Are Manufacturers Cleaning Up?

The Hidden Vacuum Cost of Ownership

Stephen B. Pociask

October 5, 2010

Released by The American Consumer Institute
Center for Citizen Research

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Executive Summary

Vacuums are one of the most common household cleaning devices, with a complex and wide variety of features, quality, functionality and price. While consumers look to retail price as an easy way to compare brands and models, understanding the total cost of owning and operating a vacuum cleaner is difficult, and most often missing from the upfront buying process. Yet, once consumers buy a vacuum cleaner, they are often unwittingly locked into buying the expensive accessories required for its operation – including bags, belts and various filters. In addition, vacuum cleaners can be costly to service and repair, which makes warranties an important consideration. Besides features, consumers need to know the price and all of the variable costs associated with using and maintaining their vacuums, or what this study refers to as the total *Vacuum Cost of Ownership*. This study calculates the Vacuum Cost of Ownership (VCO) for popular U.S. brands and models over a five-year period. The findings are as follows:

- The variable cost incurred to operate vacuums is often greater than the upfront price. In one illustration, the five-year Vacuum Cost of Ownership was estimated to be seven times the price of the vacuum.
- Less expensive vacuums tend to have higher hidden costs and lower quality. One consumer may buy a low-end $50 vacuum, only to spend $300 in additional costs over the first five years of ownership.
- Higher-priced vacuums tend to have lower repair costs, but many still have high variable costs, resulting in hundreds of dollars of hidden expense.

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* This study was conducted by TeleNomic Research and was supported in part by an unrestricted financial grant from Dyson. Because of its consumer research content, it is being released by the American Consumer Institute Center for Citizen Research (ACI), a nonprofit research and education organization. ACI received no funding for the study or its release. The author wishes to recognize and thank Professor Joseph P. Fuhr, Jr. for his insightful comments to this study. The views, analyses and conclusions expressed in this study are those of TeleNomic Research.

This study shows that consumers may be much better off paying a little more upfront to buy vacuums with low or no variable costs. Unfortunately, it is difficult for consumers to identify these hidden costs, leading some consumers to buy cheaper and lower-quality brands and models, only to pay much more than they would have paid over the years. As the adage goes, "you get what you pay for."

The problem, in substantial part, is that consumers do not have readily available the information they need to make rational cost-comparative choices among manufacturers. Consumers are well-informed of the upfront costs of vacuums, but it is harder for them to determine the annual or lifetime cost of maintaining and operating these vacuums. Lured by the low-cost vacuums, consumers wind up signing what is effectively a long-term lease for the purchase of higher-priced accessories – bags, belts and filters. This asymmetric information serves the interests of producers, but not the interests of consumers. The overall impact of current pricing practices results in a transfer of economic wealth from unwary consumers to suppliers, over the useful life of these products. Inadequate consumer information also serves to heighten barriers to entry of firms with more consumer-friendly pricing strategies and propositions.

The answer to the problem is simple – manufacturers should disclose these hidden costs in order to give consumers better information to compare brands and models. This can be accomplished with Federal Trade Commission action to develop an industry standard to help consumers make product comparisons.

This study proposes using the *Vacuum Cost of Ownership* as a common standard that would allow consumers to make informed market decisions which will better suit their needs and save them money. In turn, this will encourage competition in the market for vacuums with lower variable costs. Better informed consumers and increased competition is a recipe for maximizing consumer benefits and savings. For consumers, the current system of hidden costs provides neither.

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I. Introduction and Purpose

Consumer choice among vacuum cleaners has expanded to embrace wide ranges in price, functionality, quality, and assorted minor and major product differentiating characteristics. Models vary by type (upright, canisters, robotic and cordless handheld), while some are bagless, others provide sealed HEPA filtering, as well as other features.

For the ordinary household, choosing among competing brands and models is both a complex and potentially costly undertaking. Vacuum cleaner models offer different degrees of quality, styling, suctioning and warranty coverage; and they cover a wide range in prices – from less than $50 to $1,200 per vacuum. Annual spending on vacuum cleaners is quite sizeable, totaling approximately $1.4 billion in shipments value and $1.9 billion in consumer expenditures per year.[1]

However, a sizable portion of consumer spending is not the upfront price of the vacuum itself, but the service maintenance and accessories needed for operation, such as bags, belts and filters. In fact, the upfront price does not, in most cases, reflect what this study refers to as the total *Vacuum Cost of Ownership*. In other words, while vacuum prices are apparent to consumers at the checkout register, the longer term cost of owning and operating these vacuums is not obvious. Without fully understanding the Vacuum Cost of Ownership, consumers may be misled into purchasing inferior vacuums and vacuums with higher ownership costs.

[1] See U.S. Census Bureau "2008 Annual Survey of Manufacturers," Value of Shipments for Product Classes, Sector 31, NAIC 335212 (household vacuum cleaners) downloaded August 13, 2010; and U.S. Census Bureau "2008 Consumer Expenditure Survey," Table 1202, electronic home cleaning equipment (the average expenditure per household is $16.04 times 120.8 million households).

