the same parent company. Additionally, having more partnerships helps a brand alliance last longer, but too many alliances have a negative effect on staying in the marketplace. The findings suggest that brand managers looking to enter into a brand alliance can anticipate how long the product might last based on these partnership factors.

Keywords Brand alliances · Co-brands · New products · Bayesian hazard model

Introduction

A growing strategy among managers is the use of brand alliances, or co-brands, which feature two brands in a single product (Keller 2013). Chiefly, the primary brand imports the brand equity of a secondary brand to offer a unique value proposition to consumers (Uggla 2004; Koschmann and Bowman 2016). Brands are a key asset of firms as a resource for obtaining competitive advantage (e.g., Grant 1991); strategic alliances represent the collaboration between two or more firms to share resources or information (Besanko et al. 2007) and have become "common and important structural vehicles for business development" (Albers et al. 2016, p. 582). Indeed, the practice of brand alliances has grown from 3.5 to 6% of all new consumer packaged goods launched in the USA (Schultz 2014).

Although brand alliances are of growing importance to managers, less understood is how long these alliances last in the marketplace. Whereas prior research has taken an internal approach of the firm regarding alliance duration (e.g., Harrigan 1988; Park and Russo 1996), few studies have approached the issue from a market performance aspect. Indeed, only scant research has explored market effects of brand alliances (e.g., Desai et al. 2014; Koschmann and Bowman 2016; Swaminathan et al. 2012). More recently, research has found that brand alliances reduce the brand equity of the primary brand (Koschmann 2017). While these studies have emphasized the outcome, another aspect of brand alliances is the process and duration.

This study makes three contributions to the brand alliance literature. One, the research proposes that the type of brand alliance, parent company ownership, and the number of brand alliances have an effect on how long a brand alliance persists in the market. Drawing on brand strategy

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research, it is proposed here that ingredient brand alliances (where the fundamental product composition is changed: Keller 2013) last longer than licensed brand alliances. Additionally, when both the primary and secondary brands are owned by the same parent company the brand alliance survives longer. Furthermore, if the primary brand engages in more brand alliances, this should lead to longer alliance durations; however, too many alliances will hasten any single alliance to exit from the market. Second, whereas prior brand alliance research has often used consumer survey data (e.g., Decker and Baade 2016; Dickinson and Heath 2006; Simonin and Ruth 1998; Van der Lans et al. 2014), the theories are tested using large-scale aggregate field data of consumer purchases. The data cover the market performance of 524 brand alliances across 83 product categories of consumer packaged goods sold in the USA during a 13-year period. Third, the data are examined using a Bayesian hazard model. The findings show that most brand alliances are short-lived; the median duration is 2 years. However, this average masks some issues of interest to managers. Brand alliances that are licensed in nature (vs. those that utilize the secondary brand as an ingredient or component) last much shorter, on average. When the parent company owns both brands, there is no significant difference in survival when compared to brand alliances that are not owned by the same parent company. Finally, the number of brand alliances a brand engages in is more likely to keep any particular brand alliance, on average, in the marketplace. However, too many alliances have a negative effect on keeping any particular brand alliance in the marketplace.

This article is organized as follows: First, theory is developed around the types of brand alliances and their durations. Then, the theories are tested using a Bayesian duration (hazard) model for continuing in the marketplace. The research concludes with a discussion of the empirical findings, implications for managers, and avenues for future research.

Theoretical development

Nature of brand alliances

Brand alliances (or co-brands, used hereafter interchangeably) represent two brands jointly presented as one product offering (Keller 2013). Brand alliances are a subset of broader strategic alliances, in which "two or more firms agree to collaborate on a project or to share information or productive resources" (Besanko et al. 2007, p. 150). A key distinction is the use of the brand and the meanings each brand has with consumers. Unlike a joint venture, which pools resources to create new and separate enterprises (Anderson 1990), brand alliances seek to operate within the existing product space of the brands. Whereas a strategy like a brand extension seeks to export the brand equity to a new product category, the brand alliance aims to import the brand equity of a second brand to aid the primary (or focal) brand in its existing category space. For example, when laundry detergent Tide includes cleaning spray Febreze as an ingredient in its product, the resulting brand alliance is Tide with Febreze as a laundry detergent. In doing so, Tide seeks to leverage Febreze's brand equity by operating as the primary brand with Febreze as the secondary brand.

