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# QUANTIFYING THE IMPACT OF BAD BOTS ON ECOMMERCE MERCHANT PROFITABILITY

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## Executive Summary

Aberdeen's analysis estimates that **75-80% of eCommerce operational costs** (e.g., the cost of website infrastructure, website marketing, and checkout fraud) **are negatively impacted by malicious bots**, which represents a material and growing problem for eCommerce merchant profitability. Further analysis estimates that **advanced bot detection and mitigation services can reduce this negative impact by >50%** at times of peak bad bot traffic — helping to preserve and protect the bottom line.

### eCommerce Profitability Baseline, and the Impact of Bad Bots

eCommerce merchants well understand that not all visitors to their websites are human. That is, they know that a significant percentage of their website traffic consists of **bots** — the small, purpose-built software programs that are designed to perform automated, repetitive, well-defined tasks at Internet speed and scale. Many bots are considered essential to their success, for example the web crawlers that find and index an eCommerce website's content, making it easier for human visitors to find and purchase the goods and services that interest them.

Other bots, however, represent a growing problem for eCommerce merchants, and currently their negative business impact is *not* that well understood. To this end, previous Aberdeen research reports (see "Related Research") have focused on the impact of bots and their role in:

- ▶ **Credential stuffing and account takeovers**, as a means to execute fraudulent purchases and other types of financial fraud;
- ▶ **Website scraping**, to automate the gathering of competitive data such as product descriptions, suppliers, pricing, and inventory levels; and
- ▶ **Web browser extensions**, particularly those that lead to lower conversion rates and lower order values for legitimate online shoppers. These negative outcomes can also be caused by bots that are designed to gobble up limited quantities of products or tickets being offered in a "hype sale," for resale at high markup.

As the focus of this report, Aberdeen sought to understand (and quantify) how bad bots negatively affect the **operational profitability** of eCommerce merchants, by conducting primary research in six popular retail categories involving physical goods: *Consumer Electronics; Fashion and Beauty; Food and Beverage; Furniture, Appliances, and Home Improvement; General Merchandise; and Health and Leisure.*

As the focus of this research report, Aberdeen sought to understand (and quantify) how bad bots negatively affect the **operational profitability** of eCommerce merchants, by conducting primary research in several popular retail categories involving physical goods:

- ▶ Consumer Electronics
- ▶ Fashion and Beauty
- ▶ Food and Beverage
- ▶ Furniture, Appliances, and Home Improvement
- ▶ General Merchandise
- ▶ Health and Leisure

In this study, all respondents generated between \$50M and \$2.5B in annual revenue from their primary eCommerce segment, the majority of which was from online shoppers in the United States.

As a baseline and reference, Table 1 shows the historical profitability of eCommerce merchants (across all categories) over the most recent five-quarter financial reporting period, from 2Q2020 to 2Q2021. As it happens, this coincides with onset of the global pandemic — a period which saw significant increases in bad bot activity, as malicious actors sought to capitalize on sudden shifts in buyer behaviors, supply chain disruptions, and so on.

**Table 1: eCommerce Merchant Profitability, 2Q2020-2Q2021**

Common-Size Income Statement	eCommerce merchants (all categories)		
1 Net Revenue	100%	100%	100%
2 Cost of Goods Sold	62.6%	60.9%	58.6%
3 Gross Margin	37.4%	39.1%	41.4%
4 eCommerce Operational Costs	24.0%	26.2%	29.9%
5 EBITDA	11.5%	12.9%	13.9%

How much are eCommerce operational costs impacted by bad bots? How much can the negative impact of bad bots be reduced, using advanced bot detection and mitigation services?

eCommerce profitability metrics are expressed in “common size” format, as a percentage of top-line revenue from the eCommerce merchant website (total net revenue = 100%). Performance reflects the range (90% confidence interval) and most likely values, based on the annualized trailing twelve months (TTM) performance over a five-quarter reporting period. Source: Empirical data for Gross Margin and EBITDA adapted from [csimarket.com](https://www.csimarket.com), 2Q2020-2Q2021; Aberdeen, October 2021

**Gross Margin (line 3)** reflects the net revenue generated by the eCommerce merchant’s sale of physical goods (line 1), less the associated cost of producing or acquiring those physical goods (line 2). Over this time period, publicly available gross margins for eCommerce merchants in these categories ranged **between 37.4% and 41.4%**. (By comparison, gross margins for successful software-as-a-service businesses are typically in the range of 75% to 85%.)

**Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA, line 5)**, is considered to be the most useful measure for comparing the operational profitability of eCommerce merchants, before the impact of non-operating factors (interest expenses, taxes, and accounting for capital investments) is taken into account. Over this time period, EBITDA in these categories ranged **between 11.5% and 13.9%**.

The difference between Gross Margin and EBITDA reflects the **operational costs (line 4)** of the eCommerce merchant's platform, which range **between 24% and 30%** of top-line revenue. This raises the key questions for this research report: To what degree are eCommerce operational costs impacted by bad bots? How much can the negative impact of bad bots be reduced, using advanced bot detection and mitigation services?

## Top-Line Revenue: Measuring eCommerce Funnel KPIs

To gain insights into these questions, Aberdeen conducted phone-based interviews with subject-matter experts in each of the six eCommerce retail categories, from which a range of performance for selected key performance indicators (KPIs) in each category could be established. The research findings were then used as modeling parameters in a quantitative analysis of the negative impact of bad bots, both “before” and “after” the use of best-in-class mitigating technologies.

For example, the path to bottom-line profitability begins with the top-line revenue — which for eCommerce merchants is driven by how effectively they can help online shoppers move through the process of visiting the website, actively engaging with products, selecting and adding specific items to their online shopping carts, and ultimately making a purchase. Over time, this traditional “funnel” model for the buyer's journey has led to four common KPIs for eCommerce merchants:

- ▶ **Bounce Rate** — The percentage of eCommerce website visitors who leave the site without actively engaging with one or more items.
- ▶ **Add to Cart Rate** — The percentage of website visitors who add one or more items to their online shopping cart.
- ▶ **Cart Abandonment Rate** — The percentage of online shopping carts that are abandoned before a purchase is completed.
- ▶ **Conversion Rate** — The percentage of website visitors who ultimately complete a purchase.

Combined with the **Number of Website Visitors** and the **Average Order Value** for completed purchases, these half-dozen well-established factors are widely used to describe and manage eCommerce performance. The pseudo-equation for top-line revenue for a given time period is simply:

$$(\# \text{ of website visitors}) \times (\text{conversion rate}) \times (\text{average order value})$$

The eCommerce Funnel KPIs for each of the six retail categories, as found in Aberdeen’s primary research, are summarized in Table 2.

**Table 2: eCommerce Funnel KPIs — Research Findings / Modeling Parameters, by Category**

eCommerce Category	Bounce Rate			Add to Cart Rate			Cart Abandonment Rate			Conversion Rate			Average Order Value		
All Categories	38.0%	56.9%	77.0%	5.4%	7.8%	12.0%	46.0%	63.3%	80.4%	1.25%	2.37%	4.20%	\$28	\$202	\$800
Consumer electronics	42.8%	46.9%	53.5%	7.4%	8.4%	10.0%	62.0%	69.2%	80.4%	1.70%	2.20%	2.60%	\$150	\$246	\$400
Fashion and beauty	55.0%	64.7%	77.0%	5.5%	6.4%	7.4%	55.0%	64.3%	74.0%	1.25%	1.90%	2.50%	\$80	\$270	\$800
Food and beverage	48.0%	51.7%	56.0%	8.8%	10.5%	12.0%	52.0%	59.9%	65.0%	2.80%	3.44%	4.20%	\$48	\$61	\$86
Furniture, Appliances, and Home Improvement	65.0%	70.0%	74.5%	5.4%	6.7%	8.0%	55.0%	61.8%	74.0%	1.60%	2.28%	3.20%	\$216	\$320	\$460
General merchandise	38.0%	48.9%	57.0%	7.0%	8.8%	11.0%	46.0%	61.3%	70.0%	1.80%	2.56%	3.60%	\$85	\$145	\$250
Health and Leisure	46.0%	52.2%	60.0%	5.8%	7.3%	10.0%	56.0%	63.6%	78.0%	1.60%	2.00%	2.40%	\$45	\$165	\$238