The problem is that consumers are trying to save money by reducing their upfront price, while not realizing that they may be purchasing a vacuum with a much higher long term operating cost that comes in the form of bags, filters, belts and repairs. The cost of operating vacuums is seldom apparent to consumers and that is the hypothesis that this study sets out to test.

The purpose of this paper is to illustrate these hidden costs by examining the fixed and variable costs associated with buying and operating household vacuums, and to propose a new metric to help consumers quantify the real cost of the vacuums they buy. If manufacturers fully disclosed these costs, then consumers would know the Vacuum Cost of Ownership and would have the right information to make the best choice to suit their needs. In the absence of this information, however, they are needlessly overpaying on hidden costs, and manufacturers are cleaning up.

II. Theoretical Discussion of Pricing and Asymmetrical Information

A. Razor-and-Blade Pricing

The pricing practice of many vacuum cleaner manufacturers is to integrate the supply of machines with the demand for disposable consumer goods, like bags, belts and filters, a strategy often likened to the so-called *razor-and-blade pricing model*. The name derives from the practice of the inventor of disposable razor blades, King C. Gillette, who commenced more than a century ago the marketing practice of selling the permanent platform (razors) at or below cost and the consumable complement to the platform (blades) at a significant mark up over cost.

The basic economics of the razor-and-blade pricing model derive from a combination of interrelated phenomena: a) product complementarity; b) switching costs; and c) consumer lock-in. Products are complementary when the value of one is related closely to, or entirely dependent on, the presence of another. Ownership of the device creates an obstacle and cost to switching, thereby locking consumers into buying costly supplies in order to operate the device.

Other examples of razor and razor blade pricing model include mop handles and heads, operating systems and software, iPods and iTunes, and game platform devices and games. In many cases, consumers can do a little bit of upfront research and understand, in general, the fixed and variable costs of the product, and decide if the purchase makes sense for them.

On the other hand, sometimes the variable costs are not so obvious. For example, many consumers purchase low cost inkjet printers without fully understanding the ink costs incurred during printing – a cost which is dependent upon the cartridge price; cartridge yield; number of cartridges per printer; composition of printing monochrome, color and photos; and so on. The calculation of variable costs can be complex, can vary substantially from printer to printer, and are sometimes not made readily available to

consumers. Without fully understanding these hidden costs, consumers are potentially making costly choices. One study found that consumers are paying $6 billion too much on printer ink annually, because of these hidden costs.[2]

Similarly, vacuum cleaners often have variable costs that are difficult for consumers to determine when making their buying decision. This is because many household vacuum cleaners require specific bags, belts and filters to operate, though a few models require no additional accessories to operate. In our review of popular vacuum cleaner models, the price of a belt can vary from $1.49 to $15.68, a bag from $1.25 to $5.00, and a filter from $1.09 to $55.00, depending on the type, brand and model. This means that consumers wanting to know their Vacuum Cost of Ownership would need to identify and price the accessories, and estimate how often these accessories are normally replaced (under certain conditions), as well as the expected value of repairs over the useful life of the vacuum. That information is not readily available on the box, on the accessory packaging and rarely on the manufacturer's website or owners manual. Even if consumers could diligently do this research, it would be extremely difficult and time consuming to compare this information across brands and models. As a result, consumers are making decisions on which vacuum to buy based, in large part, on its upfront price, without knowing what the cost of operating the vacuum will be over, say, the next five years.

By not having this information at the time of purchase, consumers are locking themselves into buying the manufacturers' high-margin accessories, such as pre-motor filters and HEPA filters, in order to operate their vacuums. The degree of lock-in depends on the magnitude of switching costs, reflected by out-of-pocket expense to buy a new vacuum, inconveniences and other costs incurred by buyers as a result of changing

[2] For a detailed theoretical explanation of razor-and-razor blade pricing and its application to the printer and print cartridge market, see Larry F. Darby and Stephen B. Pociask, "Inkjet Prices, Printing Costs and Consumer Welfare," TeleNomic Research, November 19, 2007; and "What's the Real Cost of Owning a Printer? Lack of Industry Standards Leads Consumers to Overspend $6 Billion for Home Computer Printers Ink," ConsumerGram, the American Consumer Institute, Released November 7, 2008, online at http://www.theamericanconsumer.org/2008/11/07/what-is-the-real-cost-of-owning-a-printer-2/.

from one supplier or product to another. High switching costs make it difficult for competitors to win customers by offering superior or more cost-effective machines, because the lack of information adds to the cost of finding better substitutes.[3] As a result, consumers pay more and manufacturers profit from not disclosing these costs. Essentially, these variable costs are hidden from would-be buyers, who may unwittingly lock themselves into inferior or costly to operate products.

Product complementarity, switching costs and consumer lock-in, when taken together in the context of the vacuum and vacuum accessory market, give rise to market imperfections that could diminish consumer welfare by leading consumers to make upfront purchasing decisions with costly consequences. In essence, consumers may be spending more on operating their vacuum cleaner (buying bags, belts and filters) than the upfront cost of the vacuum.

