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MEJO 479 Final Industry Report

Section I: Scenario Planning Analysis

Overview

Scenario planning is a long-term strategic planning approach for a company. It addresses changes in the company's industry as well as possible scenarios the company might encounter over the next three to five years. By engaging in scenario planning, the company is able to prepare for how the industry might change in the next few years and how the company can react to maintain a strong position in the market.

The following scenario planning addresses the base case, sub optimal performance, optimal performance, and unicorn scenarios for Microsoft. By tracking and analyzing different data sets on Tableau, the following analyses will identify potential changes in industry that may indicate the occurrence of the unicorn scenario.

Base Case

Industry Reports

The tech industry is developing rapidly as new innovations emerge, and with this change Microsoft will have opportunities for growth as well as challenges. Based on industry reports in the technology sector, such as the CompTIA IT Industry Outlook 2018 and the Deloitte 2018 Technology Industry Outlook, there will be several things for Microsoft to look out for in the future. Developments in cloud computing will begin changing the way businesses operate through artificial intelligence and the Internet of Things (IoT). With cloud computing, demand for flexible consumption like pay-as-you-go models will drive costs down. Demand for tech products continues to be high, and the industry will experience 5-7% growth in the next year (IT Industry Outlook 2018). Pitfalls to watch out for in the base case scenario are the risks of cyberattacks with new, untested technology as well as changes in the regulatory environment.

Customer Satisfaction

Microsoft's customer satisfaction seems to vary among its various product offerings and services. Its technical support system has been frequently criticized by customers, but its tech products seem to garner positive reviews, and even outcompetes that of other brands. For example, last year J.D. Power's US Tablet Satisfaction Survey rated Microsoft's Surface higher than both Apple and Samsung for

user satisfaction (Siegal, 2017). Among its B2B customers, a large part of its revenue, Microsoft beat out competitor Google on overall customer satisfaction according to a study from Collaborative for Customer-Based Execution & Strategy (2018). On the other hand, Microsoft seems to have more negative customer feedback regarding its technical support. On Consumer Affairs, the company has an average 1.1 star satisfaction rating based on the reviews of 118 customers in the past year, with many of the reviews referencing unpleasant or unhelpful experiences with Microsoft's technical support.

Pricing Analysis

Microsoft uses a blend of proactive and reactive pricing strategies. The company does sales around the holidays and in response to noticeable dips in consumer demand (Valentine, 2014). Microsoft typically decreases the prices of its products as they become outdated and reactively adjusts pricing based off of the success of the product. For example, Microsoft has not discounted the highly regarded Surface Pro since its launch more than 17 months ago but it has discounted its unsuccessful Lumia smartphone line in an effort to sell off inventory as it discontinues the line.

In general, Microsoft positions itself as a lower priced but still quality technology brand. This is demonstrated by its Lumia smartphone and Surface Pro laptop prices, both of which have lower starting prices than high-end competitor Apple. Competition with Lenovo, which has had significant growth in recent years, and other PC brands has forced Microsoft and other companies to lower their prices and create new products that are comparable with Apple (Bacchus, 2018; Ranger, 2018).

Microsoft has experienced increased consumer demand and greater pricing resiliency in its laptops in recent years. The company has started to create products that seriously compete with Apple, such as the Surface line. Revenue from the Surface line has grown since its debut in 2014, with both sales of newer models and of older price-reduced models contributing to increased sales. In 2017, earnings from Q1 and Q2 (when the Surface products were released) were 50% higher than Q3 and Q4, demonstrating the success of the line (Microsoft, 2017).

Financial Analysis

2018 Q2 Analysis (in millions)
Comparing Quarter Ending June 2018 to June 2017 (Microsoft, 2018)

	June 30, 2018	June 30, 2017	Increase/Decrease ($)	Increase/Decrease (%)
Accounts Payable	$1010	$850	$160	18.8%
Accounts Receivable	$9188	$7029	$2159	30.7%
Inventory	2662	2181	481	22.1%

Operating Profit Margin	34.5	30	4.5	15%
Research and Development	3993	3514	479	13.6%
Cash Flow	11946	7663	4283	55.9%
Revenue	$28,918	$25,826		12%

The 18.8% increase in accounts payable indicates that Microsoft has increasing debt compared to last year. However, Microsoft invested 13.6% more in research and development, which demonstrates that the company is using this money to invest in new products and technology. This is also reflected by the 22.1% increase in inventory.

Microsoft also experienced an increase in accounts receivable and cash flow, conveying that the company is generating revenue and getting paid for its products and services on time. The increase in operating profit margin of 15% demonstrates that the company is managing its operating costs well and increasing its profits. This may indicate financial efficiency and stability.

Comparing Fiscal Year 2018 to Fiscal Year 2017 (Microsoft, 2018)
(Year ending June 30, 2018)

	2018	2017
Revenue	$110,360 million	$96,571 million
Research & Development	$14.7 billion	$13 billion

Overall, Microsoft experienced an increase in revenue in 2018. The company struggled in its phone businesses where restructuring plans decreased operating income by $1.1 billion. Despite this, Microsoft still did well financially in 2018 and experienced an increase in stock pricing from a high of $72.89 in 2017 to a high of $102.69 in 2018 (Microsoft, 2018). The tech industry as a whole is experiencing significant growth this year, leading to many opportunities for Microsoft to capitalize on. In its annual report, Microsoft detailed that it increased its research and development on cloud and AI platforms, its recently acquired LinkedIn platform, and gaming. This demonstrates the company's commitment to staying competitive in the industry in a variety of technology markets.

Microsoft Revenue Increases from 2017 to 2018 by Product (Microsoft, 2018)

Product	Revenue Increase/Decrease (%)
Commercial cloud (Microsoft Office 365	+ 56%

commercial, Azure, Dynamics 365, other cloud properties)	
Gaming	+ 14%
Microsoft Surface	+ 16%
Office Commercial	+ 11%
Azure	+ 91%
Windows Commercial	+ 12%

Despite experiencing phone issues financially, which the company did not detail extensively in its annual report, Microsoft had boosts in revenue among many of its products and services. Microsoft had an increase in its Surface revenue, which it credits to its release of new editions of Surface, an increase in volumes sold, and by having a greater mix of premium devices. Microsoft had a very high increase of 91% in Azure revenue, demonstrating that the research and development that it has been putting into its cloud platform is paying off.

Summary

Overall, Microsoft is doing well in the tech market. While its success varies by product, the company has had positive financial statements, is seeing great growth with its Surface line, and is positioning and pricing its products in a niche unique from competitors such as Apple. Increases in research and development demonstrate that the company's plan is to stay innovative and nimble as it continues to invest in budding technologies such as AI and IoT.

As for its customer base, Microsoft has done a stellar job keeping satisfaction with its products and services high and, in many cases, outstripping its competition. Its one weakness is a general dissatisfaction with its technical support services, but if the company improved its employee training and virtual assistance there would be an increase in customer satisfaction.

Suboptimal Scenario

With widespread concerns over data privacy, Microsoft can also become embroiled in a data breach problem in a suboptimal scenario. Facebook is being hurt by a recent data breach affecting 50 million accounts. It has been fined £500,000 ($645,000) by the UK's Information Commissioner's Office for the Cambridge Analytica data breach, the highest punishment the office can dish out for a data breach (Kanter, 2018). Comparing the quarterly earning report of Q2 2018 to Q1 2018, the growth of Facebook daily active users was stagnant.

Regulators around the world are also putting stricter regulations on data privacy. On May 25, 2018, the European Union enforced General Data Protection Regulation, known as GDPR, setting new rules for how companies manage and share personal data (Brandom, 2018). GDPR fundamentally flips the relationship between massive tech companies that gather data and the users they gather it from. Japan's Personal Information Protection Commission (JPPC) also has launched an investigation recently into the social media company (Vengattil & Dave, 2018). As Microsoft provides software and services for both enterprise and individual customers, data privacy should be top priority to plan around.

Besides the cyber security issue, potential declining customer demand is indicated in a recent report on brand preference for laptop computers from February through June 2018. According to the report, the top three brands selected by participants are Apple, HP and Dell. Only 6.3% respondents stated they prefer Microsoft, not based on special offers or sales (MSW-ARS Research/The Brand Strength Monitor, 2018). This projects disadvantages of Microsoft laptop products among competitors. More effort should be devoted into brand management.

Inventory increase is a also a potential problem Microsoft should be aware of. From Microsoft's 2019 Q1 Report, the inventories have grown 35.8% from 2662 million as of June 30, 2017, to 3614 million as of September 30, 2018 (Microsoft, 2018). The increase in inventory projects a potential decrease in customer demand or distributors no longer stock up the products.

As of overall economic environment, tech stocks tanked amid a broader stock market slide in October. On Oct.10, stocks like Amazon (down 6.15 percent) and Tesla (down 2.25 percent) led in the downturn (Shieber, 2018). Rising inflation and interest rates as well as a move by the Fed to tighten policy drove the drop. The overall market downturn also influenced the performance of Microsoft (Shieber, 2018). In order to guarantee rates of return, Microsoft can make big money moves and take money out of the stock market to invest more secure bonds.

Optimal Scenario

This section will explore Microsoft's optimal scenario. In five to ten years, if everything goes as well as it possibly could, Microsoft will be a different company than it is today. Much of that change will likely be affected by the company's recently-appointed CEO, Satya Nadella. Nadella, who was appointed CEO of Microsoft in 2014, has drastically changed the way the company does its business. Unlike his predecessor, Nadella's Microsoft no longer tries to make everything run on Windows, instead Nadella wants to ensure that everything can work *with* Windows (Bohn, 2018). The goal is to convince consumers that they will be better off if they have Windows around to augment the gear they're already using. Doing this expands Microsoft's potential client base — instead of being limited to only PC users, it now includes anyone who has a product that connects them to the internet (Bohn, 2018). Given that Microsoft is changing its focus away from hardware to ubiquitous software, the company will likely look more like IBM than Apple in the future.

To accommodate this shift away from physical products to software, industry reports show that Microsoft is shutting down manufacturing plants in the United States and moving operations to China (Hruska, 2017). The cost of labor in China is cheaper than it is in the United States, meaning Microsoft stands to make a greater profit by relocating its manufacturing there in the future. Recent tariffs imposed on China by the U.S. government will be unlikely to damper these prospects, as Microsoft has diversified its product lines to be able to absorb additional costs, rather than pass them along to consumers (Liedtke & Gill, 2018).

Microsoft's new mission has only recently been implemented, which means most of its gains will be realized in the near future. For the first time in decades, Microsoft is being called "innovative," and demand for its products has been on the rise (Weinstein, 2018). It is working to expand its software so it can work in new, cutting-edge Internet of Things (IoT) devices like drones, support companies with cloud services, and improve its enterprise software (Ryssdal & Bodnar, 2017). Nadella says that within the next five to ten years, Microsoft's focus will be on its AI, Intelligent Cloud, and Intelligent Edge (Bohn, 2018). The company has already begun to embark on this mission with innovative AI endeavors. For example, a beta Microsoft application released within the last year converts spoken language in real time, so two people speaking different languages can have a conversation with each other (Bohn, 2018). Nadella says that AI applications like these are the future for Microsoft. Other innovations include DJI drones using Microsoft's machine learning models to identify breaks in oil pipelines, Uber using Microsoft's facial recognition for driver identification, and Twitter using Microsoft's AI capabilities to do machine translations (Bohn, 2018). Changing consumer demands have also improved Microsoft's prospects. Virtual reality is a rapidly expanding market, and Microsoft's Hololens and A.R. are at the forefront (Ryssdal & Bodnar, 2017). As AI and virtual reality become more mainstream, Microsoft stands to make considerable gains.

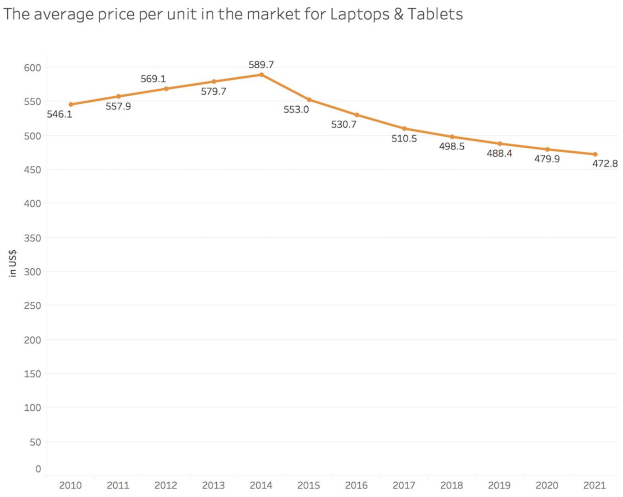
Recent innovations in software, virtual reality and cloud computing have improved Microsoft's financial prospects greatly. Since Nadella became CEO, Microsoft's stock has more than doubled, and will likely continue to rise in the future (Weinstein, 2018). In Microsoft's optimal scenario, the company will continue to expand its consumer base and excel financially through further innovation and software integration.