eCommerce KPIs are expressed as a percentage of total visitors to the eCommerce merchant website (total visitors = 100%). Source: Modeling parameters reflect the range (90% confidence interval) and most likely values for each factor, based on primary research with eCommerce merchants in each category; Aberdeen, October 2021

For example, note the sharp contrast between:

- ▶ **Food and Beverage** — this category has the highest conversion rate, with a most likely value of 3.44%; and the lowest Average Order Value, which ranges from a most likely value of \$61 to as high as \$86.
- ▶ **Fashion and Beauty** — this category has the lowest conversion rate, with a most likely value of 1.90%; and among the highest Average Order Value, which ranges from a most likely value of \$270 to as high as \$800.

Using quantitative models, it’s reasonably straightforward for eCommerce merchants to evaluate the potential to optimize their top-line revenue (line 1) — based on estimating the incremental costs and incremental benefits from improving one or more of these six fundamental factors.

### Bad Bot-Impacted Operational Costs: Measuring the Impact

In a similar way, it’s also reasonably straightforward to estimate the negative impact of bad bots on eCommerce operational costs (line 4) — and the potential to reduce that negative impact, by making an incremental investment in advanced bot detection and mitigation. This is,

however, one of the areas that currently is not as well understood. For this purpose, Aberdeen’s phone-based interviews with subject-matter experts also established a range of performance for selected eCommerce operational costs that are negatively affected by bad bots, in two high-level categories:

- ▶ **Total bad bot traffic** results in higher costs for the eCommerce platform — including the overprovisioning of *website infrastructure*, and wasted expenditures on *website marketing* (examples include negative search engine optimization, skewed website analytics, and digital ad fraud). Collectively, Aberdeen refers to these as **eCommerce platform costs**.
- ▶ **Bad bot traffic at checkout** corresponds to attacks that have reached the stage of making fraudulent purchases, which is reflected in *declines*, *chargebacks*, *other fraud*, and the *cost of making decisions* about which transactions are legitimate. Collectively, Aberdeen refers to these as **eCommerce funnel costs**.

The factors needed to build a quantitative model for these **eCommerce bad bot-impacted costs** for each of the six retail categories, as found in Aberdeen’s primary research, are summarized in Table 3. In addition, Aberdeen made estimates for the range of *blocked bot traffic* (which includes all types of bad bots) and *checkout attacks* (as a percentage of total checkouts) by adapting empirical data from a leading solution provider of bot detection and mitigation services, over the same period.