Several reasons motivate the primary brand's inclusion for the secondary brand. The addition of a secondary brand helps to create differentiation and further signals the brand equity of the primary brand (Rao et al. 1999). The secondary brand also adds to the value proposition by bringing its own brand equity (Desai and Keller 2002), raising the perception of the brand alliance. Additionally, consumer familiarity with the secondary brand may induce consumers to purchase the brand alliance product, benefitting the primary brand.

Brand alliance duration

Since brand alliances are designed with a mutually beneficial arrangement in mind, of interest to managers is how long these products survive in the marketplace. Previous research has shown that approximately half of new electronics brand alliances lasted four or fewer years (Park and Russo 1996) and the majority of durable goods last less than 4 years (Harrigan 1988).

With this in mind, several factors may underlie why brand alliances could be short-lived. One aspect is that the brand alliance will compete against the existing brand in the marketplace. In doing so, it could not be expected to overtake the primary brand, but merely act as a supplemental offering for variety-seekers. As a differentiated offering, it might be picked up by consumers stockpiling the primary brand, but as a complement rather than a core offering.

Another challenge working against the brand alliance is how to deal with opportunism. While slow sales may put a premature end to the relationship, success may also expedite the end of the relationship. One explanation for this is that marketplace success may induce one party to demand a larger share of the rewards. Indeed, "pie sharing" is a complex process, particularly when resources and uncertainties are apparent (e.g., Jap 2001). Considering these challenges, brand alliances are likely to be short-lived in nature. **P1** Brand alliances are short-lived in the marketplace.

Brand alliances types

Brand alliances are frequently treated as one of two types (Keller 2013): the name or likeness of one brand is lent to another (licensing alliance), or the inclusion of a second brand to fundamentally change the product composition (ingredient alliance). The previously mentioned Tide with Febreze represents an ingredient brand alliance, as the formula for Tide laundry detergent is altered by the inclusion of Febreze. A licensing example might be Betty Crocker brand fruit snacks use the image and likeness of Spider-Man or Captain America on the package of its fruit snacks. Licensing might also take the form of sponsorships, such as New Era Cap Company's agreement with the Buffalo Bills to rename the stadium New Era Field.

Licensed brands face a challenge by delivering more value that is symbolic in nature rather than functional (Chernev et al. 2011). This symbolic benefit of the brand is largely derived from the image of the brand. Image-related lifecycles, such as style, fashion, and fads (Kotler and Keller 2012), often have shorter periods in the marketplace. One explanation for this is that licensing is often tied to brands popular at the moment and is treated like fads (Keller 2013). When the secondary brand is an ingredient, it is likely a mature brand. As a mature brand, it has built its brand equity over time. The brand manager is careful to not overexpose the brand, which could diminish brand equity (Uggla 2004). A challenge for the brand alliances is that sales of the brand alliance come at the expense of the primary brand and reduce brand equity (Koschmann 2017). Given these beliefs regarding how licensed and ingredient brand alliances view the marketplace, one would expect that ingredient brand alliances last longer, on average, than licensed brand alliances.

H1 Ingredient brand alliances survive longer than licensed brand alliances.

Brand alliance ownership

While ingredient brand alliances are believed to last longer than licensed brand alliances, of further interest is how survival varies when a parent company owns both brands in the alliance. One view is that in owning both brands, the parent company may be trying to achieve some form of reduced transaction cost or governance. By owning both brands, the parent company is likely to have some degree of shared cultures, processes, and production. This may reduce complexity, which is associated with reduced transaction costs (Choi and Krause 2006). Alliances, as a relationship mechanism, can create competitive advantages (Dyer and Singh 1998), which should aid the brand alliance in market performance. By performing well, the brand alliance is more likely to stay in the marketplace.