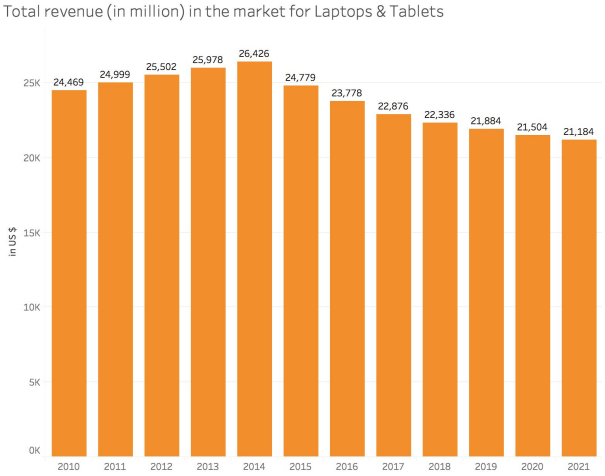
Unicorn Scenario

As the technology market continues to develop, artificial intelligence (AI) remains at the forefront of interest. The ability for computers to do more and let humans do less is generally appealing to consumers. Inventions like Siri for the iPhone and Amazon's Alexa are just two examples of how AI technology is beginning to proliferate the consumer market. Along with the creation of AI goods for mass markets is the development of products to make manufacturing faster and simpler. Machines have already become common in factories, thus replacing human jobs and reducing long-term production costs. A reduction in costs leads to a reduction in prices, which subsequently creates a more disposable item. For example, when the calculator was

first created, the price was far higher than it is today and thus the product was more valuable. Now, however, calculators are sold for $1 and are easily replaceable. Similarly, if the price were to drastically drop for today's technology, consumer value ideas would shift and technology companies would have to approach their market offerings with a quantity over quality perspective.

Yujie Tao



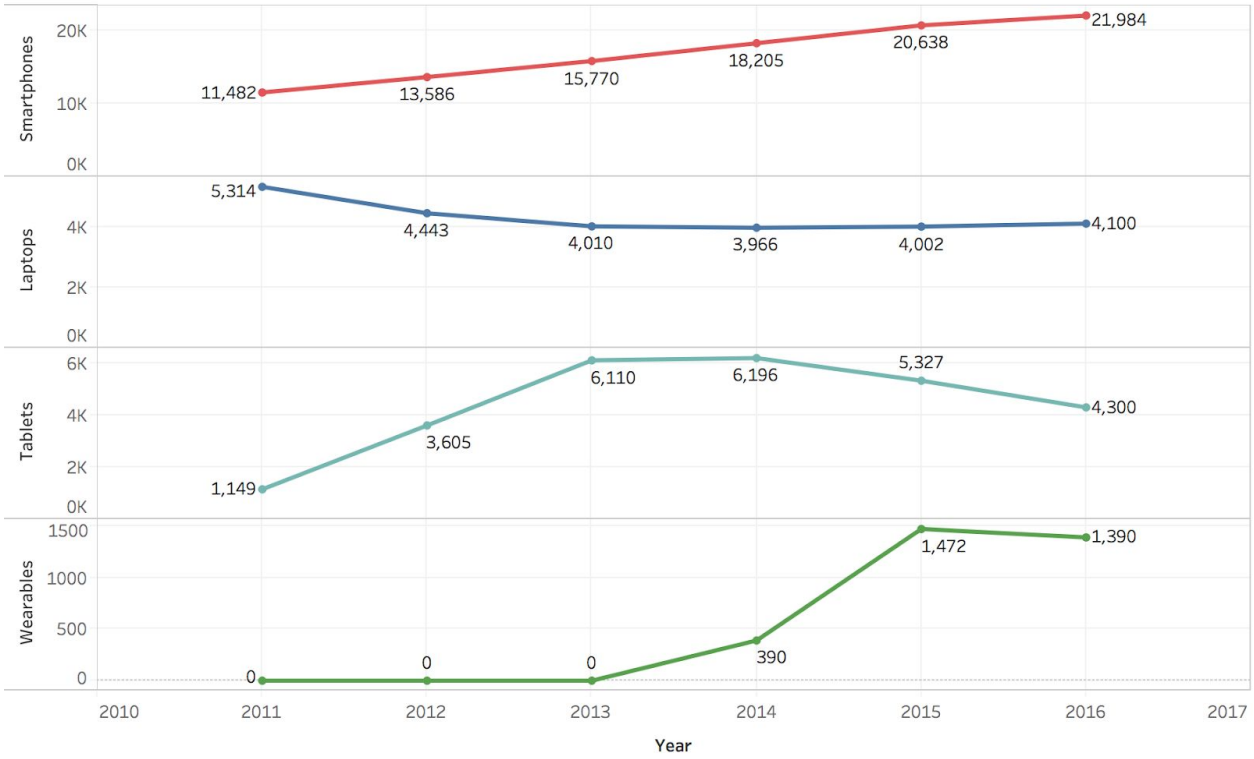


By offering four different models, 20 different hardware configurations under Surface product line, Microsoft has been a big player in laptop and tablet market. In 2018, Microsoft announced the release of Surface Go, Surface Pro 6 and Surface Laptop2, which cover both tablet and laptop products.

There are three leading indicators for the unicorn scenario: average price, product sales and manufacture laboring. The first dataset being analyzed projects the trend of laptop and tablet market worldwide from 2010 to 2021. From the dataset, it's clear that the revenue from laptop and tablet market is shrinking. With average price per unit drops from $564.1 in 2010 to $472.8 in 2021, total revenue drops from $24,469 million to $2,1184 million, both decreasing by 13.4% (Statista, n.d.). The projection of lower average price per unit and total revenue indicates how mass manufacturing influenced the tablet and laptops market: the products are being more inexpensive as mass manufacturing lowers entry bar and incentivizes price competition.

Customer's demand in laptop and tablet products is also shrinking. The second dataset shows the annual sales volume of tablets, wearables, laptops and smartphones in France between 2011 and 2016. Laptop annual sales dropped from 5,314 thousand units in 2011 to 4,100 thousand units in 2016, decreased by 22.8%. Tablets have been raised between 2011 and 2014 but the annual sales volume dropped after 2014 by 44.1% (Mobile Marketing Association France, n.d.). Less customer demand would lead to lower price as there would more supply in the market then demand, which in turn make tablet and laptop products more disposable.

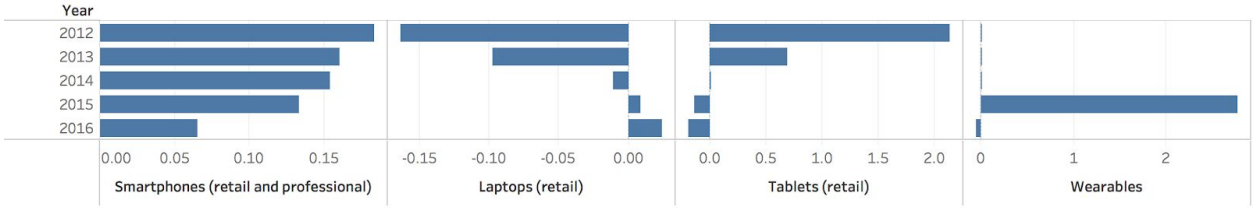
Annual sales volume of smartphones, tablets, wearables and laptop in France from 2011 to 2016 (in 1,000 units)



The trends of Smartphones (retail and professional), Laptops (retail), Tablets (retail) and Wearables for Year. Color shows details about Smartphones (retail and professional), Laptops (retail), Tablets (retail) and Wearables.

Measure Names
- Laptops (retail)
- Smartphones (retail and professional)
- Tablets (retail)
- Wearables

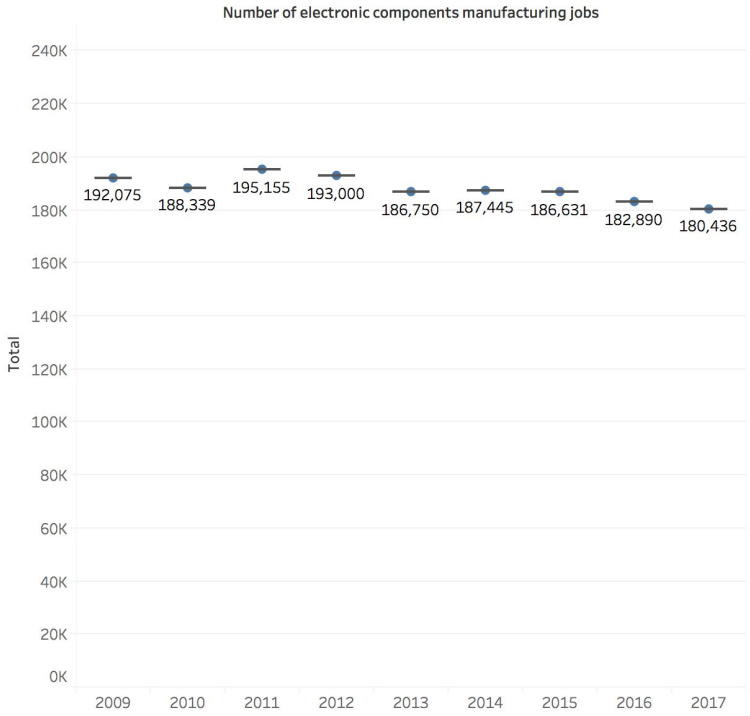
Annual sales volume growth rate of smartphones, tablets, wearables and laptops in France from 2012 to 2016* (in 1,000 units)



Sum of Smartphones (retail and professional), sum of Laptops (retail), sum of Tablets (retail) and sum of Wearables for each Year. The view is filtered on Year, which keeps 2012, 2013, 2014, 2015 and 2016.

The third indicator for unicorn scenario is the manufacturer laboring. From the third dataset, the total number of electronic components manufacturing jobs in the United States has decreased in recent years. In 2009, there were about 192 thousand jobs in the electronic components manufacturing industry, but this number decreased 9% by 2017 (CompTIA, n.d.).. The trend can be attributed to automation in manufacturing industry, which in turn lowers the manufacturing cost of electronic products.

Total number of electronic components manufacturing jobs in the United States



In order to adapt to the unicorn scenario, there are several strategies Microsoft can adopt from inside and outside industry cases. From the second dataset, one major trend that appear in 2014 is the raise of wearables. Wearable product is an emerging market Microsoft can put into effort before laptop and tablets become disposable products and no longer generate enough revenue. Apple is a leading company in wearable products, selling 4.7 million Apple Watches and capturing 17 percent of the global market. Apple's wearables business, which includes Apple Watch and AirPods, saw 60 per cent revenue growth in the June quarter(Mayo, 2018).

Microsoft can also learn from Amazon Kindle's pricing strategy. Amazon sells its tablet device at a loss to drive customers in. By tightly integrating the devices with Amazon's online store, Amazon hopes to make money by selling lots of e-books, music, movies, and other stuff to Kindle and Kindle Fire users over time (Levine-Weinberg, 2014). Microsoft can also keep the its hardware product's price low if unicorn scenario happens, but include add-on value on their software being provided. By integrating Azure cloud services, MR experience, gaming softwares with Surface would help Microsoft to generate revenue as the customers use and purchase those softwares over time through Surface.

With the rise of mass production, clothing industry has suffered the problem of lower manufacturing cost, which leads to the lower price and revenue. Retailers slashes prices to attract customers. Fast fashion company such as H&M and Forever 21 coped with this scenario by unlocking fast fashion, which provides low costs clothing and deliver new products to stores frequently. Zara stores famously gets two new shipments of clothes each week, while H&M and Forever 21 get clothes daily (Bain, 2016).

However, this strategy is not for Microsoft. Fast fashion brands are notorious for knocking off high-end designers, allowing the customer to get something at least superficially similar to the original at a small fraction of the cost, and they're priced lower than the rest of the market, making their products feel like a bargain (Hyland, 2018).

Customization is a strategy Microsoft can adopt to adapt itself in unicorn scenario. In footwear, Nike and Converse have built popular 'mass customization' services, which allow customers to participate in the design of their products, which are then built to order in large-scale factories, blending the benefits of traditional craft production with the efficiencies of modern industrial processes (Abnett, 2015). Microsoft can also roll out customized laptops for its customers to keep the price high and generate enough revenue.

