

In Defense of Axon and VieVu Merger

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Case Overview

Axon is a leading company providing law enforcement technologies and is the largest manufacturer in the police-use body-worn camera system market. VieVu is a subsidiary of the Safariland Group, another law enforcement technology provider, and is a leading provider of body-worn camera and video technologies. On May 3, 2018, Axon acquired VieVu from Safariland. On January 3, 2020, the Federal Trade Commission (FTC) filed a complaint on this consummated merger, arguing that the Merger eliminated vital competition in the market and thereby harmed police departments and the community they serve.¹

Market Background

Relevant Market

The relevant market in which to assess the effects of the Merger is the sale of police-use body-worn camera system (BWC System) to large, metropolitan police departments in the United States.

It is important to consider BWC System as a whole in our analysis. BWC System comprises a hardware component and a software component. The hardware component is body-worn cameras (BWCs), and the software component is digital evidence management systems (DEMS). The hardware and software components can be purchased separately. However, large, metropolitan police departments often seek to purchase both the hardware component and the software component, and they often inter-operate effectively.²

Customers in this market are large, metropolitan police departments to which Axon and VieVu targeted their sales. Police departments have unique needs for BWC Systems,

1. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, 2020, https://www.ftc.gov/system/files/documents/cases/d09389_administrative_part_iii_-_public_redacted.pdf.

2. Federal Trade Commission, p. 4.

such as feature-rich and cloude-based DEMS and secured layers for authorized personnel access.³

There are no reasonable substitutes for BWC System. In-car camera systems are not substitute for BWCs because they are mounted in the vehicle and cannot capture videos needed when police officers are away from the car. Records Management Systems, which centralize various types of written reports, are not alternatives to DEMS, which primarily record video and audio evidence from BWCs.⁴

Geographically, the relevant market is in the United States, which is in compliance with relevant laws: BWC-generated data must be stored in the United States.⁵

FTC has shown that a hypothetical monopolist in this market would find it profit-maximizing to impose at least a small but significant and non-transitory increase in price (“SSNIP”).⁶ Therefore, the relevant market above is properly defined.

Market Participants

The BWC System market featured around 38 participants, offering a diverse range of 66 different products. Major competitors are Axon and VieVu. Significant players include Motorola, WatchGuard, Panasonic, and Utility. Small players include Digital Ally and Reveal Media..⁷

3. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, pp. 4-5.

4. Federal Trade Commission, p. 5.

5. Federal Trade Commission, p. 5.

6. Federal Trade Commission, p. 5.

7. Vivian Hung, Steven Babin, and Jacqueline Coberly, *Market Survey on Body Worn Camera Technologies* [in English], technical report NCJ 250381, Grant No. 2013-MU-CX-K111 (810 Seventh Street NW, Washington, DC 20531, United States: National Institute of Justice, November 2016), p. 3-13, <https://www.ojp.gov/ncjrs/virtual-library/abstracts/market-survey-body-worn-camera-technologies>.

Market Characteristics

BWC System market is a differentiated product market and has several important characteristics. Firstly, the consumers in this market - police departments in United States - have high product quality standard requirements. BWC System should have functionalities such as feature-rich and cloud-based DEMS, secured layers for authorized personnel access, and tools for more effective redaction of bystander's faces, etc.⁸ Secondly, demand is sticky. Due to high switching costs, police departments usually renew years-long contract with previous vendors if the products were reliable.⁹ Moreover, this market has a huge impact on social welfare because the purpose of BWC System deployment is to improve public safety, police accountability, and transparency, and enhance community-police relations.¹⁰ All these characteristics imply that product innovation plays a key role in the BWC System market, and in order to stay competitive in this market, firms should keep innovating and improving their product features.

Competition Structure

The competition structure in the BWC System market is differentiated Bertrand competition. Firms compete on contract price in police department's procurement auction. They bid on contracts that cover purchase, maintenance, and data storage.¹¹ Since products are differentiated, firms also compete on product features. Police departments would choose

8. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, pp. 4-5.