B. Asymmetrical Information

Information about vacuum cleaners, their accessories and other costs at the time of purchase would provide consumers the ability to compare prices and lifetime costs across brands. So informed, consumers would be able to seek out products that suit both their needs and budget constraints. Clearly, the ability to do this kind of comparison shopping requires readily available information on all products. It also requires that cost information about vacuum cleaners and their accessories be symmetric in the sense that buyers and sellers have access to the same product and price information.

[3] Joseph Farrell and Paul Klemperer, "Coordination and Lock-In: Competition with Switching Costs and Network Effects," May 2006. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=917785 "Switching costs and network effects bind customers to vendors if products are incompatible, locking customers or even markets into early choices. Lock-in hinders customers from changing suppliers in response to (predictable or unpredictable) changes in efficiency, and gives vendors lucrative *ex post* market power over the same buyer in the case of switching costs (or brand loyalty), or over others with network effects." The antidote to switching costs and lock-in is interoperability or standardization among different primary and complementary products.

On the other hand, consumers are disadvantaged by imperfect or asymmetric information, when sellers have more and better information than buyers.[4] Unlike consumers in the textbook models of perfect competition,[5] consumers generally have an incomplete or inaccurate understanding of facts material to a particular choice. At the time of purchase, consumers may not be totally informed about the full costs of using a durable good – including the costs of repair, and, in particular, the costs of complementary products or services needed to use the good. The costs of acquiring pertinent information -- search costs -- are often substantial. Rather than bearing search costs, the outcome of which is not predictable, consumers often buy products about which they are poorly informed.[6] In the absence of information, consumers can make poor decisions that will not maximize their welfare. Also, the lack of information reduces market rivalry and lessens price competition in the market.

When it comes to consumers buying vacuum cleaners, they seldom know the cost of ownership, but manufacturers know full well that belts, filters and bags will need to be purchased. This asymmetric information disadvantages consumers and leads them to purchase higher-cost vacuums and, in some cases, inferior quality vacuums. Consumers need to have the information necessary to make good decisions, which, in turn, will

[4] The implications of imperfect information informing consumer choices have been intensively studied. An extensive review and summary is beyond our scope here, but we can recommend a handful of studies and the references they cite. See, Joan K. Lewis, Teresa Mauldin, "Returns to Investments in Information: Can Investments Reduce Bad Purchase Experiences of Consumers?" *Journal of Consumer Studies and Home Economics*, 20 (2), 183–199, 1996. The authors examine the impact of consumer information, information sources, information acquisition costs, and consumer demographics on "bad purchase" experience. The results suggest that age, education, extent of social contacts with relevant information and others were relevant. See also, George B. Sproles, Loren V. Geistfeld, and Suzanne B. Badenhop, "Types and Amounts of Information Used by Efficient Consumers," *Journal of Consumer Affairs*, Vol. 14, Issue 1, p. 37, June 1980. The paper examines the efficiency of consumer decision-making as indicated by the types and amounts of informational resources utilized. They classify consumers in three groups ranked by their relative efficiency in making optimal choices in the context of their wants/needs/preferences and the information available about alternatives. Taken together these papers indicate that inadequate consumer information leads to loss of consumer welfare; that information acquisition by consumers is often costly; and that investing in better information can lead to increased consumer welfare.

[5] For example, the model of perfect competition assumes that buyers and sellers have perfect information to make their buying and selling choices.

[6] See A. Postlewaite, *Asymmetric Information, Allocation, Information, and Markets,* (John Eatwell, Murray Milgate, Peter Newman, eds.), The New Palgrave, WW Norton, NY and London, 1989, pp. 35-38.

improve price competition in the market and through that accelerate the rate of diffusion of new pricing schemes.

The next section will calculate the Vacuum Cost of Ownership, a metric designed to help consumers compare the total cost of operating and maintaining a vacuum cleaner. In using this proposed metric, this study will compare the upfront price and the five-year costs of operating popular vacuum cleaner machines in order to demonstrate this problem of hidden costs. The purpose of the next section is to illustrate how this metric can be calculated and used as a common industry standard.

III. Vacuum Cost of Ownership – Methodology

This study estimates the fixed and variable cost of vacuum cleaners over a five-year period, in order to illustrate how different vacuum brands and models can be compared. This section describes the general methodology for this proposed comparative metric – a metric described in this study as the total *Vacuum Cost of Ownership* – and consisting of the sum of the price, the cost of accessories needed for operation, and the cost of servicing and repair of the vacuum over a five-year period.

A. Cost of the Vacuum and Its Accessories

In order to analyze the total cost of vacuums over a five-year period, data on the retail price of popular vacuums and its accessories (including pre-motor filter, HEPA, other filters, bags and belts), the frequency of replacement of these accessories, and the repair costs were collected from several sources.[7] All retail prices for the vacuums and their accessories analyzed in this report were downloaded from each manufacturer's website during July 2010.[8] Prices and the frequency of replacement for accessories were estimated and verified on telephone calls with the manufacturer's customer service representatives. Since there was occasionally variation in the information provided by customer service representatives, all information was collected several times and then averaged.

In some instances, this information was augmented by other sources. For example, if manufacturers were found to sell discounted combinations of filters or other accessories as an annual subscription, this study used this information in determining the average frequency of replacement and average cost per year. In some cases where accessories were sold in a higher quantity at a lower per unit cost, this study used lower-priced alternatives for estimating costs, where available. When the manufacturer's website specified the frequency of replacement for some items, these figures were used.