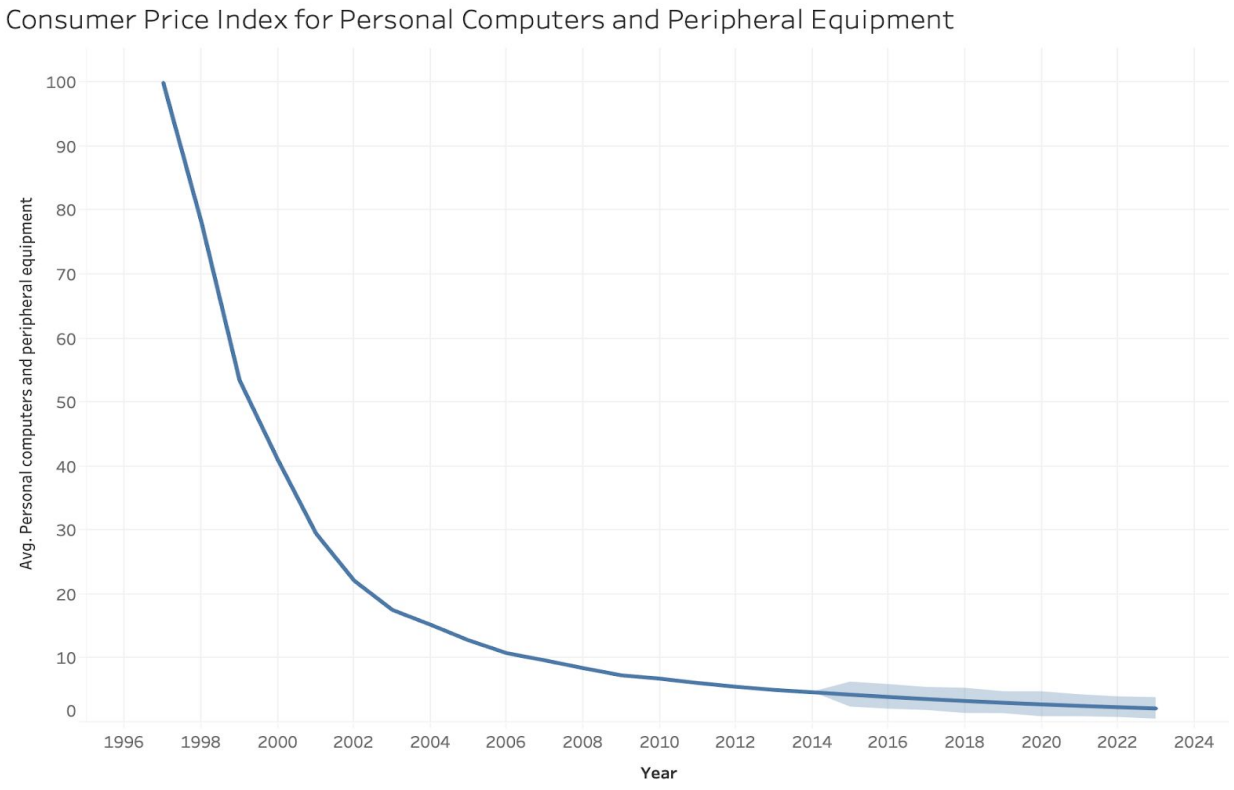
Purely focusing on mass production without innovation and customization would lead to problem. GM is a company that failed to adapt itself and overly focused on mass-manufacturing. Founded in 1908, the company was the largest automobile manufacturer from 1932 through 2007. By failing to innovate and ignoring the competition, GM found themselves at the doorstep of the largest bankruptcy in American history. They avoided investing in new technologies that could have improved the quality of its product to meet the changing needs of customers. Mass production and piece-rate incentives created a workforce with little pride in the quality of the product (Kay, 2009). Focusing on profiting from finance, GM's management failed to adapt GM to changes in customer needs, upstart competitors, and new technologies. The current company, General Motors Company (GMC) was founded in 2009 and purchased the majority of the assets of the old company (Asalaid, 2018).

Paige Colpo

While it may seem unlikely that the price of laptops will decrease to the point that they are rendered disposable, it is a scenario that data trends suggest could become a reality in the future. It is a trend that companies, like Microsoft, that depend on laptop sales should be concerned about. Should this unicorn scenario become a reality, Microsoft stands to lose a lot of money — Microsoft's Surface laptop raked in $1.1 billion for the company in the 2017 fiscal year alone (Hardawar, 2018).

One of the primary indicators that corroborate this unicorn scenario is the decreasing consumer price index (CPI) of personal laptop computers and peripheral equipment. The price of laptop computers has steadily decreased since Compaq Computer launched the first laptop PC in 1988. In 1996, the average laptop cost around $4,000 — around $6,000 when adjusted for inflation (Comen, Sauter, & Stebbins, 2016). In 2018, it is possible to purchase a laptop for as little as $150 (Brant, 2018).

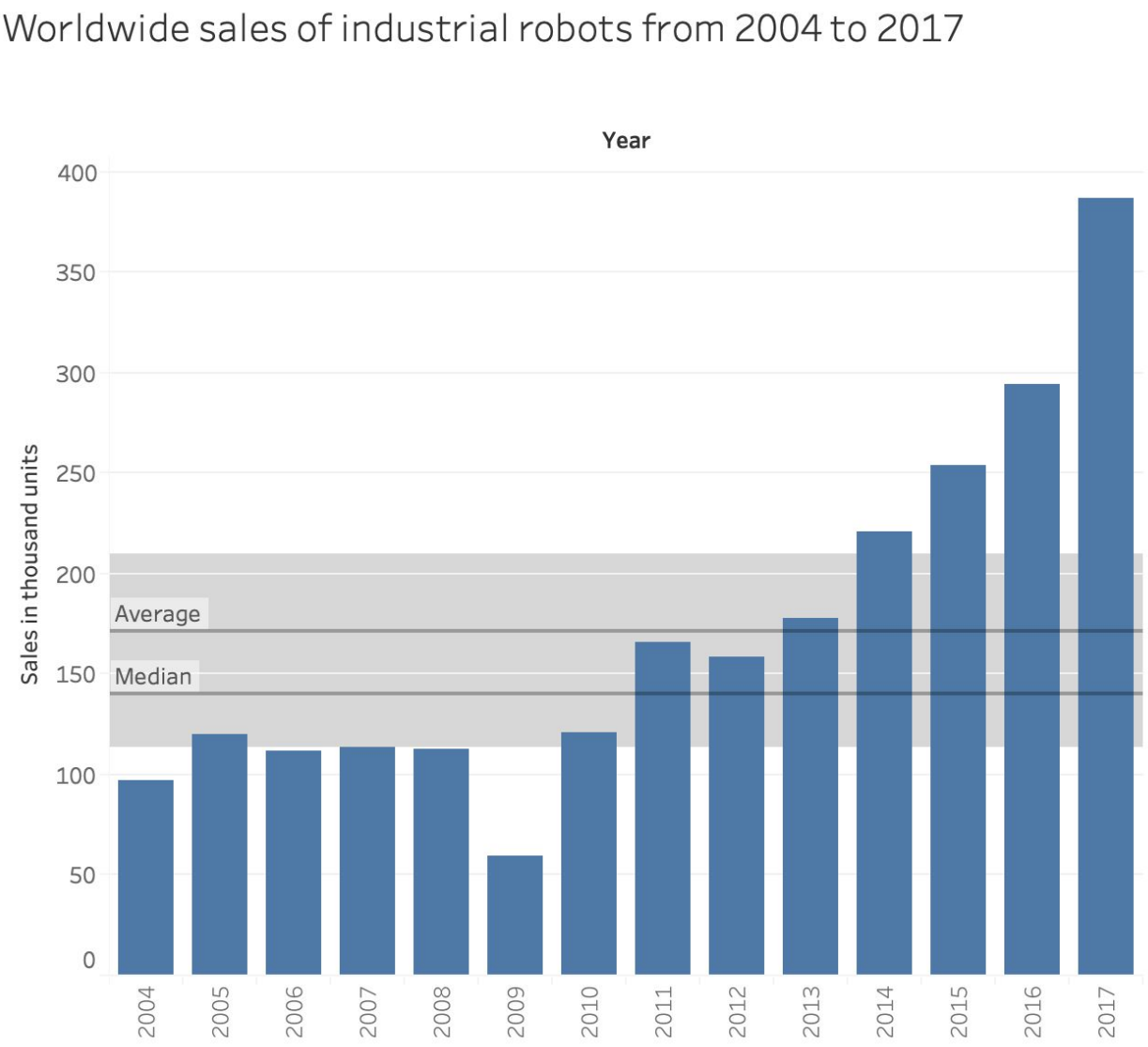
Year	Average CPI	Median CPI	Min CPI	Max CPI
1997	100.00	100.00	100.00	100.00
1998	78.19	77.60	64.20	96.90
1999	53.47	53.70	47.00	61.40
2000	41.07	40.75	36.50	46.40
2001	29.54	29.55	25.30	35.00
2002	22.16	22.45	19.70	24.60
2003	17.58	17.35	16.20	19.50
2004	15.27	15.40	13.90	16.20
2005	12.83	12.90	11.70	14.00
2006	10.82	10.65	10.30	11.60
2007	9.69	9.65	8.90	10.30
2008	8.48	8.50	7.90	9.00
2009	7.36	7.35	7.00	7.90
2010	6.84	6.80	6.60	7.00
2011	6.16	6.15	5.80	6.50
2012	5.58	5.65	5.30	5.80
2013	5.08	5.05	4.90	5.30
2014	4.72	4.75	4.40	4.90
2015	4.34	4.35	4.20	4.40



As the above graph demonstrates, the consumer price index (CPI) for personal computers and peripheral equipment has steadily decreased since 1997 (Bureau of Labor Statistics, 2015). If the CPI of a good declines, that means there is a steady decrease in the price of the good (Koba, 2011). The CPI for laptops in 1997 was 100.00; in 2015 it was only 4.34. According to Tableau's forecast, the CPI will decrease to 2.18 in 2023. As such, it can be reasonably assumed that the selling price of laptops

will continue to decrease in the future. This trend should concern Microsoft, as it is shows that it is possible for the price of laptops to decrease to the point that they would be rendered disposable. The mean and median of the CPI data confirms these findings and further suggests that laptop prices will continue to decrease in the future.

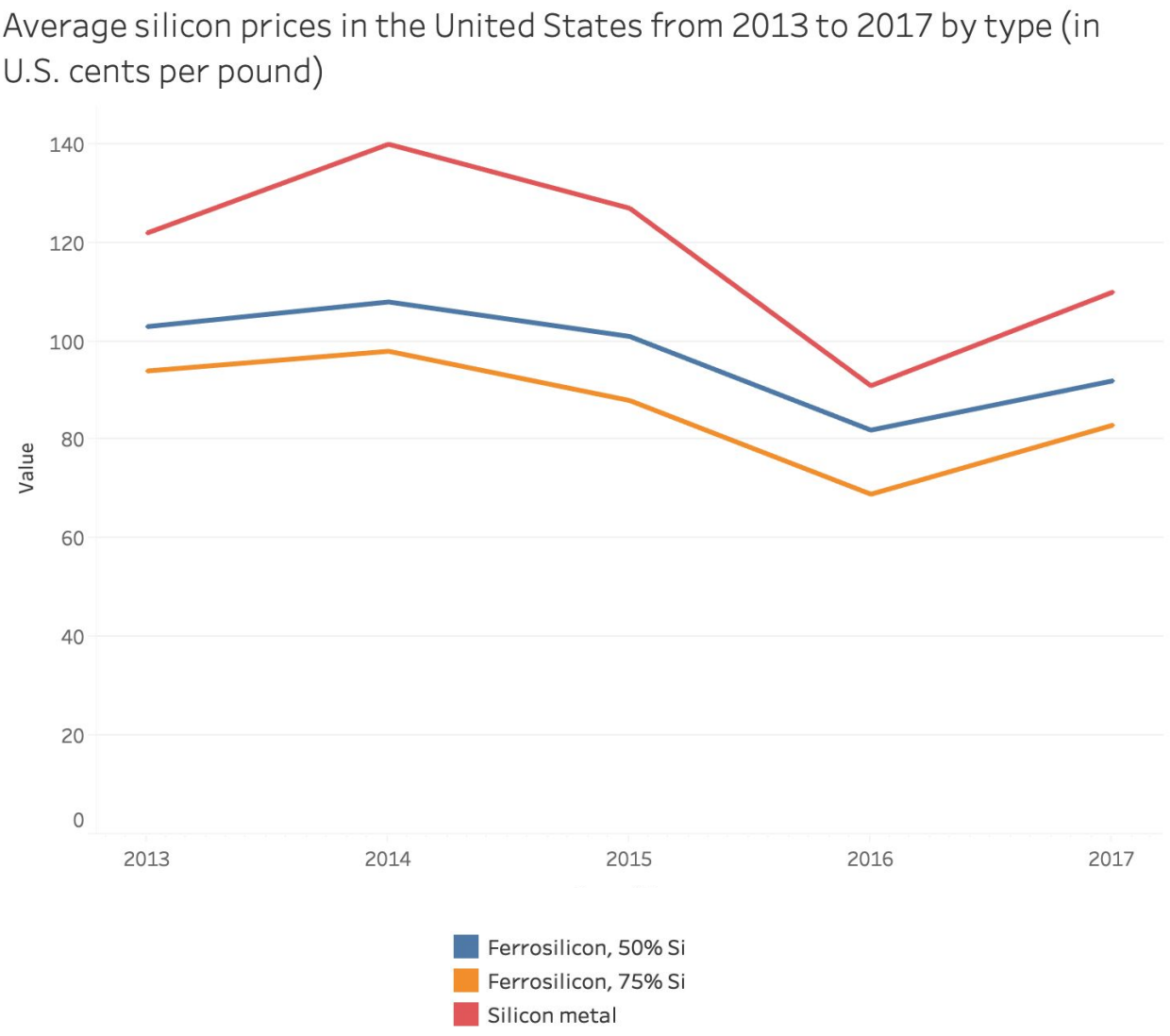
Another trend that indicates the possibility that laptop prices will decrease drastically in the near future is the growing prevalence of industrial robotics and artificial intelligence (AI) in laptop manufacturing.



