

## **The effect of cumulative category and brand growth on competitive intensity**

### **Short Abstract**

The Duplication of Purchase Law states that brands share customers in line with their size, not their positioning. Expected customer sharing between any pair of brands can be benchmarked using the duplication matrix sharing-coefficient. D-values can be interpreted as a summary measure of competitive intensity, but research has yet to explain why they differ between categories and over time. In equilibrium markets, both category and brand penetrations increase cumulatively so there is every reason to expect that values might vary. To test this, we examine the effect of cumulative penetration growth in six consumer goods categories to find that the Duplication of Purchase Law holds even over five years. D-values are however dependent on category saturation and only stabilise once total buyer numbers peak. This is important because it shows how brand growth depends on not just increasing penetration, but also on high levels of switching from other brands' buyers.

**Keywords:** *Duplication of Purchase, Duplication Coefficient, Brand Repertoire, Brand Switching*

**Track:** *Marketing Analytics, Methods and Modelling*

## Introduction

In stable consumer packaged goods (CPG) markets, brand repertoires emerge over successive purchases but at heterogeneous rates defined by category purchase rates (Ehrenberg et al., 2004). The extent to which brands then share customers (Duplication of Purchase (DoP)) is a measure of competitive intensity, but one that may be time dependent. Between equal successive periods, most buying metrics remain stable (Graham et al., 2017), including repertoire size (Dawes et al., 2015) and the DoP coefficient (D-value), which is the relative customer sharing between brands. However, this loyalty view does not reflect cumulative analysis (e.g., comparing continuous buying metrics in one and five years) showing that repertoire, category and brand penetrations all increase with time (Banelis et al., 2013). We, therefore, report short and long-term customer sharing between brands in the context of cumulative buying behaviour. We contribute theoretically by validating the extended use of the D-value and managerially by showing the relative effect of penetration growth on loyalty.

## Background & Conceptual Model

Category penetration grows over time as ever-lighter buyers make a purchase. At the same time, brand penetrations grow as household repertoires expand (Ehrenberg, 1988) so that a brand's customer base at five years is larger than at one, even though its share remains the same. But, customer-sharing between brands increases over time as more buyers switch between more alternatives over longer sequences of purchases (Stern and Hammond, 2004). Although annual buying metrics remain stable from one year to the next, the surprising fact is that they reflect the buying of a mix of heterogeneous households. Any long-term behavioural loyalty measure, including DoP, may, therefore, diverge from an annual measure.

DoP analysis reveals the percentage of customers that one brand shares with another within a category. It provides managers with knowledge of which brands they compete with, and how many customers they share with them. The analysis creates a sharing matrix containing the percentage of a brand's customers who also bought a competitor brand, i.e., the proportion of buyers of brand 'X' who are also buyers of brand 'Y' (Sharp et al., 2003). This type of analysis led to the empirical generalisation that brands share customers with competitors in line with how large those competitors are, and not with how they are positioned (Ehrenberg & Goodhardt, 1970). Since brand size (penetration) and brand duplications are normally almost perfectly correlated, the intensity of category competition can be summarised as the ratio between their means, the duplication coefficient "D", is then used to predict expected sharing.

Scriven & Danenberg (2010) show how D-values may be interpreted. They report that in a year D normally takes a value between one and two. When  $D=1$ , a buyer of Brand X is just as likely as any other household to buy any other brand. When D is higher, say at 1.3, it means a buyer of X is 30% more likely to buy Y too, just because they have bought X. D can exceed 2 in categories with many light or non-buyers and many heavy ones (pet food, for example), or when consumers establish wide brand portfolios over successive purchases, e.g., in categories such as confectionery. D-values under 1 mean buyers of X would be relatively less likely to buy Y. This might be because the analysis period is so short that few buyers have bought any other brand at all. Few buyers can be "shared" because repeat purchase is low.

The DoP is highly generalised, but Corkindale et al., (2013) notes that its time sensitivity has not been widely examined and Scriven & Danenberg (2010) reports that different category values remain unexplained. As D-values are useful summary measures of loyalty that manager can easily derive, we address these two gaps by observing the evolution of the D-value in cumulative continuous buying in different markets between one and a five-years.

## Method

Annual and cumulative brand and category performance metrics were extracted from a five-year panel of continuous UK reporters in six CPG areas covering food, and personal and household care to conduct the analysis. Half achieved almost total household reach within a year; half were far smaller with annual penetrations ranging from 50% to 25%. All six were identified as near stationary with little change in the category or brand size from year to year. Four effects of interest were then compared (Table 1); cumulative growth between one and five years in the category and average brand penetrations and, from duplication of purchase tables, the change in the average brand duplication % and the D-values for each category.

## Results and Discussion

Table 1 documents brand and category penetration growth over five years, and the differential effect that this has on customer sharing. The largest categories achieve near-total household penetration in the first year, adding only eight points over five years. The three small categories expand much further, attracting up to 100% more buyers. Average brand penetrations grew rather more, doubling on average in five years, but tripling for smaller categories. Therefore, more than half of a brand's buyers did not buy that brand in the first year. When they did buy, they were more likely to be (1) new category buyers in smaller markets, (2) switchers in bigger categories and (3) light or very light buyers of the category or brand in both cases because consistent growth in average duplication from near 20% to over 40% across categories represents a substantial increase in sharing and repertoire over time.

Table 1: The effect of penetration growth on customer sharing intensity

Category	Category Pen.		Avg. Brand Pen.		Avg. Dup. %		D-Values	
	1 Yr	5 Yrs	1 Yr	5 Yrs	1 Year	5 Yrs	1 Year	5 Yrs
Laundry Detergent	91	99	19	39	21	45	1.1	1.2
Biscuits	90	98	30	55	38	64	1.3	1.2
Toothpaste	88	98	17	35	20	42	1.2	1.2
Male Deodorant	51	76	8	22	17	38	2.1	1.7
Shampoo	34	53	6	15	16	37	2.7	2.5
Choc Ices	25	57	2	11	9	20	4.5	1.8
<b>Average</b>	<b>63</b>	<b>80</b>	<b>14</b>	<b>30</b>	<b>20</b>	<b>41</b>	<b>2.2</b>	<b>1.6</b>

The D-value is time-sensitive only in relation to cumulative category growth. When saturation is quick, values hardly changed between periods of different length, but in slower developing categories, D-values started above 2 but fell with further purchasing. Although all brands shared far more of their increasing customer base with rivals, it was not a “free for all” - correlations between penetration and duplication were always high ( $r= 0.98$  or more), so the DoP Law was never violated, even though D-values changed dramatically.

## Implications for Theory and Practice

The study makes major contributions to the modelling of long-term buying. Findings validated the DoP to benchmark expected sharing in the long-term customer base. It added to the interpretation knowledge of D-values, which are influenced by category growth rates. Scriven and Danenberg (2010) were intuitively right. In one year the high D-values (low loyalty) in shampoo, choc-ices and male deodorant are brought about by low penetration, not unusually high sharing. But, as many more, lighter buyers make successive purchases, a more “normal” D-value is established. This has never been discovered before and highlights all brands need penetration growth just to maintain share over time. Because brands share proportionately more of their customers in five years than in one, stable market performance depends partly on loyalty but also on its exact opposite – switching – attracting customers as they churn around rival brands. Our findings support the notion that household repertoires must grow over time and with successive purchases, but further research is now needed to account for the effects of category and brand purchase incidence heterogeneity in this process.

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