[7] A list of the most popular upright and canister vacuums was collected from industry analyst reports and interviews with retail dealers. This is not a comprehensive list of brands and models, but is intended to provide an illustration of the divergence in fixed and variable costs among popular models.
[8] Because prices can vary over time, these estimates should be considered a snapshot in time.

In order to make the quality of vacuuming somewhat similar, where possible we used HEPA quality filters in our calculations. There were also two models that did not include vacuum hoses for corners and steps, but included handheld vacuums instead. Any variable costs for these handheld devises were included in the cost analysis.

It is also worth noting that vacuums usually come with some accessories already in the box, and some vacuums were bagless and had washable filters. This information was collected from customer service representatives, manufacturers' websites and product manuals, and then factored into cost calculations over a five-year period. Since some brands and models have little or no variable costs, by calculating the upfront cost and five-year variable costs, a more complete comparison of ownership costs can be made. This comparison will identify the extent to which consumers may be unwittingly locking themselves into higher cost and buying potentially lower-quality vacuums.

Actual costs experienced by consumers will vary depending on the amount of cleaning; the size of the home; the mix of carpet, tile and hardwood floors; the presence of pets and other factors. Since the data collected in this study can vary from actual experience, the results are not intended to be precise calculations, but are more reflective of the general nature and magnitude of the cost of operating popular vacuum cleaners over a five-year period. The analysis presented in this study is an illustration of potential costs to operate these popular brands and models, and does not endorse or favor any particular brand or model.

B. Cost of the Servicing and Repair

Except for various product reviews, there is little free public data that would permit common comparisons of price, reliability and performance across a wide range of vacuum brands and models. Even less apparent are public data on repair costs and the costs of accessories required to operate most vacuums. Yet, these accessories, servicing and repairs could add up to be a major expense for vacuum cleaner owners in just five years of operations.

In order to collect information on the cost of servicing and repairing household vacuum cleaners, 202 vacuum repair shops were identified in five U.S. cities and their surrounding areas – New York City, Atlanta, Chicago, San Antonio and Los Angeles.[9] A survey was sent to these shops, which listed the most popular brands and models, and asked these businesspeople to indentify which brands they repair, how frequently would they expect these models to be repaired in the first five years of ownership, and how much it would cost (on average) to service or repair the vacuums.[10] After deducting those surveys that could not be delivered by the U.S. Post Office, the universe of repair shops in these five areas totaled 197. Respondents were paid $25 for completing the survey and 53 completed surveys were received, representing a relatively high completion rate of 26%.[11] In addition, respondents provided information about the general quality of these vacuums and many wrote unsolicited comments onto the survey questionnaire.

Vacuum manufacturers offer products of very different levels of quality, warranty coverage and expected cost for servicing and repairs during the first five years of ownership. While some brands have multi-year warranties, others may have only one-year warranties. For a consumer, lower-priced vacuums could eventually cost more if repairs are more likely, compared to higher-priced vacuums, everything else being equal. For this reason, this study includes the expected cost of servicing and repairs for those years outside of the warranty period. For example, a consumer who buys a vacuum with a three-year warranty will need to pay the cost of servicing and repairs during years four and five. Using the survey responses for the average of the cost of servicing and the frequency of servicing, this study estimates the expected cost to consumers during the first five years for each model. This study assumes that the incidence of servicing and repair is equally distributed over the life of the vacuum and calculates these costs for any years not under warranty.

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[9] The list of repair shops was taken from the Eureka, Electrolux, Hoover, Dirt Devil and Bissell websites. Duplicates were removed and shops exclusive to one brand were not considered. All shops repaired multiple brands, including 92% repairing 8 or more brands.

[10] A full list of these vacuum brands and models is available in **Figure 2** and **Figure 3** of this study.

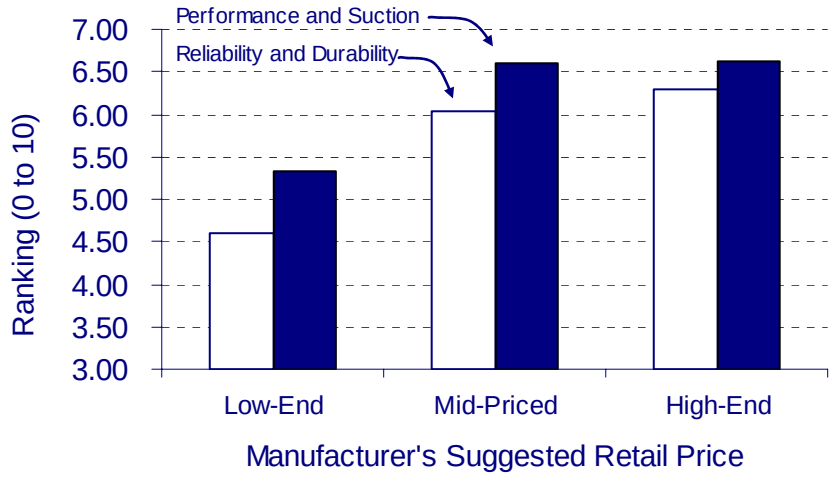
[11] While the response rate is high for a mail survey of small businesses, confidence intervals are sizeable.