As the above graph demonstrates, industrial robotics sales are increasing — the average of the data is 171.14 thousand, and the median is 140 thousand (International Federation of Robotics, 2018). Industrial robot sales surpassed the average and median figures in 2013 and have continued to rise, likely meaning that robots will replace human manufacturing capital in the near future.

As industrial robots replace human labor, manufacturing costs will decrease. Companies offering laptops at very low prices — achievable thanks to incredibly low manufacturing costs — will force companies like Microsoft to decrease their prices in order to remain competitive. Eventually, prices could be driven down to the point that laptops are no longer a big ticket item.

A third factor that could contribute to the unicorn scenario becoming a reality is decreasing raw materials costs. Microsoft's laptops are made from a variety of elements, one of which being silicon (Devices Sustainability, 2018). As raw material costs decrease, the price of laptops will ostensibly decrease as well.



As the above graph demonstrates, silicon prices have been decreasing over time (U.S. Geological Survey, 2018). While they have rebounded slightly in the last fiscal year, industry reports forecast that they will begin to decrease again in the upcoming months — below the current average of 100.53 cents per pound and median of 98 cents per pound (Hutchins, 2018). Decreasing raw material costs will drive the costs of

laptop computers down, meaning Microsoft will have to decrease its prices to remain competitive.

In order to avoid falling victim to this unicorn scenario, Microsoft should follow the lead of the Swedish furniture company Ikea. Within the last decade, the furniture market has faced many of the same issues raised in this unicorn scenario. Increasing automation, low raw materials costs, and decreasing sales prices have created an environment in which furniture is so cheap it is essentially disposable. Instead of fighting this reality, Ikea has embraced it. It has rebranded itself as affordable and practical, and has increasingly taken advantage of the college-aged consumer segment, which is notorious for purchasing "temporary" furniture. Consumers have responded remarkably well to this brand positioning, and the company has earned a cult-like following as a result. Should the unicorn scenario raised in this report become a reality, Microsoft could take a similar approach and embrace the trend toward cheaper, disposable electronics. Through targeted advertising and marketing, it could establish itself as the go-to laptop brand for college-aged students, who typically don't have much expendable income or need for long-lasting products.

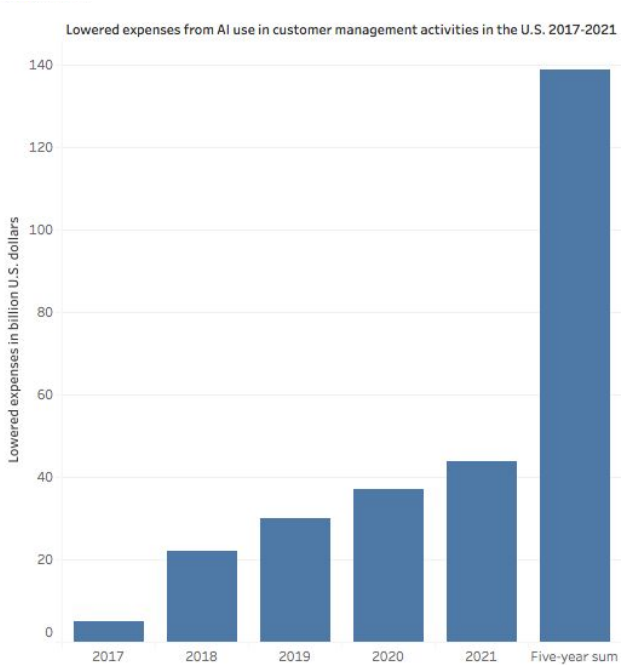
If Microsoft doesn't adapt to the changing market, it could face a fate similar to Mattress Firm. As more companies have entered the mattress industry, furious competition for consumers' business has generated deals and low prices. Mattress Firm, formerly the No. 1 U.S. mattress retailer, hasn't adapted to the decreasing prices, overexpansion and high competition —– as a result, the company has lost considerable business to more its tech-savvy competitors and has been forced to close hundreds of stores (Bomey, 2018). Without a loyal consumer base, successful marketing campaign or differentiation strategy, consumers ignore Mattress Firm. The company is now considering filing for bankruptcy (Bomey, 2018). Microsoft could avoid going down the same path by differentiating itself and adapting to the changing market, as Ikea has done.

Sara Edwards

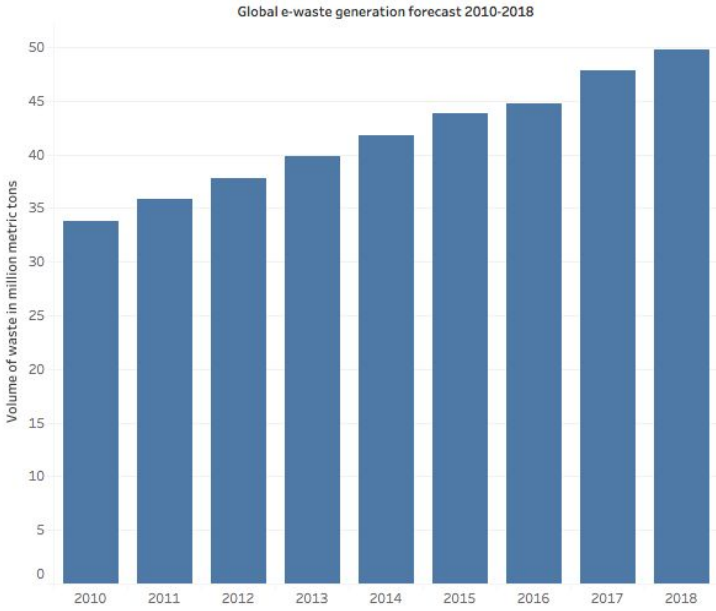
In order to track the probability of the unicorn scenario, Microsoft should also track the trends in pricing for inputs for manufacturing its products. Observing when prices and manufacturing costs drop will alert Microsoft to the potential resulting devaluing of its products. The first trend Microsoft could track is the adoption of artificial intelligence, which has been increasingly adopted in manufacturing, logistics, transportation, and other links in the supply chain to reduce costs and save time (Bharadwaj, 2018). To determine the extent of adoption of AI in these sectors and inform Microsoft's decision-making, the company could track the expenses saved by AI, shown in the forecast below from 2017 to 2021. As the graph depicts, in that time frame U.S. companies will have saved nearly 140 billion dollars from the use of AI.

Tracking this metric will allow Microsoft to see when AI increases efficiency to a critical point of making manufacturing and transport of products cheap enough to lower their value. An example of another industry that is being disrupted by AI is agriculture. With the advancements in automated technology facilitated by AI, some predict that

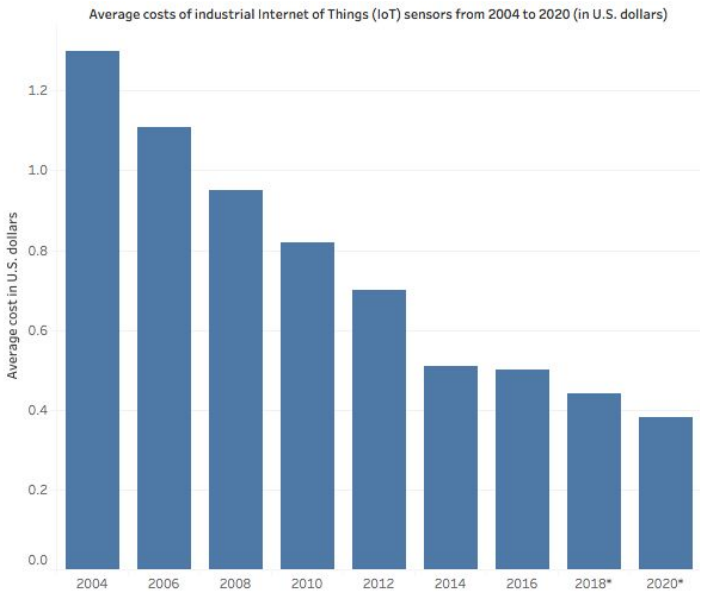
farm equipment like tractors will become self-operated, freeing up expenses used for human employees (Underwood, 2018).



In a potential future scenario, tech products including laptops could become more disposable due to decreased cost of production. To anticipate this scenario, it could be useful to track the change in global e-waste generation, such as in the graph below, which could indicate a changing mindset about the value of technology. This variable is not a direct measurement of the declining value of tech products, but it can be used as an indirect variable that can be assumed to change concurrently. Although more factors go into the generation of e-waste, such as a general increase in the global volume of tech products, analysts would simply have to account for those factors to determine whether e-waste is caused by changing attitudes.

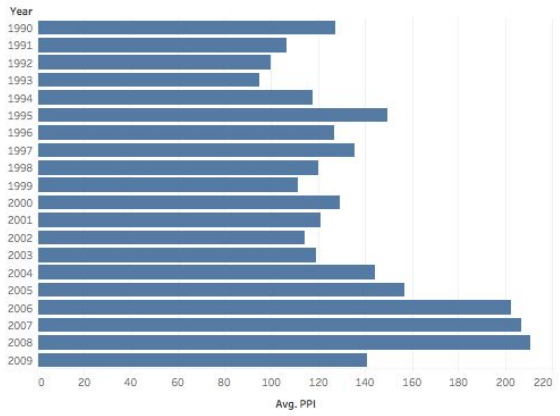


Another input that will increasingly be involved in future tech products is components of the Internet of Things. This network of interconnected, Internet-enabled objects can range from smart watches to smart homes. The average cost of IoT sensors has decreased significantly since the first days of the Internet, and devices are being incorporated into daily life more and more in recent years. Microsoft has a significant portion of its business in the IoT and plans to invest $5 billion in the industry in the next few years (Microsoft, 2018). A decrease in the price of these devices and sensors can be used as an indicator of shifts in the tech industry in general. Additionally, when the production costs of inputs to Microsoft's tech products fall, the value of those products might also fall. The graph below shows the decreasing costs of industrial Internet of Things sensors from 2004 projected into 2020.



Maddie Omeltchenko

Producer Price Index (PPI) Industry Data for Primary Aluminum



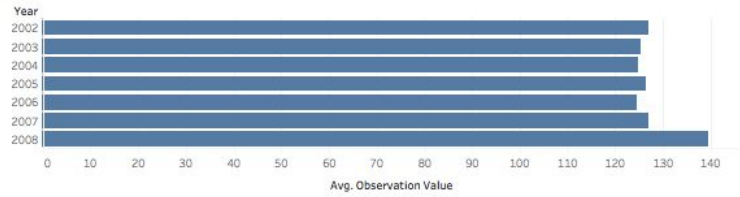
Average of PPI for each Year.