An alternative perspective is that when firms own both brands, the firm may keep the brand alliance in the marketplace longer to recover some perceived cost. The sunk cost fallacy (e.g., Arkes and Blumer 1985; Kahneman and Tversky 1979) suggests that individuals may be more inclined to stick to a losing proposition if a considerable cost has already been paid, rather than cutting one's losses. Owning both brands in an alliance removes any loss of control (Uggla 2004). By owning both brands, managers may feel that since a prior cost was incurred to acquire (or at least to maintain) the brands, further efforts should be expended to "milk" the brand as much as possible. While a price may have been paid previously, the need to do as much as possible to monetize the brand-even if the gain is less than what might be achieved through other opportunities-may induce managers to keep a branded alliance in the marketplace beyond its peak performance. With these considerations in mind, it is proposed that brand alliances in which the brands are owned by the same parent company should last longer in the marketplace.

H2 Brand alliances in which the parent company owns both brands last longer than those brand alliances not owned by the same parent company.

Number of brand alliances

An additional aspect of brand alliances is how many alliances the primary brand can realistically manage. One position is that the focus of strategic alliances is on learning (Larsson et al. 1998) as a means of gaining competitive advantage. Learning includes exploration of the brand's boundaries, particularly in terms of what it can push on competitive frontiers. It also acts as a means of gathering information about other brands in coalition building. As the primary brand learns from each additional alliance, it gains knowledge and insight into improving partnerships and achieving economies of scale. Learning, arising both internally and externally, affects proprietary processes and assets (such as brands) to create competitive advantage (Schroeder et al. 2002). As the primary brand engages in more alliances, it should learn more about these processes and outcomes. This enhanced learning should lead to greater likelihood of successful market performance, to which managers will be more inclined to keep the brand alliance products in the marketplace longer.

H3a Increasing the number of brand alliances by the primary brand is positively associated with survival of its brand alliances.

While previous research (Park and Russo 1996) has found a marginally positive effect of number of partners on failure, curvilinear effects may underlie this finding. Engaging in more brand alliances should increase the primary brand's chances of any particular branded alliance to succeed. Beyond a certain point, however, too many alliances may become an issue for the primary brand. The brand may extend itself to too many partners, increasing the possibility of negative spillover effects (Simonin and Ruth 1998) and potentially damaging brand equity. Even if there are no negative spillover effects, too many brand alliances may stretch the brand manager's resources too thin; there will be less time to maintain each brand alliance relationship. With less time to manage each brand alliance, the probability increases, on average, that any particular brand alliance might be eliminated.

H3b Beyond a certain point, the number of brand alliances is negatively associated with survival the primary brand's brand alliances.

Methodology

Method

To examine brand alliances durations, hazard models are used. Here, the focus is on the time until an event occurs, which is the time until the brand alliance leaves the marketplace. In exploring H1 and H2, a Bayesian analysis compares the two types of brand alliances by borrowing information from other observations to shrink the parameter estimates. The survival function, S(t), specifies the probability that exiting the marketplace (*T*) is later than some time, *t*, given time-invariant variables, *z* (e.g., Gardiner 2010):

$$S(t|z) = Pr(T > t|z).$$
(1)

The complement, F(t), specifies the cumulative probability of failure:

$$F(t) = 1 - S(t).$$
 (2)

From this, f(t) is the derivative of F(t), denoting the rate of failure. The hazard function, $\lambda(t)$, then becomes the proportion of failure rate to survival:

$$\lambda(t) = \frac{f(t)}{S(t)}.$$
(3)

Logistic regression is used with brand alliance outcomes of either being in the final year or a continued year of being in the marketplace. The model appears in Eq. (4):

$$F(x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}.$$
(4)

Here F(x) is the probability of the brand alliance continuing in the marketplace, or $Pr(Y_{it}=Continue \mid X)$ for brand alliance *i* at time *t*, while *X* represents a vector of predictor variables. To further examine H1 and H2, in addition to H3, the key variables of market share, brand alliance type, parent company ownership, and the number of alliances are considered as predictors.