C. Quality vs. Price Tradeoff

There is a general notion that lower-priced goods and services often sacrifice quality. As the old saying goes – "you get what you pay for." Since quality, at least to some degree, influences price, it seems unreasonable to assume that a $50 vacuum will perform as well or have as many features as a $500 vacuum. These vacuums are not likely to have comparable suction, reliability, performance and/or warranty coverage. After all, if quality did not vary, there would be no reason for the same manufacturer to offer both higher-priced and lower-priced models – but they do.

Available empirical evidence supports the notion that lower-priced products have generally (on average) a lower level of quality. Using data from our survey of repair shops, **Figure 1** (below) demonstrates that lower-priced models have lower performance, suction, reliability and durability.[12] Interestingly enough, the high-end vacuums appear only marginally better than the mid-priced vacuums. Again, prices are based on the MSRP and do not consider operational costs.

Figure 1: Low-Prices and Low-Quality?



[12] Repair shops were asked their opinions on these various brands and models. **Figure 1** summarizes their responses for low-priced (models priced less than $200), Mid-priced (models priced between $200 and 400, and high-priced (models priced $400 and up).

The notion that quality generally varies with price is also supported by some unsolicited comments made by survey respondents that appeared critical of only the lower-priced vacuum cleaner manufacturers, suggesting that these vacuums broke easily or were not worth repairing.[13]

Based on this evidence that lower-priced vacuums are usually of lower quality, this study splits the list of popular brands in two equally sized groups – lower-priced vacuums (those with an MRSP of less than $200) and the remaining (mid-priced and higher-priced) vacuums. This will permit, to some extent, a better representation of models within a similar range of quality. **Figure 2** and **Figure 3** (on the next page) show twenty-eight popular models with fourteen models classified (for the purpose of this study) as lower-priced and fourteen models as higher-priced. While this will not completely control "oranges and apples" differences in brand and model quality, it will permit a somewhat more meaningful comparison of the Vacuum Cost of Ownership.[14]

In summary, because the upfront price for vacuums can vary so much, this study attempts a modest control of quality variation by looking at lower-priced vacuums separately from higher-priced vacuums. In the section to follow, lower-priced and higher-priced vacuums will be analyzed for their total cost of ownership over a five year period – including the upfront cost of the vacuum, the purchase of accessories (if any), and servicing and repair costs, if not under warranty. This study is a first attempt to quantify the Vacuum Cost of Ownership. Because the cost figures to follow are initial estimates of potential consumer costs, further research and refinement is needed, and we encourage the development of an industry standard using this metric.

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[13] Several respondents claimed that brands made by some manufacturers were disposable in nature or that these vacuum cleaners would not make it through five years of use. Specifically, we received five such comments on Shark, 4 for Bissell, 3 for Dirt Devil and 1 for Eureka. Among our list of popular brands, all of these models had MSRP values of less than $200.

[14] A better way to control for quality is to determine ways to measure it and test each model in a multivariate analysis. While this is beyond the scope of this cost study, it would be an important approach for future research.

Figure 2: Popular Lower-Priced Vacuums

Brand	Model	Model #	Type	MSRP
Bissell	Zing	7100	Canister	$49.99
Dirt Devil	Easy Lite Quick Vacuum	UD40230	Upright	$49.99
Eureka	Optima	431F	Upright	$74.99
Bissell	Cleanview Helix	82H1	Upright	$79.99
Dirt Devil	Featherlite Bagless Upright	M085845	Upright	$79.99
Eureka	Surfacemax 300	2976AVZ	Upright	$89.99
Dirt Devil	EZ Lite	SD40010	Canister	$99.99
Dirt Devil	Vision	082660	Canister	$119.99
Dirt Devil	Purpose for Pets	SD40000	Canister	$119.99
Hoover	Windtunnel T series Rewind Bagless	UH70120	Upright	$129.99
Bissell	Pet Hair Eraser Dual Cyc Bagless	3920	Upright	$149.99
Eureka	Surfacemax	6833D	Canister	$149.99
Bissell	Lift off Multicyclonic Pet	89Q9	Upright	$179.99
Shark	Navigator	NV22	Upright	$199.80

Figure 3: Popular Higher-Priced Vacuums

Brand	Model	Model #	Type	MSRP
Hoover	Anniversary Windtunnel Self-propelled Bagged	U6485900	Upright	$229.99
Hoover	Windtunnel Bagless	S3755	Canister	$262.49
Hoover	Platinum Lightweight Bagged w/ Canister	UH30010COM	Upright	$299.99
Hoover	Anniversary Bagged Canister	S3670	Canister	$299.99
Hoover	Windtunnel Bagless	S3765	Canister	$314.99
Dyson	All Floors	DC24	Upright	$399.99
Dyson	All Floors (Telescopic Reach)	DC14	Upright	$399.99
Dyson	Turbine Head	DC23	Canister	$399.99
Miele	Polaris	S4212	Canister	$439.00
Oreck	XL Pro Series Gold w/ Canister	U7050ECBPDC	Upright	$499.95
Dyson	All Floors	DC25	Upright	$499.99
Electrolux	Oxygen	EL6988A	Canister	$499.99
Dyson	Animal	DC25	Upright	$549.99
Dyson	Animal	DC28	Upright	$599.99