**Table 3: eCommerce Bad-Bot Impacted Costs — Research Findings / Modeling Parameters, by Category**

eCommerce Category	Declines			Chargebacks			Other Fraud			Cost of Decisions			Website Infrastructure			Website Marketing		
All Categories	1.2%	2.8%	4.0%	0.10%	0.39%	0.60%	1.0%	1.7%	2.4%	0.90%	1.8%	3.10%	3.2%	6.0%	8.2%	5.3%	7.9%	11.0%
Consumer electronics	2.8%	3.2%	3.8%	0.22%	0.37%	0.60%	1.0%	1.5%	2.0%	1.60%	2.1%	2.50%	4.0%	5.4%	7.5%	5.8%	8.1%	10.0%
Fashion and beauty	1.4%	2.6%	3.3%	0.20%	0.38%	0.60%	1.2%	1.7%	2.3%	1.50%	1.8%	2.50%	4.8%	6.2%	7.8%	5.5%	8.3%	11.0%
Food and beverage	2.2%	3.0%	3.5%	0.38%	0.48%	0.60%	1.2%	1.9%	2.3%	1.10%	1.5%	1.80%	3.2%	4.0%	5.2%	6.5%	7.4%	8.6%
Furniture, Appliances, and Home Improvement	1.8%	2.5%	3.1%	0.30%	0.42%	0.55%	1.2%	1.6%	2.0%	1.50%	1.8%	2.20%	5.8%	6.6%	8.2%	6.8%	7.4%	8.0%
General merchandise	1.2%	2.4%	3.0%	0.10%	0.30%	0.44%	1.0%	1.5%	2.0%	1.40%	2.0%	2.90%	5.5%	6.2%	7.2%	6.9%	8.4%	10.0%
Health and Leisure	1.9%	2.7%	3.1%	0.20%	0.35%	0.40%	1.0%	1.7%	2.2%	0.90%	1.4%	2.00%	5.5%	6.8%	8.0%	6.5%	7.9%	10.0%

eCommerce bad bot-impacted costs are expressed as a percentage of top-line revenue from the eCommerce merchant website (total revenue = 100%). Source: Modeling parameters reflect the range (90% confidence interval) and most likely values for each factor, based on primary research with eCommerce merchants in each category; Aberdeen, October 2021

**The cost of making decisions — which includes the total cost of people, processes, technologies, and services — has become an increasingly important factor on overall eCommerce profitability. The cost of services in particular is on the rise, as merchants must engage frequently with software vendors to manage and tune basic bot management offerings and add custom services to meet their rapidly evolving needs.**

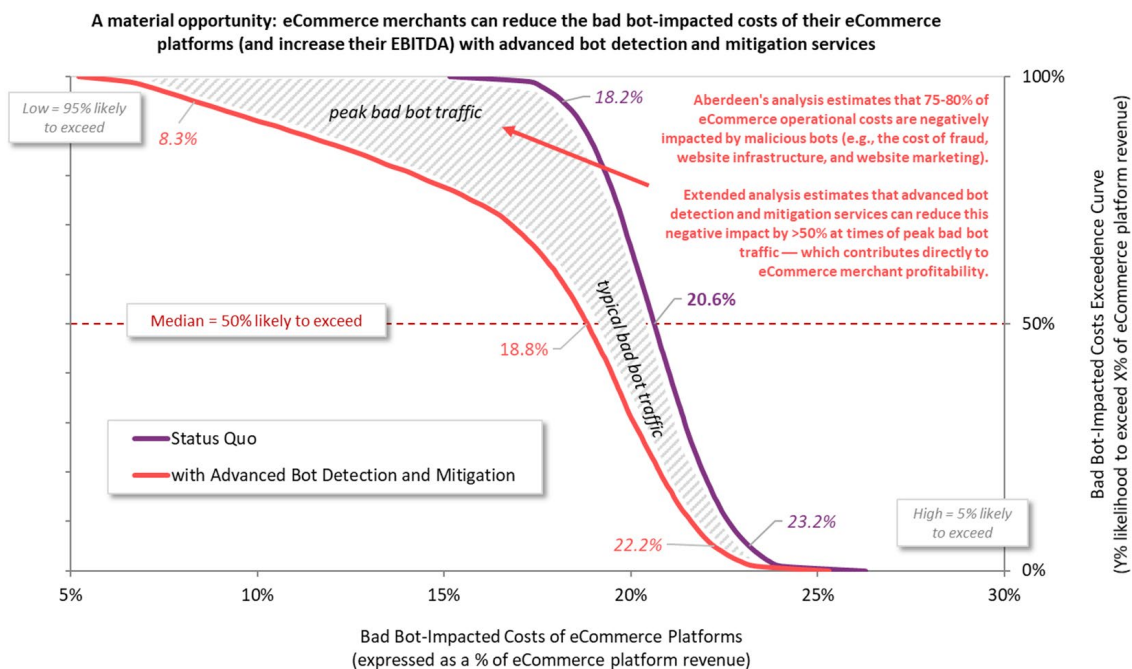
## Quantifying the eCommerce Platform Costs that are Negatively Impacted by Bad Bots, and the Value of Advanced Bot Detection and Mitigation Services