PPI For Primary Aluminum – Descriptive Statistics

Year	Average PPI	Median PPI	Minimum PPI	Maximum PPI
1990	127.0	124.0	116.5	148.7
1991	106.2	103.1	92.6	117.9
1992	99.3	101.1	89.6	103.5
1993	94.7	95.3	88.8	98.4
1994	117.6	114.3	93.6	150.3
1995	149.3	149.7	134.5	170.6
1996	126.6	127.2	115.6	135.5
1997	135.4	136.2	126.8	140.3
1998	119.9	117.5	110.6	132.3
1999	111.2	107.9	105.7	126.0
2000	129.2	129.3	121.9	138.3
2001	120.8	122.0	108.2	131.2
2002	113.9	114.3	109.9	116.3
2003	118.7	117.9	115.1	126.5
2004	144.0	144.5	130.2	153.9
2005	156.8	155.2	144.4	175.5
2006	201.8	201.4	184.0	215.3
2007	206.3	212.0	190.3	220.3
2008	210.4	218.8	169.3	233.5
2009	140.9	139.9	120.3	162.5

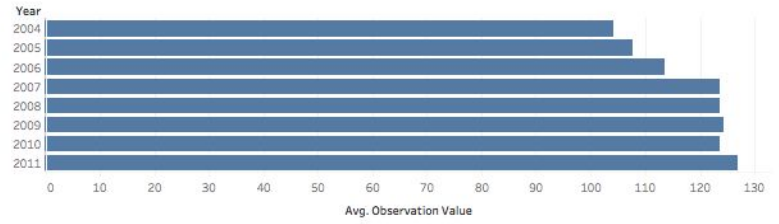
Average PPI, Maximum PPI, Median PPI and Minimum PPI broken down by Year.

Producer Price Index (PPI) for Magnesium and Magnesium-Base Castings



Average of Observation Value for each Year.

Producer Price Index (PPI) for Hi-Temp Metal Investment Castings (Iron, Nickel, or Cobalt-based alloys)



Average of Observation Value for each Year.

Producer Price Index (PPI) for Hi-Temp Metal Investment Castings (Iron, Nickel, or Cobalt-based alloys) – Descriptive Statistics

Year	Mean PPI	Median PPI	Minimum PPI
2004	104.08	104.05	103.30
2005	107.53	107.80	106.00
2006	113.49	115.35	108.80
2007	123.48	124.25	120.60
2008	123.65	123.70	121.00
2009	124.35	124.30	124.00
2010	123.62	123.50	123.10
2011	126.83	127.05	125.70

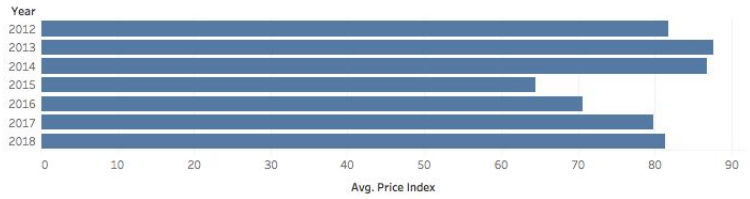
Maximum PPI, Mean PPI, Median PPI and Minimum PPI broken down by Year.

Producer Price Index (PPI) for Hi-Temp Metal Investment Castings (Iron, Nickel, or Cobalt-based alloys) – Descriptive Statistics

Year	Maximum PPI
2004	104.80
2005	108.60
2006	116.70
2007	124.80
2008	125.40
2009	125.20
2010	124.80
2011	127.50

Maximum PPI, Mean PPI, Median PPI and Minimum PPI broken down by Year.

Import Price Index for Tin 2012-2018



Average of Price Index for each Year.

Import Price Index for Tin – Descriptive Statistics

Year	Mean Price Index	Median Price Index	Minimum Price Index
2012	81.63	81.10	72.90
2013	87.48	89.35	76.80
2014	86.72	88.65	78.10
2015	64.39	62.50	56.30
2016	70.43	69.50	55.90
2017	79.74	79.20	76.30
2018	81.27	82.60	74.70

Maximum Price Index, Mean Price Index, Median Price Index and Minimum Price Index broken down by Year.

Import Price Index for Tin – Descriptive Statistics

Year	Maximum Price Index
2012	95.40
2013	96.70
2014	91.80
2015	77.60
2016	84.50
2017	83.80
2018	85.60

Maximum Price Index, Mean Price Index, Median Price Index and Minimum Price Index broken down by Year.

Data sources: United States Department of Labor

An important indicator of the unicorn scenario is cost of raw materials. The tech industry is reliant on metals for its products. Microsoft lists cobalt, aluminum, tin and magnesium as some of the key materials it sources, and the current and future price of these metals will indicate whether Microsoft is able to decrease its costs for the unicorn scenario to become a reality (Microsoft, 2018).

Microsoft uses aluminum in its enclosures and printed circuit boards. The producer price index, which measures the average change in selling prices for producers, of aluminum spiked in the late 2000s, indicating that this resource might not decrease in price for Microsoft in the next three to five years for the unicorn scenario to happen. However, considering that there is not data from the past nine years and that Microsoft has a 2019 goal to use more recycled aluminum, it is possible that the company may experience lower costs of sourcing this material (Microsoft, 2018).

Microsoft uses magnesium in its enclosures. In the 2000s, there was not great variation in the price of this metal aside from a spike in 2008, demonstrated by the higher maximum PPI. Microsoft does not have a comprehensive plan to adjust its magnesium sourcing and it seems unlikely that the cost of this material will decrease in the near future.

Cobalt is an alloy that Microsoft uses primarily in its batteries. This material has become controversial recently as it is considered a new conflict mineral (Source Intelligence, 2017). The price for high temperature metal investment castings including cobalt steadily increased from 2004 to 2011, possibly because it is a key material for phone, electric vehicle and other batteries (Source Intelligence, 2017). In 2019, Microsoft plans to implement its Responsible Mineral Assurance Process (RMAP) for cobalt smelters and refiners and to map its cobalt supply chain and mitigate risks (Microsoft, 2018). Although Microsoft is taking a proactive approach to this material, its price may continue to rise, especially as more companies seek to source it responsibly.

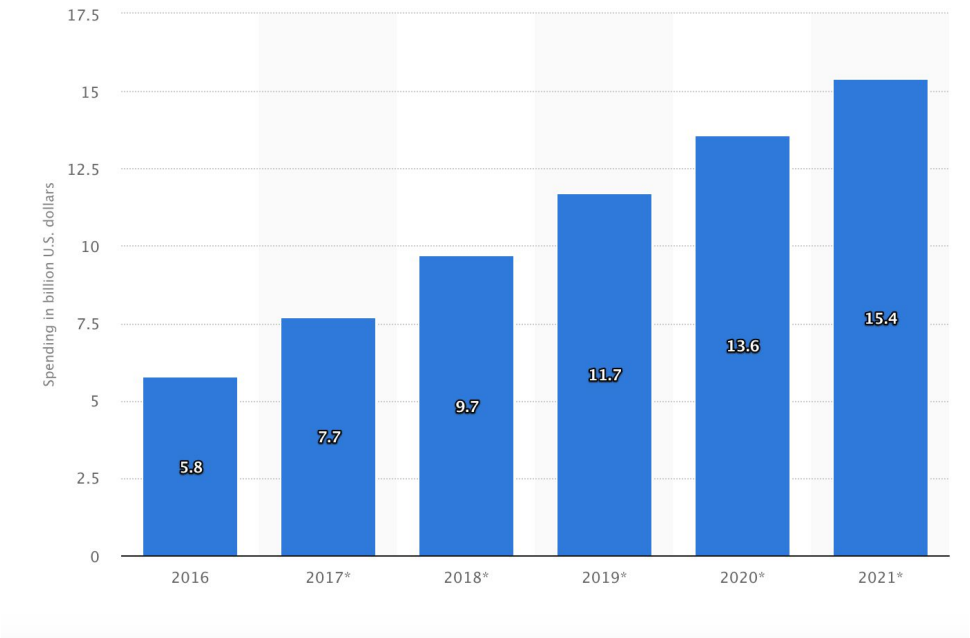
Microsoft sources tin for its enclosures and mechanicals. Tin is a material that involves high-risk operations, conflict, and supply chain uncertainty, as demonstrated by the 2016 Myanmar mine insurgence (Lee and Schectman, 2016). The import price index for tin has not increased in recent years, even experiencing a dip in 2015 and lower prices in 2018 than in 2013 and 2014. However, the risks associated with this metal indicate that its price may be unstable in the future, lessening the likelihood of the unicorn scenario.

One industry that experienced a similar unicorn scenario is the razor industry. Razors used to be high quality, durable metal razors that individuals would invest in and have for multiple years but now plastic disposable razors are the norm. One company that proactively evolved with this trend is Gillette. Gillette responded to the rise in quicker dry shaving and cheaper razors by developing higher end electric razors (Tarantola, 2014). Now Gillette has both cheap razors and high quality electric ones, demonstrating that a company can adjust to this type of unicorn scenario by offering a wide range of product options with tiered pricing. Microsoft could do something similar by having a cheap, disposable version of its product and a higher end one that people would value more and be willing to pay a higher price for.

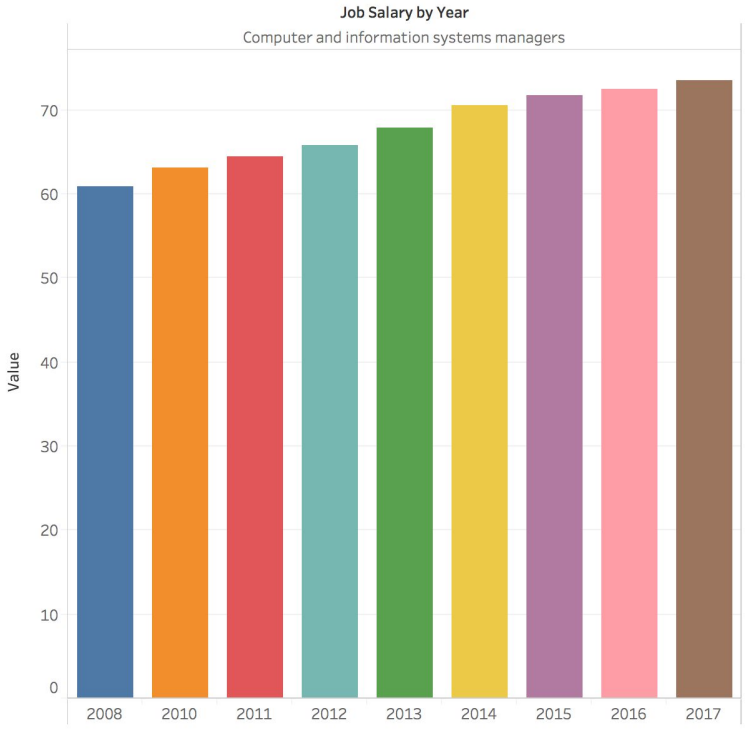
Portable drinking water has undergone a unicorn scenario where it has become normal to purchase cheap plastic water bottles that individuals quickly throw away or recycle. As plastic water bottles became the norm in the early 2000s with increased fears of contamination from tap sources, companies such as Nestle reacted by creating their own plastic water bottle brands while Perrier did not adjust from carbonated water, causing its brand to stagnate and not evolve with the still bottled water trend (Hurly, 2016). In the case of the unicorn scenario, Microsoft should make sure to adapt to the changing market landscape and keep its brand nimble.

Caroline Fletcher

Although the technology industry is where the AI is coming from, the industry itself is likely to become one of its largest consumers. For example, recently an AI program called Bayou was created that can write its own software code (Source: Fast Company). Relating to this, there has been a 6% drop in technology manufacturing jobs from 2009 to 2017 (Source: Statista), which is most likely from increased automation. The AI market has steadily been increasing, with spending increasing from approximately $2 billion per year since 2016 from $5.8 billion to an estimated $15.4 billion in 2021.