9. Federal Trade Commission, pp. 10.

10. Shelley S. Hyland, *Body-Worn Cameras in Law Enforcement Agencies, 2016*, technical report NCJ 251775 (Bureau of Justice Statistics, November 2018), <https://bjs.ojp.gov/library/publications/body-worn-cameras-law-enforcement-agencies-2016>.

11. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, p. 5.

the vendor based on officer feedback, battery life, ease of use, storage, and costs.¹² Therefore, innovation competition is essential in this market.

FTC's Accusation Against the Merger

The FTC's accusation can be summarized into three main points. First, the Merger will entrench Axon's dominant position and further increase the already high market concentration in the BWC System market. Second, the Merger will eliminate the vigorous competition between Axon and VieVu in terms of both pricing and innovation, thereby harming consumers. Finally, there are no countervailing factors that could offset the loss of competition resulting from the merger.

Concentration Measure

Herfindahl-Hirschman Index (HHI) is a tool for measuring market concentration, which is calculated by totaling the squares of the market shares of every firm in the relevant market. According to the *Horizontal Merger Guidelines*, established by the U.S. Department of Justice and Federal Trade Commission in 2010, a merger is presumptively considered illegal if post-merger HHI exceeds 2,500 and if the merger increases HHI by more than 200.¹³

FTC argues that the Merger resulted in a post-merger HHI above 2,500, and increased HHI by more than 200 points.¹⁴ Therefore, the Merger is presumptively anticompetitive and illegal.

12. Craig D. Uchida et al., "Managing Digital Evidence from Body-Worn Cameras: Case Studies in Seven Sites," March 2022, p. 7, <https://www.ojp.gov/library/publications/managing-digital-evidence-body-worn-cameras-case-studies-seven-sites>.

13. U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, 2010, chap. 5.3, <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>.

14. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, p. 6.

Unilateral Effects

The FTC argued that before the Merger, Axon and VieVu were the closest competitors. They were the market participants that can best meet large metropolitan police departments' needs, both in terms of innovation and pricing. The FTC contends that the Merger eliminated the fierce competition, characterized by aggressive pricing and innovation, between Axon and VieVu, which could lead to increased prices, inferior services, and a decline in product quality and innovation.¹⁵

Before the Merger, Axon and VieVu were engaged in a robust and consistent price competition to win contracts from metropolitan police departments, which significantly drove down the prices. For instance, VieVu's former General Manager attested that VieVu intentionally reduced its prices to get market share from Axon. Numerous police departments received considerably lower bids from VieVu compared to Axon. VieVu's aggressive pricing strategies compelled Axon to decrease its own bids. However, following the merger, Axon implemented a substantial price increase on its BWC System, which could potentially harm the budget-constrained police departments.¹⁶

In addition to price, Axon and VieVu also competed on the innovative features of BWC Systems, including auto-activation of BWCs when an officer unholsters a gun or taser, and computer-assisted facial redaction tools for digital evidence management system videos. The FTC contends that the merger will diminish the benefits of innovation competition, as it will reduce Axon's incentive to innovate.¹⁷

Furthermore, other existing BWC System providers, such as Motorola and Panasonic, are unable to replicate the competitive pressure VieVu exerted on Axon. They encounter challenges such as the absence of references from metropolitan police departments, inade-

15. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, p. 7.

16. Federal Trade Commission, p. 7.

17. Federal Trade Commission, p. 8.

quate service levels for such customers, and software with limited functionality. Moreover, they are unable to reduce their prices to the aggressive levels that VieVu had previously established.¹⁸

Lack of Countervailing Factors

The FTC suggests that there are no countervailing factors that could mitigate the anticompetitive effects of the merger. First, it is not likely that new entries or expansion by existing firms would be timely or sufficient. New entrants would encounter significant barriers, including the need for substantial upfront investments to develop features specifically for law enforcement agencies, and high switching associated with data transfer and officer training. Second, Axon is unable to demonstrate that the Merger would result in specific efficiencies that could counteract these anticompetitive effects. Finally, Axon is unable to prove that VieVu was a failing firm as per the criteria outlined in the *Horizontal Merger Guidelines*.¹⁹

Counterargument in Defense of the Merger

In defense of the Merger, we contend that the FTC's evaluation of unilateral effects is significantly flawed and incomplete. Our primary argument is that we should take a long-term dynamic perspective to analyze the welfare implications of the Merger because innovation is an important feature of the BWC System market. The short-term static model employed by the FTC is unsuitable for this purpose.