Data

The context of consumer packaged goods makes for a suitable area to test the proposition and hypotheses, as it encompasses many brands and brand alliances are a common approach. While prior attention has been made to more durable goods (e.g., Harrigan 1988; Park and Russo 1996), the area of consumer packaged goods has been paid less attention regarding brand alliances. Brand alliance data come from Information Resource Inc. (IRI) as its Marketing Fact Book. IRI annually published these data through its Builders Suite program. The annualized data provide aggregate measures of purchase data from approximately 55,000 households in the panel for about 300 product categories. Data are broken out at three levels: category (e.g., soft drinks), category type (e.g., low-calorie soft drinks), and product (e.g., Caffeine-Free Diet Coke). For example, within the "baking mixes" category, Jell-o with Oreo (as a "coffee cake/ginger bread/pastry mix" category type) achieved 4.6% volume market share within the category type. Although many brands and products exist in the marketplace, IRI sets a minimum threshold: For a product to be reported in the data set at least 0.5% of households purchased the product. This helps to minimize survivor bias, as only brands with some meaningful purchase activity are included.

The data set covers 13 years of annual data, from 1999 to 2011, the last year that IRI made available the Marketing Fact Book. The, 1998 data were also collected, but were excluded to remove any brands that were left-censored (i.e., their introduction year to the marketplace was unknown). Brand alliance products were often apparent, such as "Tide with Febreze" or "Crest SpongeBob." To validate the data, two separate judges were each given the same 20% sample of IRI data. Each judge was asked to determine whether a listed product appeared to be a brand alliance or not. Inter-coder reliability was 99%, with the remaining 1% resolved through discussion.

From this 13-year span of data, 524 branded alliances were identified. This included 138 unique primary-category brands from 83 product categories. The product categories could be further classified into 128 subcategories, or category types as labeled by IRI. These brand alliance products tallied 1687 brand-year observations. Some brands

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appeared in more than one category. For example, Betty Crocker produces baking mixes as well as fruit snacks. It was listed for each product category. This is because the brand might have different brand equities across product categories and faces different competitive and product category environments. Several other considerations affected whether a product was included in the data set. First, each brand had to exist as its own product offering. For instance, Pillsbury markets some of its baking mixes with Funfetti sprinkles. While Funfetti is indeed an ingredient, and its packaging carries a registered trademark, the product is unavailable as its own stand-alone purchase offering. As such, it has no chance of forming brand alliances with other brands. Second, the brand alliance focuses on the branded product, not the corporate brand. Consider breakfast cereals: When a consumer shops for breakfast cereal, the consumer is looking for a particular brand, such as Apple Jacks or Frosted Flakes and not the corporate brand, Kellogg's. Instances where only the corporate brand appeared as part of an alliance were excluded.

Results

Of the 524 brand alliances in the data, most are relatively short-lived, with 34.2% showing 1 year of data. Furthermore, 58.1% of brand alliances had 1 or 2 years of data, and 77.8% had three or fewer years of data. Table 1 presents the descriptive statistics for the durations of the brand alliances identified in the data set. Across the various types of brand alliances (all alliances, ingredient alliances, parent-owned alliances), the median is 2 years, suggesting that brand alliances are short-lived in the marketplace, evidence of P1. Some examples highlight this variation in brand alliance duration; Farley's fruit snacks with Hawaiian Punch and Teddy Grahams cookies with Rugrats characters each had 1 year of observation, and Bull's-Eye Barbecue Sauce with Guinness lasted 2 years. Other relationships lasted longer, such as Speed Stick deodorant with Irish Spring (5 years), One-A-Day vitamins with Scooby Doo (6 years), and Bounce dryer sheets with Febreze (7 years). Further still, some brand alliances give a long-term

Table 1 Descriptive statistics of brand alliance durations (in years)

Duration	Ν	Mean	Median	SD	Min	Max
All	524	2.70	2	2.00	1	11
License	399	2.58	2	1.90	1	11
Ingredient	125	3.06	2	2.24	1	11
Parent-owned (no)	70	3.17	2	2.43	1	11
Parent-owned (yes)	55	2.91	2	1.99	1	9

impression: Apple & Eve juices with Sesame Street, Band-Aid bandages with Barbie, and Keebler pie crust with Hershey's each ran the full 11 years of observable data.