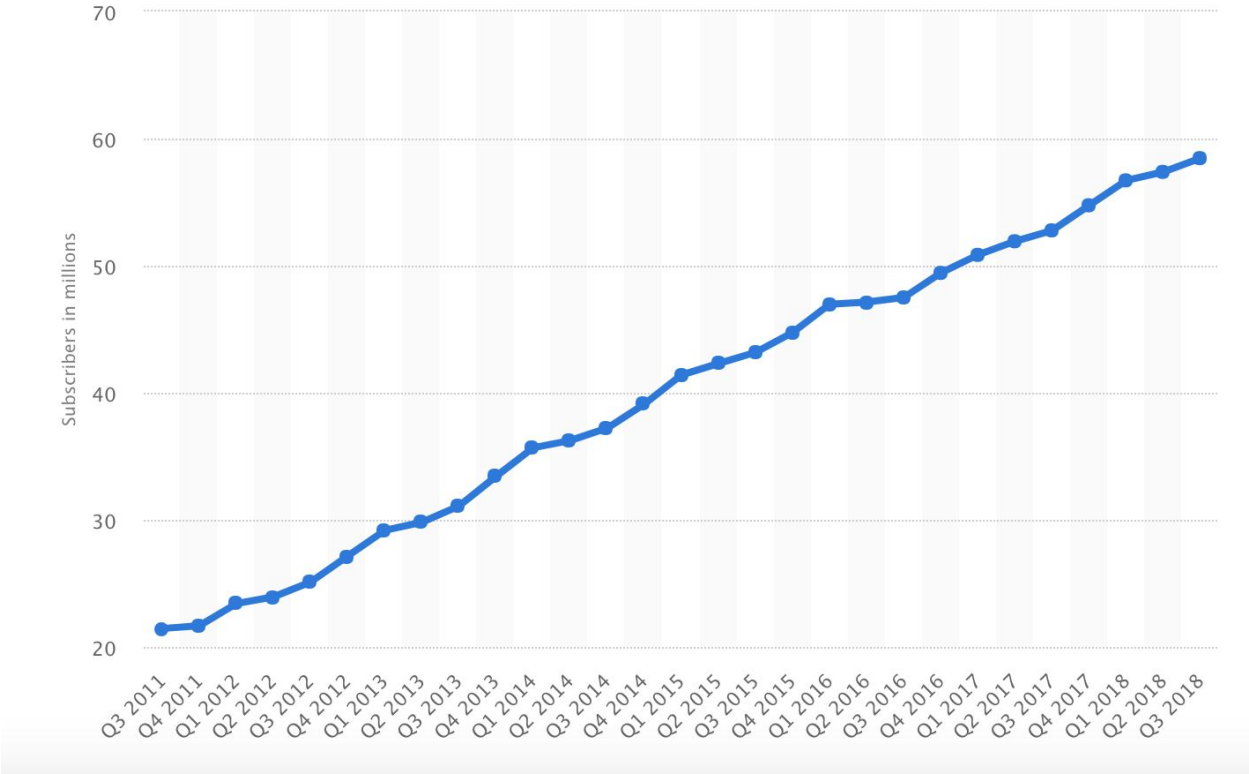


Additionally, the median hourly wage earned by computer and information systems managers in the United States has increased from approximately $60 an hour to $70 an hour from 2008 to 2017.



This shows that while manufacturing costs are decreasing, human labor is an area where cuts are harder to make. Replacing human labor costs with one-time cost AI would drastically decrease the cost and subsequently pricing structure of technology. In doing this, the perceived value of the product would drop, which would create a need for a shift in marketing the product as something that is more frequently replaced or upgraded.

One company that failed to failed to adapt to the changing market was Blockbuster. As streaming and on-demand services began to pop up, Blockbuster was not quick enough to change its business model, and thus lost the majority of its customer base. In fact, the company actively opposed a change when it turned down Netflix's offer in 2000 of a partnership promoting each other (Forbes). The entertainment industry rapidly shifted to simpler TV viewing options, as the graph below demonstrates in Netflix subscribers since 2011.



Section II: Importance of Real-Time Performance Tracking

Real-time performance tracking is necessary to guide Microsoft toward achieving its strategic goals (Smith, 2017). When using real-time performance dashboards, businesses can translate nebulous strategies into operational actions founded on data that can be collected and monitored. This data, comprised of Key Performance Indicators (KPIs), acts as a compass: a measurement of where a business is, relative to

where it has come from and where it is going (Smith, 2017). KPIs are important metrics used to understand a company's progress and inform its future decision making.

There is no substitute for concrete numerical data when it comes to measuring a business's health and managing its direction. Failing to track real-time performance indicators means Microsoft will be forced to rely on gut feelings and assumptions when it comes to making decisions (Smith, 2017). When Microsoft has a specific strategy, it can use real-time performance tracking and KPIs to inform managers and staff to execute that strategy in the present and the future.

Real-time performance tracking is also useful to assess the success of current business initiatives. The data can show Microsoft's executives if ongoing investments are generating returns, if customers are satisfied with new products, and if marketing initiatives are translating into increased sales, among other metrics. They provide a simple, insightful snapshot of the company's overall performance that lets Microsoft know if it is achieving its strategic goals or not. In turn, KPIs and real-performance dashboards generate an atmosphere of learning in an organization as they promote conversations between staff that can yield innovation and a better understanding of the overall business strategy.

Tracking KPIs and real-time performance can also be rewarding and motivating for staff, as receiving positive feedback that goals have been met generates positive morale (Smith, 2017). Without measuring outcomes, quality work can be easily overlooked. Finally, while Microsoft's staff will change over time, the measurement of KPIs should remain consistent over time. This allows the company to monitor long-term strategic goals and ensures consistency and continuity.

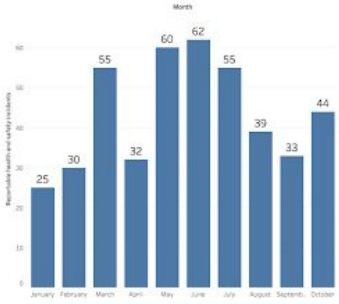
Section III: Performance Dashboard Mockup Creation

Yujie Tao: Manufacturing & Supply Inventory Management

Manufacturing and Supply Inventory Performance Dashboard

Monthly Average Perfect Order Rate

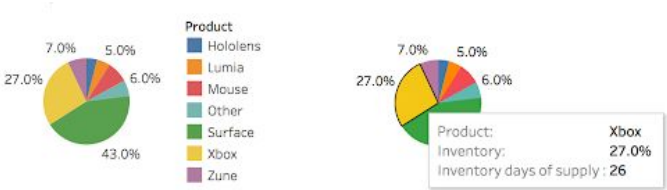
Monthly Reportable Health and Safety Incdents



Monthly Overall Equipment Efficiency

Quarterly Supplier's Quality Incoming

Inventory Composition



The five internal key performance indicators for Manufacturing & Supply Inventory Management are: perfect order rate, supplier's quality incoming, overall equipment effectiveness, reportable health and safety incidents, inventory days of supply. Those five key performance indicators correspond to goals of manufacturing and supply inventory management: improving customer experiences and responsiveness, improving quality, improving efficiency, ensuring compliance and optimizing inventory.

Perfect order rate is a composite of important metrics, including on-time delivery, in-full delivery, damage-free delivery and accurate documentation (Benchmark Success,

2018). It addresses on percentage of sales orders that arrive on time, delivered completely, damage-free and well documented (Benchmark Success, 2018). The threshold of perfect order rate should be 95%. If the perfect order rate drops below 95%, it indicates Microsoft is suffering from manufacturing & supply chain ineffectiveness and is potentially losing customers. Microsoft should reinforce quality check. Perfect order rate above 98% would be considered as a milestone for customer experiences. The indicator should be updated every month.

Supplier's quality incoming is a measure of the percentage of good quality materials coming into the manufacturing process from a given supplier (Davidson, 2018). Ensuring raw material quality is an essential part of quality control for manufacturing sector. Tracking supplier quality allows Microsoft to choose the best suppliers to partner with. The threshold of this KPI should be 98%. If the indicator of a supplier goes below this threshold, Microsoft should consider replace the disqualified supplier. Data should be updated every quarter.

Overall equipment effectiveness is a multiplier of availability, performance and quality. This multi-dimensional metric can be used to indicate the overall effectiveness of a product line (Davidson, 2018). For Microsoft, this indicators measure the manufacturing effectiveness from production side. In turn, managers can also use latest OEE to foresee potential production problem and make according adjustment. The threshold for OEE is 98%, OEE under this threshold indicates specific production line is not meeting demand on time or the sales for specific products is decreasing. Manufacturing department conduct internal check and notify sales and marketing department about the situation. The indicator should be updated monthly.

Reportable health and safety incidents measures the number of health and safety incidents that were either actual incidents or near misses that were recorded as occurring over a period of time (Davidson, 2018). Safety is the top priority in the manufacturing. This indicators helps to track and prevent major health and safety issues in manufacturing workspace. Maintaining healthy and safe manufacturing environment not only protects manufactures workers but also ensures the quality of produced products and brand image for Microsoft. The threshold for this indicator is 60 globally. Going over 60 indicates serious health and safety concerns over manufacturing workplace and Microsoft should conduct internal check. This indicator should be updated every month.

Inventory days of supply is the number of days your inventory would last without replenishment, before running out (Benchmark Success, 2018). The calculation requires the amount of inventory on hand to be divided by the average daily consumption of the same. Since Microsoft is into creating software and hardware products, it has its inventory spread across Finished Goods, Work in Progress and Raw Materials. Tracking inventory day of supply allows Microsoft to manage inventory more efficiently.

It allows Microsoft to maintain the right amount of inventory at the right time: retaining high inventory levels in order to achieve high order fulfillment rates or upcoming holidays, or frequently selling off its inventory to achieve higher profit. The threshold for inventory days of supply should be 25 days. Going above 25 days means the demand for specific product is decreasing or suppliers no longer stock up the products. This indicator should be updated monthly.

Five external key performance indicators for Manufacturing & Supply Inventory Management are: manufacturing industry news feed, supplier trending, competitor shipping units market share, major raw material price index, labor market trend. The five external key performance indicators aim at tracking the key trends in manufacturing industry, suppliers, competitor, raw material and labor market.

Manufacturing industry news feed tracks the major trend in manufacturers, such as new technology and industry focus. Understanding the current trend of manufacture industry helps Microsoft to decide the best manufacturers to partner with to achieve maximized effectiveness and efficiency. The manufacturing industry news feed data should be a composite of news of major manufacturing news outlets, such as Industry Today, The Manufacture, IndustryWeek. The threshold of this indicator is a thirty news feed every day, the news should be updated every day.

Competitor shipping units indicates the sales of competitor products. This indicator allows Microsoft to track competitor sales, consumer demand and manufacturing efficiency. By comparing the shipping units of competitors to those of Microsoft, Microsoft is able to be informed of the overall market environment. The threshold of this indicator would be the shipping units of Microsoft's products. If both competitor's and Microsoft's shipping units dropped, it indicates decreasing market demand and R&D department is should devote in developing new products or upgrade the current ones. The indicator should be updated quarterly.

Major suppliers trending tracks supplier's changes in pricing, technology, stock price, public relation issues. Supplier's research development direction and target market would highly influence the product line of Microsoft. For example, it was reported that Intel prioritizes the high-end PC market and such windows PCs aren't even showing strongest growth and the crown goes to Chromebooks. Trend in suppliers help Microsoft to identify market trend and in turn can influence its strategy in R&D. It's also important for Microsoft to partner with trustable and sustainable suppliers who hold good brand image by using the supplier trending indicator. The threshold for this indicator would be 30 news feed biweekly.

Major raw material price index should also be tracked every year. Microsoft lists cobalt, aluminum, tin and magnesium as some of the key materials it source. Major price drop or leap in those raw material indicates the resources shortage/overflow, which would influence the cost for manufactures and in turns the revenue. The average

price from last year same period should be regarded as a threshold. If there is a continuous increase in major raw material price, Microsoft should prepare to adjust its selling price in order to maintain revenue or consider replacing it with new material. This indicator should be updated every year.

Labor market trends mainly considers major regulations and issues in manufacturing labor market. For example, Amazon is now suffering from several warehouse workers protest and strike. By tracking labor market allows Microsoft to inspect its manufactures all follow the updated regulation and provide first-line workers with promised benefits. It also allows Microsoft do scenario planning around labor issues that happened in other companies. The labor market trends should be updated monthly.