Combined, Aberdeen's Monte Carlo analysis of *eCommerce platform costs* and *eCommerce funnel costs* provides an estimate for the percentage of **eCommerce operational costs (line 4)** that are negatively impacted by bad bots:

- ▶ **75-80% of eCommerce operational costs** (e.g., the cost of website infrastructure, website marketing, and checkout fraud) **are negatively impacted by malicious bots** — that is, 18-23% of net revenue, out of the 24-30% from line 4.
- ▶ **Advanced bot detection and mitigation services can reduce this negative impact by more than 50%** at times of peak bad bot traffic — which contributes directly to preserving and protecting eCommerce merchant profitability (EBITDA, line 5).

The model results for eCommerce (all categories) are shown in Figure 1.

**Figure 1: Advanced Bot Detection and Mitigation Services can Significantly Reduce the eCommerce Operational Costs that are Impacted by Bad Bots**



Source: Monte Carlo analysis includes empirical data for blocked bot traffic and checkout attacks adapted from PerimeterX *Automated Fraud Benchmark Report (E-Commerce Edition) 2020*; Aberdeen, October 2021

## Summary and Key Takeaways

- ▶ **“Bad bots” represent a material and growing problem for eCommerce merchant profitability**, and currently their negative business impact is not that well understood.
- ▶ As a baseline and reference, the **operational costs** — the difference between Gross Margin and EBITDA — for eCommerce merchants (across all categories) from 2Q2020 to 2Q2021 **ranged from 24% to 30% of top line revenue**.
- ▶ To gain insights into the negative impact of bad bots on eCommerce profitability, Aberdeen conducted phone-based interviews with subject-matter experts in each of six popular eCommerce retail categories involving physical goods.
- ▶ The findings from Aberdeen’s primary research were then used as modeling parameters in a quantitative analysis of the negative impact of bad bots, both “before” and “after” the use of best-in-class mitigating technologies. These included ranges of current eCommerce merchant performance in each category for:
  - *Bounce Rate, Add to Cart Rate, Cart Abandonment Rate, Conversion Rate, Average Order Value*
  - *Declines, Chargebacks, Other Fraud, Cost of Decisions*
  - *Cost of Website Infrastructure, Cost of Website Marketing*
  - *Blocked bot traffic (from all types of bad bots), checkout attacks (as a percentage of total checkouts) — as adapted from empirical data from a leader provider of bot detection and mitigation services*
- ▶ Aberdeen’s analysis estimates that **75-80% of eCommerce operational costs** (e.g., the cost of website infrastructure, website marketing, and checkout fraud) **are negatively impacted by malicious bots** — that is, 18-23% of net revenue, out of the 24-30% in the historical baseline.
- ▶ Further analysis estimates that **advanced bot detection and mitigation services can reduce this negative impact by more than 50%** at times of peak bad bot traffic — which contributes directly to preserving and protecting eCommerce merchant profitability (EBITDA).

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**Aberdeen’s analysis estimates that 75-80% of eCommerce operational costs are negatively impacted by malicious bots.**

**Advanced bot detection and mitigation services can reduce this negative impact by more than 50% at times of peak bad bot traffic — which contributes directly to preserving and protecting eCommerce merchant profitability.**

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## Related Research

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- ▶ *Quantifying the Impact of Credential Stuffing and Account Takeovers in Financial Services*; **September 2021**
- ▶ *Quantifying the Hidden Business Impact of Web Browser Extensions on eCommerce Merchants*; **September 2020**
- ▶ *The Business Impact of Website Scraping: It's Probably Bigger Than You Think — Here's Why*; **May 2020**
- ▶ *Quantifying the Total Cost of eCommerce Fraud: Why It's Worse Than You Think*; **October 2017**

## About Aberdeen Group

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