The analysis uses n = 1523 brand-year observations, which excludes the final year of the data due to rightcensoring (164 observations). H1 and H2 are estimated using a Gibbs sampling chain of the posterior distribution, fitting to a Weibull distribution. The method uses a burn-in period of 10,000 iterations, with 50,000 iterations thereafter. The Markov chain is thinned every 5th sample and uses an uninformative (uniform) prior.

While the medians are the same, there appears to be variation in the mean durations. To analyze this, Eq. (3) compares the hazard ratio estimates among the types of brand alliances using the procedure described in the previous section. Looking at ingredient (n = 125) versus licensed brand alliances (n = 399), ingredient brand alliances last significantly longer in the marketplace $(\beta = -.502, p < .01)$, supporting H1. Since the outcome relates to survival, a negative coefficient indicates decreasing hazard (and longer survival). The hazard ratio becomes the exponent of -.502, or .606. Thus, ingredient brand alliances have a hazard that is only 60.6% that of licensed brand alliances, indicating these significantly survive longer on the marketplace. This is further illustrated in Fig. 1, which shows the comparison between the two groups' means and 95% highest posterior densities of the credible intervals.

A further look at brand alliances tests H2, which suggests that brand alliances in which a parent company owns both brands should last longer in the marketplace. Again using Eq. (3), parent-owned co-brands (n = 55) do last longer in the marketplace when compared to those not owned by the same parent (n = 70), but the result is not statistically significant ($\beta = -.382$, p > .10). As such, H2 is not supported. Figure 2 highlights this comparison.

An additional consideration is whether these brand alliances are linked to managers' likelihood of keeping the product in the market. While prior research has shown that there is no self-selection bias to enter a brand alliance (Koschmann and Bowman 2016), there may be factors that influence the decision to exit the marketplace. Indeed, time-varying items such as the performance of the brand alliance (through measures such as market share) may induce managers to end the brand alliance. Another timevarying consideration is the number of brand alliances the firm is currently engaging in, which may also affect the decision to withdraw from the marketplace. Table 2 reports several iterations of Eq. (4) to build up the model; the table presents the log-odds ratio estimates and highest posterior densities for the outcome in favor of continuing the brand alliance.





Fig. 2 Durations comparing parent-owned versus nonparent-owned brand alliances, with 95% highest posterior densities (HPD) shown



lends further support for H1. When the same parent company owns both brands ($\beta = .64$, p < .05), the brand alliance is more likely to continue staying in the marketplace. While H2 was not previously supported, this adds partial support that may have been masked due to the inclusion of censored observations. Thus, H2 is supported here.

The number of alliances that the primary brand engages with in time t ($\beta = .01, p > .10$) is not significant, failing to support H3a. However, the hypotheses speak to diminishing returns, suggesting the effect is curvilinear rather than linear. When this is addressed in Model 3, the hypothesized **Table 2** Log-odds ratios oflogistic regression on decisionto continue brand alliance

Variable	Model 1		Model 2		Model 3	
	Coefficient	SD	Coefficient	SD	Coefficient	SD
Intercept	0.572	0.073***	0.414	0.107***	0.201	0.145*
Share	33.571	5.837***	28.823	5.860***	28.610	5.809***
Ingredient			0.408	0.174**	0.423	0.174***
Parent			0.641	0.268**	0.673	0.267***
Number alliances			0.007	0.011	0.091	0.042**
Number alliances ²					- 0.005	0.002*
DIC	1803.7		1782.5		1779.9	

N = 1523. SD represents standard deviation from highest posterior density

Significance levels: *p < .10; **p < .05; ***p < .001

effect is found: The more brand alliances that a primary brand undertakes is positively associated with keeping any one brand alliance in the marketplace ($\beta = .09$, p < .05); however, too many brand alliances have a negative effect on continuing any one brand alliance ($\beta = - .01$, p < .10). This lends support to H3a and H3b, which proposed that firms may be realizing an increase in efficiency or learning from additional brand alliances, but too many alliances may be too much for the primary brand to adequately handle.