Furthermore, VieVu's products had severe quality issues, undermining its competitiveness with Axon. Therefore, the FTC's counterfactual reasoning does not stand.

18. Federal Trade Commission, *Administrative Part 3 Complaint - Public Version*, p. 8.

19. Federal Trade Commission, p. 10.

Lastly, following the Merger, Motorola has stepped in to replace VieVu's competitive power against Axon, which underscores the ongoing vibrant competition in the BWC System market.

Dynamic Merger Evaluation Model

Since BWC System market is a differentiated product market, innovation plays a significant role in it. Companies in this market compete on innovative features to stay competitive. Police departments, the consumer in this market, demand better BWC Systems to provide better service to the community, increasing transparency and accountability. The level of innovation has a profound impact on consumer welfare and social welfare; therefore, when evaluating the implications of the Merger, it is essential to take potential influence of future product advancements into consideration. Hence, we propose the 'Dynamic Merger Evaluation Model', incorporating the trade-off between price and innovation caused by a merger, as a proper tool for analyzing the Merger effects.

Model Setup

In our model, consumer welfare (W) is defined as the sum of the current consumer surplus (CS) and the discounted expected value of future innovation (FI):

$$W = CS_n + FI_n \tag{1}$$

The current consumer surplus CS represents the difference between the consumer's willingness to pay and the actual price, which has a negative relationship with the price. Since more firms in the market will lead to more fierce competition, resulting in lower price, price has a positive relationship with numbers of firms in the market n . Therefore, CS is positively related to n , and CS_n denotes the current consumer surplus when there is n firms in the market.

The discounted expected value of future innovation FI depends on three factors: the probability of innovation success $p \in [0, 1]$, the discount factor $\delta \in (0, 1)$, and the consumer surplus increase led by the future innovation success i . Thus, $FI = \delta \cdot p \cdot i$. As the probability of innovation success p increases, FI also increases. Similarly, a faster pace of innovation implies a sooner realization of the innovation, leading to a higher discount factor δ , and consequently, a higher FI . So, both p and δ have positive relationship with FI .

The market aggregate probability of innovation success p_n equals to the weighted sum of n individual firm's probability of innovation success p_i , where the weight is firm i 's market share m_i . So, the formula for p_n is $p_n = \sum_{i=1}^n m_i p_i$. Each firm's probability of innovation success p_i is determined by their spending on R&D R_i . Here, we define an increasing and concave innovation function that maps R_i to p_i , that is, $p_i = F(R_i)$.

Therefore, the market aggregate probability of innovation success with n market participants is defined as:

$$p_n = \sum_{i=1}^n m_i F(R_i) \quad (2)$$

Equation (2) thus shows that the key determinant of p_n is each firm's spending on R&D.

We propose that a firm's spending on R&D R_i is in negative relation with number of market participants n . Firstly, when n increases, competition would become more intense, so price would decrease, leading to a decreased profit margin. This would lessen each firm's incentive to innovate and potentially result in a firm's insufficient funds to spend on R&D. This would lead to a decrease in p_n . Secondly, a research has shown that a higher profit margin would increase pace of innovation because the leading firm in the market want to sustain its leading position to earn the increased profits, and other smaller firms would have more incentive to become the leading firm to earn the higher profit margin.²⁰ So, all market

20. Guillermo Marshall and Álvaro Parra, "Innovation and competition: The role of the product market," *International Journal of Industrial Organization* 65 (2019): 221–247, <https://doi.org/https://doi.org/10.1016/j.ijindorg.2019.04.001>, <https://www.sciencedirect.com/science/article/pii/S0167718719300207>.

participants would increase their spending on R&D when there is higher profit margin, leading to a higher p_n . Hence, p_n is in negative relation with n .