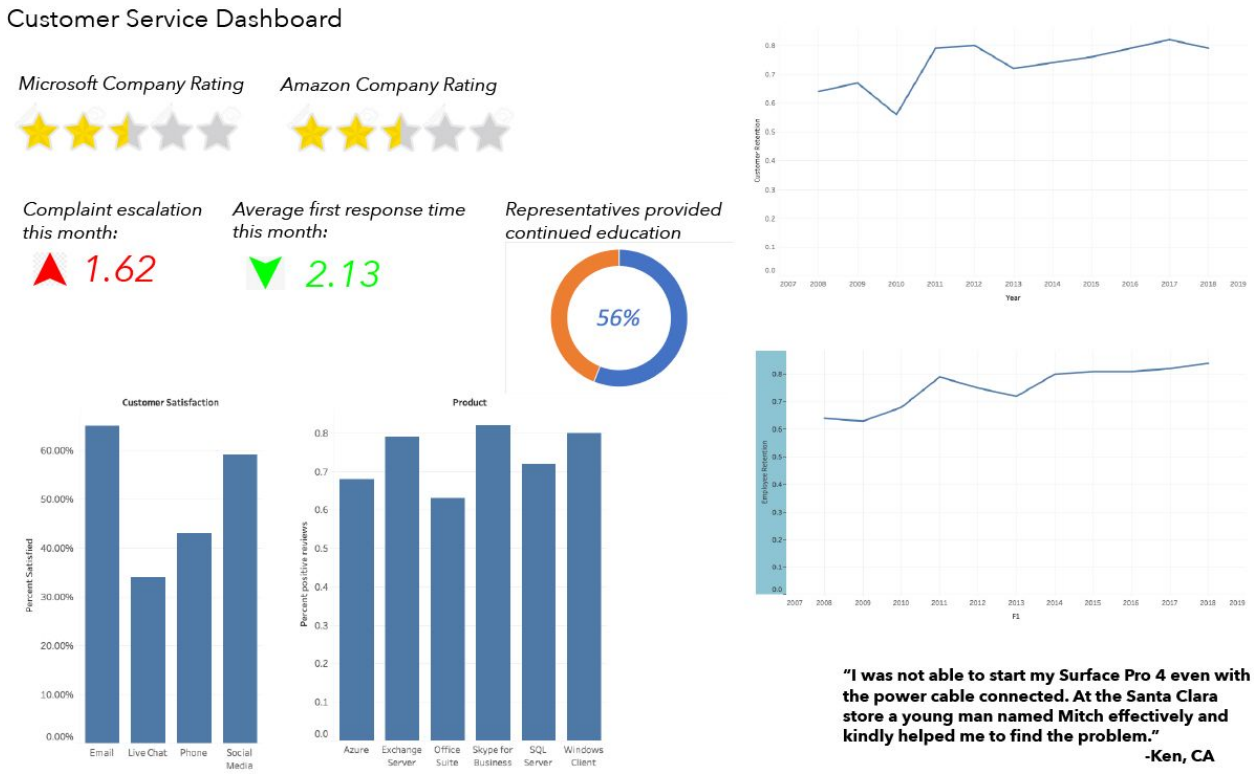
Outside those ten major indicators, there are several metrics but not being tracked either because of lack of data or of secondary importance. Customer cycle time is note being tracked in this dashboard as Microsoft owns a wide variety of products, with each of them having different product cycles. There is no average customer cycle time threshold could be applied as products. HoloLens, for example, would naturally take more time to manufacture. On the other hand, perfect order is a better indication as it shows whether the correct good is delivered on time, which is more on a consumer experience perspective in measuring manufacturing performance. In external indications, competitor's specific manufacturing information is not being tracked as the data is relatively hard to get.

The internal data source would come from the data reported by each suppliers and manufactures. Microsoft could use the same system to track performance in each manufactures, so that it automatically organize indicators of manufacturing all over the world. The external data mainly comes from industry news outlet, supplier/manufactures press release and market report. Microsoft could also conduct in-house analytics or hire market research agency to gather external data.

One outside of industry example of how other company create and leverage real-time performance dashboard is from Ford Corporate. In order to track its performance and progress in sustainability plan, Ford selects key performance indicators from six main categories: financial health, customers and products, operations, supply chain, communities and people (Ford Corporate, 2018). The supply chain section of Ford is similar to manufacturing and supply inventory management performance dashboard proposed by this market report, but with different focus and goals. Under supply chain section, it tracks three main indicators: total supplier sites trained/retrained in sustainability management (cumulative, since 2005), assessments to date, and training cascade to workforce, individuals trained. By updating those three indicators every year, it allows executive and public to track the performance of its

sustainability plan. Microsoft can also learn form Ford's supply chain performance dashboard in tracking training cascade to workforce.

Sara Edwards: Customer Service



Microsoft's customer satisfaction seems to vary among its various product offerings and services. Its technical support system has been frequently criticized by customers, but its tech products seem to garner positive reviews, and even outcompetes that of other brands. For example, last year J.D. Power's US Tablet Satisfaction Survey rated Microsoft's Surface higher than both Apple and Samsung for user satisfaction (Siegal, 2017). Among its B2B customers, a large part of its revenue, Microsoft beat out competitor Google on overall customer satisfaction according to a study from Collaborative for Customer-Based Execution & Strategy (2018). On the other hand, Microsoft seems to have more negative customer feedback regarding its technical support. On Consumer Affairs, the company has an average 1.1 star satisfaction rating based on the reviews of 118 customers in the past year, with many of the reviews referencing unpleasant or unhelpful experiences with Microsoft's technical support.

With these facts in mind, Microsoft needs to track KPIs for customer service that focus on retaining customers, customer satisfaction with technical support, and the performance of its customer service representatives. This dashboard displays 10 indicators that Microsoft should track to reach these goals: *Live chat (Virtual Agent)*

customer satisfaction, percentage positive ratings for top products/services, average company rating, average first response time, customer retention rate, employee engagement/retention rates, the latest online review/mention, percentage of representatives provided continuing education, top competitors' customer satisfaction ratings, and the *complaint escalation rate.*

Metrics having to do with Microsoft's customer service representatives are important to track because they are often the first contact point for customers. They should be highly trained to provide the best service possible and should be provided adequate support in order to represent the company positively. This also applies to the Microsoft Virtual Assistant, which should be frequently tested and monitored for accuracy and customer satisfaction. Employee training can be tracked through the percentage of representatives provided continuing education, so that Microsoft can gauge how much of its resources to put towards employee development and resources. A Harvard Business Review study examined mid-size manufacturers in Germany and concluded their success came in part from a commitment to their employees' satisfaction and relationship-building, saying: "long-term employment relationships are the key to high performance and enduring levels of employee motivation" (Weber, 2016). By actively assessing its representatives' engagement with the job, retention rates, and the level of training they receive, Microsoft can anticipate when customer satisfaction will be impacted by dissatisfied or under-trained employees. Microsoft can obtain this data by conducting quarterly or yearly job satisfaction surveys of its representatives. Data on retention rates and amount of trainings completed should be collected at the same time from each department's customer service team.

Metrics having to do with customer satisfaction are critical to collect on a near-constant basis so that Microsoft can have the information to react quickly to customer service problems. Overall company ratings and reviews should be at the top of the dashboard for a quick look at Microsoft's standing with customers, then more specific metrics will provide an in-depth look at the areas that may need improvement, such as the complaint escalation rate, percent positive product reviews, and the product with the most requests for assistance. These indicators will allow Microsoft to quickly identify when a particular product or service is garnering more negative reviews than normal and will then be able to pull it from shelves or allocate more resources to address the problem. Additionally, Microsoft should monitor the ratings of top competitors to determine how the company is doing in relation to the rest of the industry. Microsoft can gather data on its customers' satisfaction by monitoring chat rooms and social media for mentions, distributing surveys, and from its own customer service team's reports. Information about competitors can also be collected from online public spaces, as well as from surveys and competitors' employees. Industry and

financial reports are also resources for determining the general status of customer satisfaction across all tech companies.

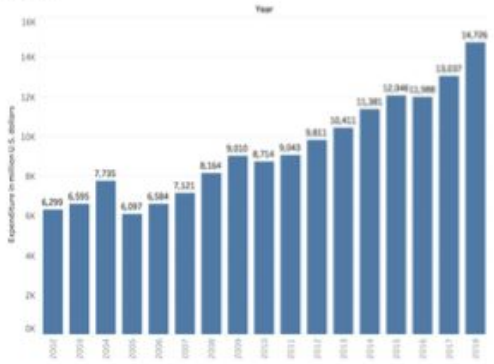
One other metric that can be used to assess customer service quality is cash flow because it can indicate customer retention. However, it is not included in this dashboard because there are many factors that affect cash flow, and directly measuring customer retention and satisfaction is a clearer indication of customer service. The same logic applies to indicators such as conversion rate. Net promoter score is another indicator left out of this dashboard, since it measures the likelihood a customer will recommend the brand to others and that can be extrapolated by the overall customer satisfaction ratings. Overall, the dashboard reflects indicators of customer service that are the most basic and can provide the clearest information to Microsoft executives when making decisions.

Microsoft has generally done a stellar job keeping satisfaction with its products and services high and, in many cases, outstripping its competition. Its one weakness is a general dissatisfaction with its technical support services, but if the company improved its employee training and virtual assistance there would be an increase in customer satisfaction. Tracking key performance indicators like the ones above will allow Microsoft to anticipate dips in customer satisfaction and changes in demand for products, contributing to the company's overall health.

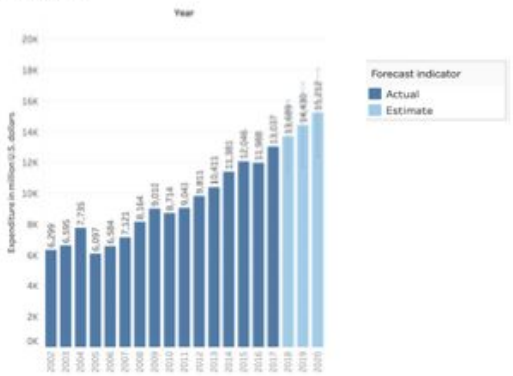
Paige Colpo: Research and Development

Research and Development
Performance Dashboard

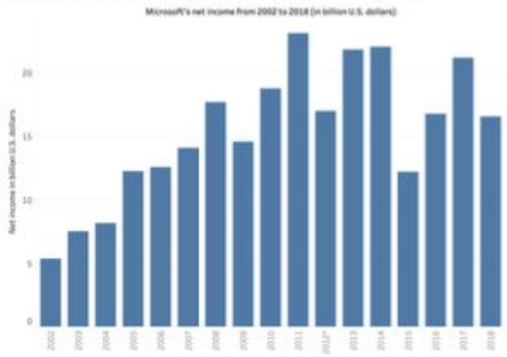
Microsoft's expenditure on research and development from 2002 to 2018 (in million U.S. dollars)



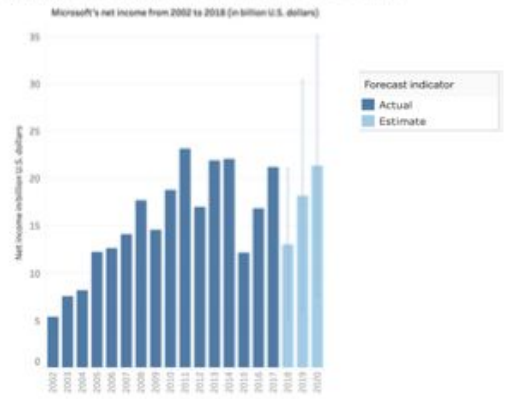
Microsoft's forecasted expenditure on research and development (in million U.S. dollars)



Microsoft's net income from 2002 to 2018 (in billion U.S. dollars)

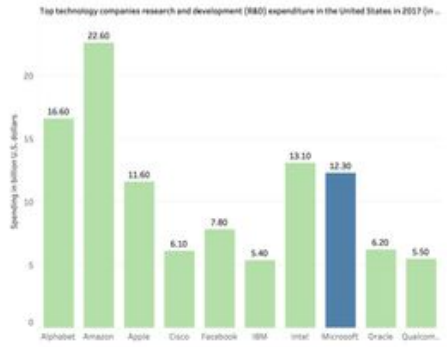


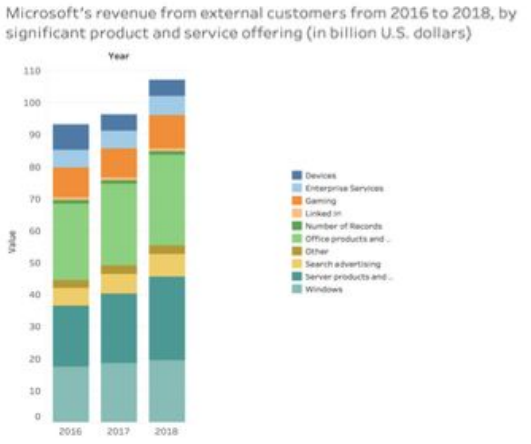
Microsoft's forecasted net income (in billion U.S. dollars)

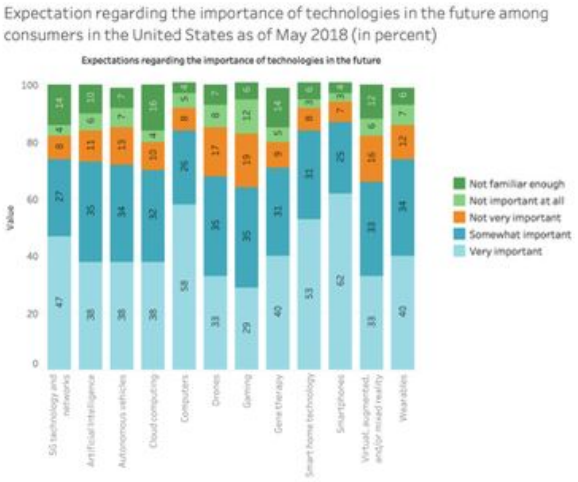


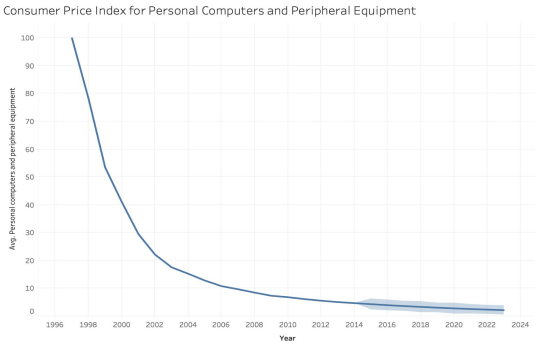
Microsoft's R&D Investment by Sector (in million U.S. dollars)

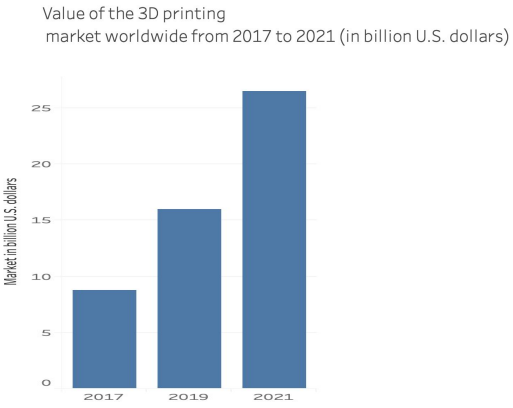
Top technology companies research and development (R&D) expenditure in the United States in 2017 (in billion U.S. dollars)











There are five key performance indicators (KPIs) that companies like Microsoft should track to ensure efficient research and development (R&D) spending. The top five KPIs fall into two categories: input and output. The first two metrics are input metrics: R&D spending and R&D headcount. The final three metrics are output metrics: Return on research capital, patent production and new products released.