Several robustness checks were also performed. Equation (4) was re-estimated using random effects to account for potential differences across primary brands. The results did not substantively change. Equation (4) was also re-estimated with the inclusion of the prior year's market share. One possibility is that managers may be committed to another year of keeping the brand alliance in the market, but lower performance may induce the manager to cut back on next year's marketing investment. When included, prior year share was not statistically significant.

Discussion

Contribution

This study examines the duration of brand alliances in the marketplace, making several contributions to the brand alliance literature. One is that while that these alliances last for a short time, this research proposes several factors that should affect brand alliance duration: type (ingredient vs. licensed), parent company ownership (namely if both brands are owned by the same parent firm), and the number of brand alliances (up to a point).

Two, the study makes use of a unique set of aggregate consumer panel purchase data which cover actual market performance of brand alliances during a 13-year period. A total of 524 brand alliances were identified across 83 product categories. While previous research has looked at particular types of brand alliances (such as ingredient cobrands) or treated the phenomena as a case study approach using a few well-known brands, this larger data set gives a different picture of how brand alliances perform in the marketplace. Using the context of consumer packaged goods, the median duration time was 2 years, with a third of brand alliances lasting just 1 year.

A third contribution is the findings. Although median duration was 2 years across all brand alliances, different duration patterns existed. Using Bayesian hazard models, ingredient brand alliances survive longer in the marketplace than licensed brand alliances. One explanation for this is that ingredient brand alliances emphasize the functional aspect of the brand and likely take a long-term view of the brand equity of the brands involved. Further segmenting ingredient brand alliances into those products in which the parent company owns both brands, there was no significant difference in survival. However, this idea was revisited using a Bayesian logistic regression with the outcome being the decision to stay in the marketplace or exit. When performance (market share), ingredient and parent-owned indicators, and the number of brand alliances are accounted for, brand alliances are more likely to continue in the marketplace when the parent company owns both brands. Additionally, the number of alliances that the primary brand undertakes is also a factor: Being in more partnerships increases the chances of any particular brand alliance of continuing in the marketplace. Yet, too many alliances have a negative effect, highlighting that a brand may have spread itself too thin and may need to end some partnerships.

Managerial implications

The findings highlight several implications for brand managers considering using brand alliances. First, brand alliances are relatively short-lived in the marketplace. Although brand alliances are a growing strategy for new product launches, managers should not anticipate longevity of these products. One possible explanation for this is that these alliances are designed to be short-lived, especially for licensed brands (e.g., movie or event tie-ins).

Second, while brand alliances that are ingredient based or owned by the same parent company last longer, on average, managers should consider the impact of learning from brand alliances. That is, additional brand alliances may help the manager learn and adapt best practices. However, too many brand alliances may hinder the manager's ability to adequately maintain any particular brand alliance. As such, managers of the primary brand will want to assess how many brand alliances can be reasonably managed without spreading the brand's resources too thin.

Limitations and future research directions

Amidst these contributions, several limitations are worth noting. One, the data set consists of brand alliances that have achieved some degree of relevance in the marketplace. IRI has set a minimal threshold (0.5% of households purchasing the product) for reporting product market performance. This study should motivate future research involving new data sets that might address this. Two, other considerations may highlight the decision to exit the marketplace, which may or may not be up to the brand manager. While prior research has shown that there is no selfselection bias for deciding to enter into an ingredient brand alliance (Koschmann and Bowman 2016), a product may intentionally have a limited shelf-life regardless of market performance. Data that incorporate this information from inside the firm may help answer this.

Although working with consumer packaged goods is a particular product arena, it presents an opportunity in other settings. Brand alliances are frequent practices in other areas such as services. One such example is the Delta Airlines credit card by American Express. Brand alliance processes and outcomes in these contexts are less known. Another avenue is the long-term effects of brand alliances. While most brand alliances are relatively short-lived in the marketplace, there may be persistent, long-term effects. These effects could occur for both the primary brand and secondary brand. Finally, while some existing research has examined brand alliances from inside the firm, a more comprehensive look at sharing and outcomes could be of interest. Not only would investigating profitability (and how profits are split between the brands) be of interest to managers, but also the impact of transaction costs and governance.

Compliance with ethical standards

Conflict of interest The author declares that there is no conflict of interest.

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