We propose that the discount factor δ is also in negative relation with number of market participants n . δ is determined by pace of innovation. As we have demonstrated that when n increases, firms will spend less on R&D, resulting in a slower pace of innovation. So, the product quality enhancement would take place later, leading to a lower discount factor. Since both p_n and δ are negatively related to n , FI is in negative relation with n . We use FI_n to denote the discounted expected value of future innovation when there are n firms in the market.

As we have demonstrated that market concentration has opposite effects on the two determining factors of consumer welfare, whether a merger harms consumers is ambiguous. Thus, evaluating whether a merger is desirable depends on how large those effects are, and we derive a new merger approval condition based on the welfare analysis tool we proposed above.

Merger Approval Condition

A merger is considered desirable iff:

$$\begin{aligned} W_{post} &> W_{pre} \\ FI_{n-1} - FI_n &> CS_n - CS_{n-1} \\ \Delta FI &> -\Delta CS \end{aligned} \tag{3}$$

Equation (3) shows that if the increase in future innovation outweigh the loss in current consumer surplus, a merger should be approved.

In the following analysis, we will evaluate ΔFI and ΔCS for the Merger between Axon and VieVu and show that $\Delta FI > -\Delta CS$.

Empirical Analysis - ΔFI

In this section, we will demonstrate that ΔFI is positive and large.

Since there is a lack of available public data for the BWC System market, to address this limitation, we conducted an analysis using simulated data. This simulated data was created to align with the real values of Axon's and Motorola's R&D spending as reported in their respective 10K reports.²¹

Figure 1 provides a visual representation of our simulated R&D spending data. Prior to the Merger, both Axon and Motorola's R&D increases at roughly the same rate. We observe that the rate at which their R&D spending increases after the Merger, and the magnitude of the increase is larger for Axon than for Motorola. This may suggest that the Merger caused firms in the BWC System market to spend more on R&D, aligning with our model predictions.

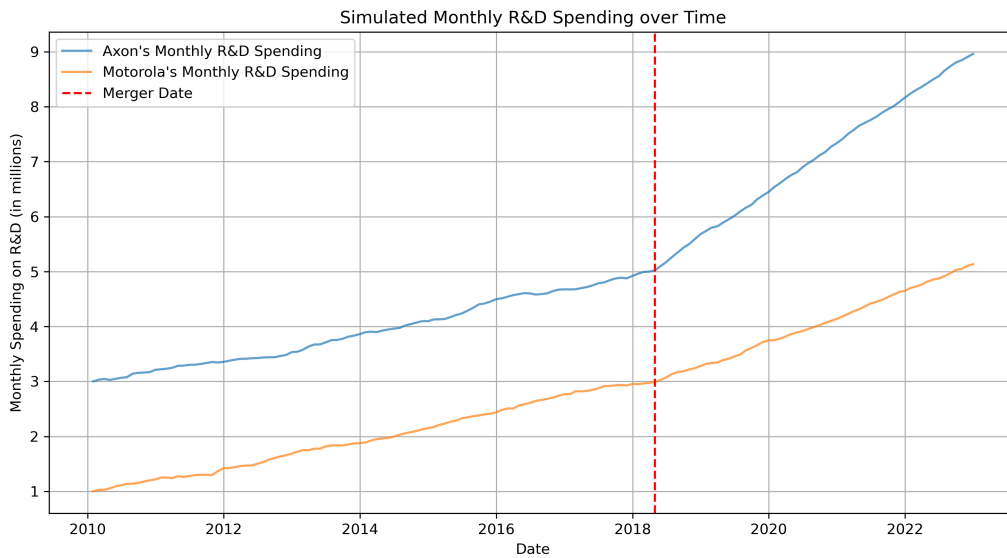


Figure 1. R&D Spending Over Time

21. Since Motorola produces a wide range of products, their spending on R&D reported in the 10K report not only accounts for the innovation in the BWC System. So we scaled down its spending on R&D.