IV. Vacuum Cost of Ownership Analysis

Consumers can find a large number and rich variety of vacuums available in the market place, but are unable to rank them in ways to make efficient, value-maximizing choices. The absence of information useful to comparing options and ranking them according to characteristics valued by consumers creates costly uncertainty, confusion and, in too many instances, poor choices. Thus, it is critically important that consumers get the right information about different vacuum options and vacuuming costs. This section will quantify the cost of buying and using these popular vacuums over a period of five years in order to determine the cost of ownership.

Figure 4 (below) compares the MSRP, variable cost for accessories and repair costs for the lower-priced vacuum cleaners, and shows that while the price range of vacuum cleaners (from $49.99 to $199.99) is less than cost range for accessories (from $0 to $202.30) and the cost range for repair service (from $0 to $266.65) over a five-year period.[15] In fact, the variable costs of operations, including the cost of the accessories and service repair costs, appear to be sizable compared to the upfront price of the vacuum. The data suggest that lower-priced vacuums could have considerable accessory and repair costs. The one exception, the Shark Navigator, is more expensive upfront, but has no variable costs over the five-year period.

Therefore, when considering the total costs, low-priced vacuums could cost more than mid-priced vacuums. Because repair costs can exceed the MRSP, consumers may need to buy lower-priced vacuums at a greater frequency, further increasing long term costs. This suggests that some lower-priced vacuums could be regarded as disposable: they are low priced; have shorter warranties; tend to break sooner and more often; and they may not be worth repairing. For these vacuums, the total cost can be pricier than more expensive models, making them a questionable alternative for some consumers.

[15] For a complete listing of model numbers, see **Figure 2** and **Figure 3** of this study. These figures are intended to illustrate the potential costs over five years, which may differ from actual use. These figures are not intended to be used to rank which brand or model is better or worse, only to illustrate that operational costs can be substantial relative to upfront costs.

Figure 4: Potential Vacuum Ownership Costs
Lower-Priced Popular Models

Brand	Model	MSRP	Accessories	Service
Bissell	Zing (Canister 7100)	$49.99	$41.93	$266.65
Dirt Devil	Easy Lite Quick Vacuum (Upright)	$49.99	$79.71	$200.37
Eureka	Optima (Upright 431F)	$74.99	$142.87	$213.35
Bissell	Cleanview Helix (Upright 82H1)	$79.99	$197.30	$266.65
Dirt Devil	Featherlite Bagless Upright	$79.99	$148.31	$150.28
Eureka	Surfacemax 300 (Upright)	$89.99	$202.30	$213.35
Dirt Devil	EZ Lite (Canister)	$99.99	$68.28	$150.28
Dirt Devil	Vision (Canister)	$119.99	$157.44	$150.28
Dirt Devil	Purpose for Pets (Canister)	$119.99	$68.28	$150.28
Hoover	Windtunnel T series Rewind Bagless (Up)	$129.99	$85.57	$145.75
Bissell	Pet Hair Eraser Dual Cyc Bagless (Up)	$149.99	$141.30	$133.32
Eureka	Surfacemax (Canister 6833D)	$149.99	$141.35	$213.35
Bissell	Lift off Multicyclonic Pet (Upright 89Q9)	$179.99	$141.30	$133.32
Shark	Navigator (Upright NV22)	$199.80	$0.00	$0.00

Figure 5: Potential Vacuum Ownership Costs
Higher-Priced Popular Models

Brand	Model	MSRP	Accessories	Service
Hoover	Anniversary Windtunnel Self-prop Bagged	$229.99	$298.54	$97.16
Hoover	Windtunnel Bagless (Canister S3755)	$262.49	$311.18	$194.33
Hoover	Platinum Lightweight Bagged w/ Canister	$299.99	$503.58	$0.00
Hoover	Anniversary Bagged (Canister S3670)	$299.99	$200.12	$97.16
Hoover	Windtunnel Bagless (Canister S3765)	$314.99	$311.18	$194.33
Dyson	All Floors (Upright DC24)	$399.99	$0.00	$0.00
Dyson	All Floors Telescopic Reach (Up DC14)	$399.99	$0.00	$0.00
Dyson	Turbine Head (Canister DC23)	$399.99	$0.00	$0.00
Miele	Polaris (Canister S4212)	$439.00	$477.39	$119.29
Oreck	XL Pro Series Gold w/ Canister	$499.95	$239.55	$54.53
Dyson	All Floors (Upright DC25)	$499.99	$0.00	$0.00
Electrolux	Oxygen (Canister EL6988A)	$499.99	$394.72	$182.75
Dyson	Animal (Upright DC25)	$549.99	$0.00	$0.00
Dyson	Animal (Upright DC28)	$599.99	$0.00	$0.00

Figure 5 (above) shows similar results for the middle to higher-priced vacuums (those with an MSRP greater than $200). Like the lower-priced vacuums, the variable costs appear to outweigh the upfront price of the vacuum. However, these more expensive models tend to have lower service repair costs, since most have longer warranty terms and are somewhat less likely to break. **Figure 4** and **Figure 5** show that buying a vacuum based on purchase price is not necessarily the lower-cost choice.