Recall that FI depends on three factors:

1. Market aggregate probability of innovation success, p_n
2. Discount factor δ
3. Consumer surplus increase led by the innovation success i

We will analyze the Merger's effects on these three factors respectively.

Proposition 1 The merger will significantly accelerate the growth of p_n .

Given the R&D spending numbers in Figure 1, we can calculate the overall probability of innovation success in the BWC System market using Equation (2). In our simulation, the innovation function F is defined by $x \mapsto \frac{1}{1+e^{-\frac{x}{20}}}$, so that F is increasing and concave and the range of F stays in $(0, 1)$.

Figure 2 visually illustrates the trend of the p_n calculated in our simulation using function F over time. It's worth noting that the rate of increase in the market aggregate probability of innovation success significantly rises following the Merger.

Hence, the Merger accelerates the probability of innovation success.

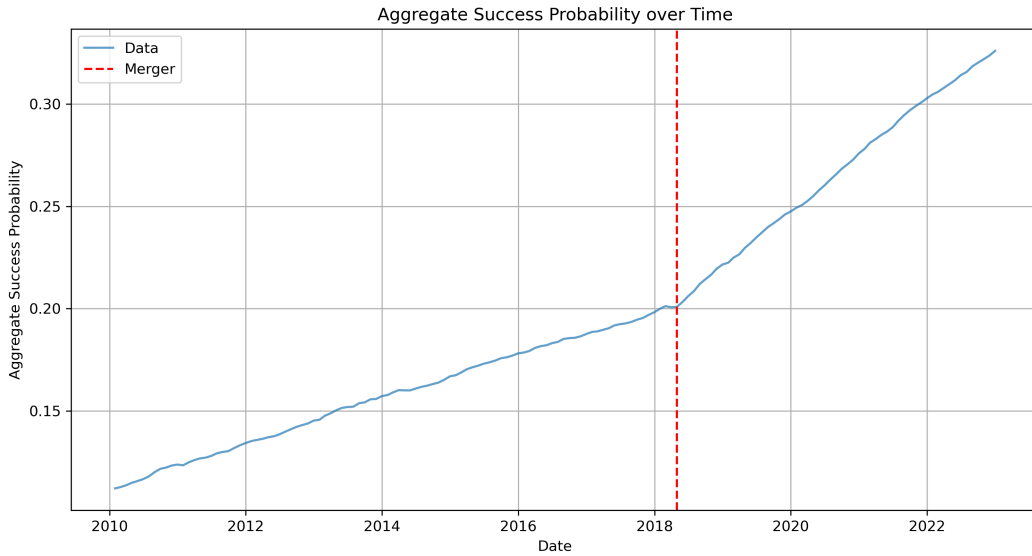


Figure 2. R&D Spending Over Time

Proposition 2 The Merger will significantly increase the discount factor δ .

As we have seen in Figure 1, the Merger significantly accelerates the growth of firms' spending on R&D in the BWC Market. According to our model, this trend will increase the discount factor δ as pace of innovation is higher and product quality enhancement will come sooner.

Proposition 3 The Merger resulted in a large consumer surplus increase led by future innovation success i .

Research has shown that data storage and management is the most costly aspect of BWC System deployments. Some police departments need to store videos in their internal sever, which requires a lot of human labor from their own technology departments and local agency support. In addition, the BWC System deployment costs are associated with employee wages because BWC System deployment program requires the hiring of personnel to manage the videos stored and redact the videos requested by the court from tons of videos.²²

However, post-Merger, Axon made key innovation on its digital evidence management system that provided much more efficient solutions for the police departments. Axon's digital evidence management system, Evidence.com, supports entirely electronic process of disclosure of videos stored to defense counsel, which reduced personnel's efforts in redacting videos and helped police departments save a lot of labor costs. Moreover, in 2022, Axon launched a new feature, 'Fast Evidence Review', on Evidence.com. This new feature supports audit transcript and keywords searching, which increased the efficiency of evidence reviewing significantly, and thus, further lowered the labor costs of video analysis.²³

22. Daniel E. Morgalo, "Welcome Innovation or Distressing Imposition? The Effects of Body Worn Cameras on Officers Attitudes And Policing Behaviors," 2020, <https://apps.dtic.mil/sti/trecms/pdf/AD1127025.pdf>.

23. "Digital Evidence Management: the Definitive Guide," <https://www.axon.com/resources/digital-evidence-management-guide>.

Therefore, Axon’s new innovation significantly reduced BWC System usage-related costs for police departments, resulting in a considerable consumer welfare gain, leading to a large increase in i .

We have shown that both p_n and δ will increase and i is large. Thus Axon and VieVu merger will result in a large increase in the present value of future innovation ΔFI .

Empirical Analysis - ΔCS

In this section, we will demonstrate that ΔCS is small enough to be offset.

In a study of BWC System deployment program conducted in 2018, Mesa Police Department reported that the total cost per camera was \$2198, including purchase, maintenance, and data storage. Their vendor was Axon.²⁴ In 2019, Mesa Police Department renewed a 5-year contract with Axon with a contract price of \$1,776,660.61, which covers the purchase of 139 BWCs and its maintenance and data storage.²⁵ Use the above data, we derive the cost of per camera to be \$2754. Based on the above data value, we estimate the post-merger price increase is 25% and argues that this is an upper bound.

The ideal data for analysis of ΔCS would be the price change on the same product and across different police departments. However, since we have limited access to the data, we could only find contract price change for a single police department. Additionally, the products in 2018 and 2019’s contracts were different. The contract renewed in 2019 was on Axon Body 3, but the one in 2018 was on Axon Body 2. Axon Body 3 has more new features such as longer battery life and video resolution.

24. *Cost and Benefits of Body-Worn Camera Deployments*, technical report (1120 Connecticut Avenue NW, Suite 930 Washington, DC 20036: Police Executive Research Forum, April 2018), p. 52, <https://www.policeforum.org/assets/BWCCostBenefit.pdf>.

25. Simi Valley Police Department, *Authorization to Purchase the Axon Officer Safety Plan 7+ for 129 Body-Worn Cameras*, Staff Report (Simi Valley, California: City of Simi Valley, Police Department, September 23, 2019), https://simivalley.granicus.com/MetaViewer.php?view_id=5&clip_id=2324&meta_id=157617.

Hence, the true consumer welfare loss caused by the price increase is much smaller than 25%, which is small enough to be offset by the consumer welfare gain generated by the product quality improvement ΔFI .

Empirical Analysis - Conclusion

We have demonstrated that the consumer welfare gain generated by the future product quality enhancement ΔFI outweighs the consumer welfare loss caused by the price increase ΔCS . Hence, Axon and VieVu merger satisfies Equation (3), and is, thus, desirable.

VieVu's Overestimated Competitive Power

VieVu's pre-Merger performance raises doubts on the FTC's argument that VieVu was a strong competitor against Axon. Financially, VieVu faced cash flow issues from unprofitable contracts, especially the contract with the New York Police Department (NYPD). At the time of Axon's acquisition, VieVu reportedly had only three days of cash on hand with no source of outside funding. Moreover, VieVu's products suffered from critical flaws, including security vulnerabilities and data loss. A BWC from VieVu caught fire while being worn by an NYPD officer.²⁶

We argue that VieVu's future market share would be zero had the merger not occurred because when more police departments notice the product issues, they would not renew contracts with VieVu and switch to other vendors. Thus, this merger should not cause competitive concerns.

26. David Griffith, "Axon Sues Federal Trade Commission Over Vievu Merger Complaint," January 2020, <https://www.policemag.com/technology/news/15313363/axon-sues-federal-trade-commission-over-vievu-merger-complaint>.

Motorola as a Strong Competitor

According to a Wall Street Journal article by Mark Maurer, Motorola became a strong competitor in the BWC System market in 2020, competing effectively with Axon in product features. This was resulted from its huge spending on investments and technological advancements.²⁷

Additionally, Motorola’s increasing competitive power against Axon is reflected by the remarkable growth of Motorola’s video security and analytics business, with a revenue increase of 30.7% in 2020 and expectations for over 20% growth in the subsequent year and its contracts with major police departments, including Metropolitan Nashville Police Department and the Illinois State Police.²⁸

Therefore, intense competition is still going on in the BWC System market, so the FTC’s argument that market participants other than VieVu could not impose competitive pressure on Axon also does not stand.