Totaling all fixed and variable costs, the results support the notion of the razor-and-razor blade pricing model -- the cost of operating a vacuum can far outweigh its upfront price. Most of the vacuum cleaners have variable costs that will disproportionately add to the cost of operating a vacuum over time. The results show that lower-priced vacuums could require significant costs to operate – as much as seven times the MSRP or what is referred in **Figure 6** as "mark-up."[16] In other words, a consumer could buy a $50 vacuum in the hope of saving money, but could actually be facing more than $300 of additional costs to operate and maintain it over five years.

As purchase price and quality increase, the hope of saving money can also be dashed by higher variable costs. As **Figure 7** shows (also below), many higher-end vacuums also have high variable costs, even though many have multi-year warranties. The costs come primarily from expensive filters, belts and bags. In effect, some consumers may be spending hundreds of dollars upfront, only to find themselves locked into spending hundreds more to keep and operate the unit. Interestingly, vacuums with the lowest ownership costs over five-years have no variable costs – they are bagless units, have washable filters, require no belts and are under warranty for repairs.[17] While these vacuums can save over time, because they have higher upfront costs, consumers may ignore them for lower-cost priced options, paying more in the long run. Without knowing the Vacuum Cost of Ownership, those choosing vacuums based on only the purchase price could be making the wrong choice.

[16] The lower the mark up, the less the impact of variable costs relative to the purchase price over the five-year period.
[17] In **Figure 6** and **Figure 7**, a mark-up of 1.0 indicates no variable costs of ownership.

Figure 6: Potential Vacuum Cost of Ownership Lower-Priced Popular Models

Brand	Model	MSRP	Total Cost	Mark-up
Shark	Navigator (Upright NV22)	$199.80	$199.80	1.0
Dirt Devil	EZ Lite (Canister)	$99.99	$318.55	3.2
Dirt Devil	Easy Lite Quick Vacuum (Upright)	$49.99	$330.07	6.6
Dirt Devil	Purpose for Pets (Canister)	$119.99	$338.55	2.8
Bissell	Zing (Canister)	$49.99	$358.57	7.2
Hoover	Windtunnel T series Rewind Bagless (Up)	$129.99	$361.31	2.8
Dirt Devil	Featherlite Bagless Upright	$79.99	$378.58	4.7
Bissell	Pet Hair Eraser Dual Cyc Bagless (Up)	$149.99	$424.61	2.8
Dirt Devil	Vision (Canister)	$119.99	$427.71	3.6
Eureka	Optima (Upright 431F)	$74.99	$431.21	5.8
Bissell	Lift off Multicyclonic Pet (Upright 89Q9)	$179.99	$454.61	2.5
Eureka	Surfacemax (Canister 6833D)	$149.99	$504.69	3.4
Eureka	Surfacemax 300 (Upright)	$89.99	$505.64	5.6
Bissell	Cleanview Helix (Upright 82H1)	$79.99	$543.93	6.8

Figure 7: Potential Vacuum Cost of Ownership Higher-Priced Popular Models

Brand	Model	MSRP	Total Cost	Mark-up
Dyson	All Floors (Upright DC24)	$399.99	$399.99	1.0
Dyson	All Floors Telescopic Reach (Up DC14)	$399.99	$399.99	1.0
Dyson	Turbine Head (Canister DC23)	$399.99	$399.99	1.0
Dyson	All Floors (Upright DC25)	$499.99	$499.99	1.0
Dyson	Animal (Upright DC25)	$549.99	$549.99	1.0
Hoover	Anniversary Bagged (Canister S3670)	$299.99	$597.27	2.0
Dyson	Animal (Upright DC28)	$599.99	$599.99	1.0
Hoover	Anniversary Windtunnel Self-prop Bagged	$229.99	$625.69	2.7
Hoover	Windtunnel Bagless (Canister S3755)	$262.49	$768.00	2.9
Oreck	XL Pro Series Gold w/ Canister	$499.95	$794.03	1.6
Hoover	Platinum Lightweight Bagged w/ Canister	$299.99	$803.57	2.7
Hoover	Windtunnel Bagless (Canister S3765)	$314.99	$820.50	2.6
Miele	Polaris (Canister S4212)	$439.00	$1,035.67	2.4
Electrolux	Oxygen (Canister EL6988A)	$499.99	$1,077.46	2.2

This study provides evidence that alternatives to the razor and blades business model could produce significant savings for consumers. For example, among lower-

priced vacuums and those vacuums rated lower in performance and quality by a survey of repair shops, the Shark Navigator, while the most expensive model in its class, had no variable costs and provided the lowest cost-of-ownership over a five-year period. Similarly, among the moderate and higher-priced vacuums and those rated highest among repair shops in terms of quality and performance, Dyson and its divergence from the razor and blades business model had no variable costs and provided the lowest cost-of-ownership over a five-year period. In short, vacuums with no variable costs tend to provide the greatest savings to consumers.