Conclusion

In this defense, we argue for the approval of the Axon-VieVu merger, countering the FTC’s concerns about potential anti-competitive effects. Our central argument is that the BWC System market thrives on innovation, thus, requires a long-run dynamic model to evaluate. We acknowledge that our model has limitations, including an simplified setup and insufficient data. However, we anticipate that future researchers, equipped with better data and advanced analytical tools, will be able to assess the dynamic impacts of such mergers more thoroughly.

27. Mark Maurer, “Motorola Solutions Raises Spending on Body Cameras to Grab Market Share,” June 2021, <https://www.wsj.com/articles/motorola-solutions-raises-spending-on-body-cameras-to-grab-market-share-11622745009>.

28. Maurer.

Bibliography

Cost and Benefits of Body-Worn Camera Deployments. Technical report. 1120 Connecticut Avenue NW, Suite 930 Washington, DC 20036: Police Executive Research Forum, April 2018. <https://www.policeforum.org/assets/BWCCostBenefit.pdf>.

“Digital Evidence Management: the Definitive Guide.” <https://www.axon.com/resources/digital-evidence-management-guide>.

Federal Trade Commission. *Administrative Part 3 Complaint - Public Version*, 2020. https://www.ftc.gov/system/files/documents/cases/d09389_administrative_part_iii_-_public_redacted.pdf.

Griffith, David. “Axon Sues Federal Trade Commission Over Viewu Merger Complaint,” January 2020. <https://www.policemag.com/technology/news/15313363/axon-sues-federal-trade-comm>

Hung, Vivian, Steven Babin, and Jacqueline Coberly. *Market Survey on Body Worn Camera Technologies* [in English]. Technical report NCJ 250381. Grant No. 2013-MU-CX-K111. 810 Seventh Street NW, Washington, DC 20531, United States: National Institute of Justice, November 2016. <https://www.ojp.gov/ncjrs/virtual-library/abstracts/market-survey-body-worn-camera-technologies>.

Hyland, Shelley S. *Body-Worn Cameras in Law Enforcement Agencies, 2016*. Technical report NCJ 251775. Bureau of Justice Statistics, November 2018. <https://bjs.ojp.gov/library/publications/body-worn-cameras-law-enforcement-agencies-2016>.

Marshall, Guillermo, and Álvaro Parra. “Innovation and competition: The role of the product market.” *International Journal of Industrial Organization* 65 (2019): 221–247. <https://doi.org/https://doi.org/10.1016/j.ijindorg.2019.04.001>. <https://www.sciencedirect.com/science/article/pii/S0167718719300207>.

Maurer, Mark. “Motorola Solutions Raises Spending on Body Cameras to Grab Market Share,” June 2021. <https://www.wsj.com/articles/motorola-solutions-raises-spending-on-body-cam>

Morgalo, Daniel E. “Welcome Innovation or Distressing Imposition? The Effects of Body Worn Cameras on Officers Attitudes And Policing Behaviors,” 2020. <https://apps.dtic.mil/sti/trecms/pdf/AD1127025.pdf>.

Simi Valley Police Department. *Authorization to Purchase the Axon Officer Safety Plan 7+ for 129 Body-Worn Cameras*. Staff Report. Simi Valley, California: City of Simi Valley, Police Department, September 23, 2019. https://simivalley.granicus.com/Viewer.php?view_id=5&clip_id=2324&meta_id=157617.

U.S. Department of Justice and Federal Trade Commission. *Horizontal Merger Guidelines*, 2010. <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>.

Uchida, Craig D., et al. “Managing Digital Evidence from Body-Worn Cameras: Case Studies in Seven Sites,” March 2022. <https://www.ojp.gov/library/publications/managing-digital-evidence-body-worn-cameras-case-studies-seven-sites>.