These examples show that the Vacuum Cost of Ownership can be a valuable way to compare different models and brands, and that what appears to be low-cost based on the purchase price may not (over time) be low cost at all. Of course, it should be stressed that these comparisons are examples and by no means intended to identify the best-cost and worse-cost brands and models. Also, these estimates will vary based on assumptions of usage and various others factors. In short, consumers need to do their homework and understand the full cost of ownership before buying a vacuum cleaner. Furthermore, developing an industry standard would be a reasonable way to get this vital information to consumers.

V. Federal Trade Commission Action

This study has demonstrated that industry pricing practices in the vacuum cleaner industry may interfere with consumer choice and lead to costly consequences. The problem is due to the lack of information, and the answer to the problem is simple – manufacturers should disclose hidden costs in order to give consumers better information to compare brands and models. Current Federal Trade Commission (FTC) regulations make clear that Congress explicitly intended for consumers to have better information in order to make product comparisons:

> "…the Commission will consider, among other things, the Congressional policy declared in Section 2 of the Act, namely, that packages and labels should enable consumers to obtain accurate information as to the quantity of contents and should facilitate value comparisons."[18]

In this regard, the FTC could take steps to remedy this problem by filing a complaint under Section 5 of the FTC Act.[19] The Act authorizes the FTC to prevent corporations from using methods of competition deemed as unfair or deceptive acts and practices. In its evaluation, the FTC could assess whether a practice is unfair by determining: 1) if it leads to substantial harm; 2) confounds the ability of consumers to make decisions; and 3) produces a net loss for consumers.[20] Based on the findings in this study, there is sufficient evidence to warrant FTC involvement for an independent assessment these pricing practices. One potential remedy to the problem identified in this study would be for the FTC to develop an industry standard or improve package labeling. This study proposes using the *Vacuum Cost of Ownership* as a common standard that would allow consumers to make informed market decisions, and would be a good place for the FTC to start in its efforts.

[18] 16 CFR Part 503.5.
[19] 15 USC 45.
[20] Consumer Compliance Handbook, at http://www.federalreserve.gov/boarddocs/supmanual/cch/ftca.pdf, which covers the Federal Trade Commission Act, Section 5: Unfair or Deceptive Acts or Practices. The Appendix section discusses how these acts and practices should be assessed.

VI. Conclusion

Since there is little information available to consumers on the cost of operating vacuums, they often decide which vacuum to buy based primarily on the shelf tag price. This study's analyses of popular brands and models finds that the cost of operating a vacuum over a five year period can, on average, far outpace the price of the vacuum. In other words, consumers are buying vacuums based on their upfront price, and then are locked into paying substantially more than they intended over the long haul. Since there is a wide range of quality and price for vacuums, consumers need to be weary of the hidden costs of operating vacuums. Today, some vacuum manufacturers are selling units that have low or no variable costs, but it is difficult for consumers to compare these among the many other brands and models. As a result, consumers are not getting enough information to make good buying decisions.

Manufacturers should be required to estimate the variable cost of their units and disclose these costs on the outside retail packaging, so that consumers can decide if the savings on the upfront price is worth the added cost of accessories or repair. In other words, we recommend that vacuum manufacturers develop a standard industry metric – the Vacuum Cost of Ownership – and disclose this information on their websites and on their packaging. Currently, manufacturers are getting consumers to pay more than necessary by not disclosing these hidden costs, and the FTC should take action to remedy this situation.

In summary, information on the cost of operating vacuum cleaners is not being provided to consumers and suppression of this information is resulting in excessive spending by consumers on accessories, and it is may be driving consumers to purchase vacuums of inferior quality. Manufacturers should be required to disclose the Vacuum cost of Ownership, so that consumers have the information they need to be able to make better buying decisions.

ABOUT THE AUTHOR

Stephen Pociask

Mr. Pociask is a board member of the American Consumer Institute Center for Citizen Research. He has published numerous economic studies, including three books for the Economic Policy Institute, and policy studies for numerous independent nonprofit organizations. Many of his research studies have focused the consequences of public policies on consumers and consumer welfare. His research topics include energy, insurance, consumer products, information technology and healthcare.

He has also written reports for the Small Business Administration's Office of Advocacy, including one on small businesses' telecommunications expenditures and use, and one on broadband use in rural America. He has testified before Congress. He has appeared numerous times in the media, including Bloomberg News, CNBC, NBC, Fox, Congressional Quarterly, New York Times, and CNET Radio. He is a public policy associate for the Center for the New West, policy expert for the TeleNomic Research and an Adjunct Scholar for the Competitive Enterprise Institute in Washington, DC.

Mr. Pociask is currently president of TeleNomic Research, LLC, and from 1998 to 2000, Mr. Pociask served as chief economist and executive vice president for Joel Popkin and Co. – both economic consulting firms. Prior to these assignments, he was chief economist for Bell Atlantic Corporation. He has completed his Ph.D. coursework in economics and has an M.A. in economics from George Mason University.