Companies that invest heavily in R&D tend to generate bigger profits than those that don't (McClure, 2018). However, R&D spending alone does not guarantee profitability and strong stock performance (McClure, 2018). It is possible for companies to suffer poor performance losses even after investing a great deal of money each year in R&D. Therefore, it is important that companies like Microsoft track their R&D spending and headcount so they can assess the productivity of their R&D dollars spent.

To determine if R&D dollars are being spent efficiently, it is crucial that Microsoft tracks output metrics. One metric in particular, return on research capital (RORC) effectively measures the proportion of profits that are generated from R&D spending in a previous fiscal period. RORC shows whether a firm is profiting from new R&D

spending or not. Simultaneously, it lets investors know whether recent R&D investments are contributing to financial performance or whether the company is relying on older innovations (Ready Ratios, 2018). Comparing metrics like RORC and gross R&D spending will allow Microsoft to establish a trend — or lack thereof — between increased investment in R&D and increased profit so it can hit the "sweet spot" between investment and return.

Patent production is another beneficial R&D KPI to track. If Microsoft is efficiently allocating its R&D dollars, there should be a noticeable uptick in the number of patents it receives. Patents indicate successful new product development, which in turn suggests that R&D dollars are being spent well. Tracking the number of new products released per year is another way to judge the efficacy of R&D investment. If Microsoft invests 15% more in R&D than it did in a previous year but doesn't see an increase in new products released, it is likely that R&D is not being allocated efficiently and should be reassessed in the next quarter.

It is further important that companies like Microsoft keep track of where they are spending their R&D dollars. Depending on the state of the industry, investment in certain sectors can be more beneficial than others. For example, in 2010, Microsoft and Apple both had similar revenues with Apple investing around 2 percent of its revenue in R&D compared to Microsoft's 12 to 13 percent (Nichols, 2013). While it might be expected that Microsoft had leveraged greater revenue and profitability than Apple by investing more in R&D, the opposite happened. Apple grew 55 percent between 2010 and 2012, while Microsoft grew only 7 percent and received a flood of complaints from angry shareholders who were concerned about the extent of R&D investment with little return (Nichols, 2013). Microsoft, unlike Apple, had been investing huge amounts of its R&D into defending the PC business while the technology marketplace was rapidly shifting to new platforms and opportunities like mobile devices, cloud-based applications, data access and gaming consoles (Nichols, 2013). Microsoft ignored the market trends; as a result, it inefficiently invested its R&D. For this reason, it is important that Microsoft keeps track of current market trends and forecasts future trends so it can ensure the greatest return on investment. Charts like the one depicted in the dashboard titled "Expectation regarding the importance of technologies in the future among consumers in the United States as of May 2018 (in percent) can help in this endeavor. According to the chart, smart home technology, gene therapy, artificial intelligence and wearables are emerging markets in the technology sector. Microsoft should look to invest it's R&D dollars in these emerging markets so it can get out in front of competitors and ensure upward profit mobility in the future.

It is also important that Microsoft keeps track of which of its current products are doing well so it can invest in them to ensure their continued success. Charts like the one titled "Microsoft's revenue from external customers from 2016 to 2018 by significant product and service offering (in billions U.S. dollars)" that track which of Microsoft's current offerings garner the most revenue are helpful in determining where Microsoft should continue to invest.

It is crucial that Microsoft tracks all the metrics highlighted in the above dashboard. It is also important; however, that it tracks "softer" metrics, like shareholder and consumer satisfaction. Metrics like these are not made available to the general

public, but they are nonetheless crucial for determining R&D success. Ultimately, R&D spending is only worthwhile if it generates more revenue. If consumers are unsatisfied with new products released or upset with R&D-funded advertising campaigns, they will be unlikely to purchase Microsoft's products, which renders Microsoft's R&D investment inefficient. The same goes for shareholders: if shareholders are unsatisfied with how Microsoft is allocating its R&D spending, they will be likely to insist upon a change. If they are satisfied, it can serve as a good litmus test to signal that R&D is being spent well.

To evaluate its R&D spending effectively, Microsoft should evaluate internal and external data sources. Internally, Microsoft can utilize its quarterly financial reports and R&D reporting from its suppliers and manufacturers. It can also conduct in-house consumer advisory panels, focus groups and surveys through Surveymonkey or Qualtrics to gauge consumer and shareholder satisfaction with ongoing R&D spending. Externally, Microsoft should track industry reports or hire investigative marketing firms to compare its investment into R&D to that of its competitors.

It is crucial that Microsoft maintains up-to-date data on its R&D spending. As such, Microsoft should update its R&D spending data on a quarterly basis. It should continue to keep tabs on its R&D spending to monitor when it reaches thresholds that would warrant changes. For example, Microsoft should track R&D investments by its competitors across the technology industry and identify where it orients itself within that sector. It is recommended that if Microsoft's R&D investment spikes to be 25 percent above or below the industry average, the company should do an in-depth investigation of where the money is being spent and evaluate if each investment is providing adequate ROI. If Microsoft finds that the money is being allocated inefficiently, it is recommended that it utilizes real-time market intelligence to identify market opportunities to invest in or seek advice from a technology-oriented consulting firm. Exceptionally low consumer and shareholder satisfaction should also prompt Microsoft to reevaluate its R&D spending. If consumer and shareholder satisfaction ratings dip below 50 percent, Microsoft should hold focus groups to identify problems that its consumers and shareholders have regarding its R&D investment. Microsoft can then take those findings and use them to address R&D-oriented problem points. If consumers and shareholders continue to be displeased with Microsoft's R&D expenditures, investment in the company and sales will likely stagnate.

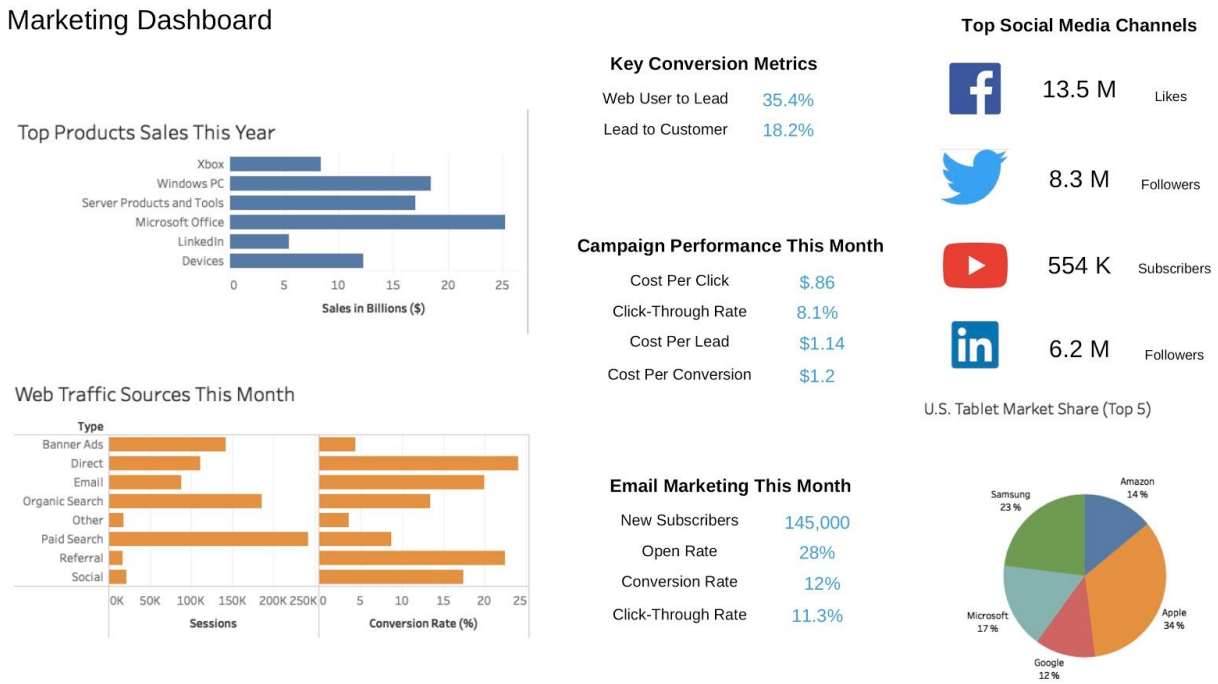
Performance dashboards are ubiquitously used by companies to leverage data into tangible results. For example, Nestle uses a real-time performance dashboard to track its progress toward its Creating Shared Value program, an initiative to bring the company closer in line with the UN's Sustainable Development Goals. Nestle tracks its progress against its communities by keeping tabs on KPIs like launching healthier food and beverage options, marketing more nutritious options to children, and continuously improving its green coffee supply chain (Nestle, 2018). Externally, Nestle has world-leading sustainability ratings and ranking agencies assess its progress toward its goal. The company's efforts have been evaluated by the Access to Nutrition Index, Dow Jones Sustainability Indices, Climate Disclosure Leadership Index, CPD Water Programme, Global 100 and Ceres (Nestle, 2018). Internally, Nestle tracks environmental performance indicators, like total water discharge, waste disposal, and

number of significant spills (Nestle, 2018). All of these metrics are assembled into a single real-time performance dashboard used by Nestle executives to track the company's progress toward fulfilling its Creating Shared Values program.

Addressing the Unicorn Scenario

As was raised earlier, it is possible that raw material costs for technology products will decrease to the point that they essentially become disposable. As is demonstrated in the above dashboard, the consumer price index (CPI) for personal computers and peripheral equipment is decreasing at an alarming rate, which corroborates the unicorn scenario raised. Additionally, investment into the consumer 3D printing industry is increasing, as is evidenced in the above dashboard. This suggests that consumers may soon be able to print their own devices at home. Currently, Microsoft is not investing its R&D dollars in a way that would combat this trend toward "disposable devices." It continues to invest heavily in its Surface Pro hardware line as well as in gaming hardware. It is recommended that Microsoft pivots to invest its R&D dollars more so in its virtual offerings, like its cloud computing services, LinkedIn and Office Suite. These offerings are immune from the trend toward disposable hardware devices and thus are a more secure investment in light of the unicorn scenario.

Maddie Omeltchenko: Marketing, Sales, Competitor Sales & Competitor Market Share



The key performance indicators (KPIs) on this marketing dashboard for Microsoft are: sales this year by the top products, web traffic sources, the performance of a certain digital campaign, key conversion metrics, email marketing performance, the

following on top social media channels, and the market share of Microsoft and the other top 5 companies in the tablet market. Together, these indicators provide a holistic view of how Microsoft is doing in marketing and sales at any given time.

Each of these indicators is important to track. By evaluating the sales of top products, the company is able to see where a significant portion of its business is coming from and identify product categories that are underperforming. Microsoft can then use this information to determine where it should devote more research and development or marketing and advertising. Web traffic sources to Microsoft offerings is important to track as it lets the company evaluate the success of different marketing efforts such as banner advertisements and paid search.

Key conversion metrics are an important KPI for evaluating how successful Microsoft is on converting users to leads and leads to customers. Conversion holds a different meaning for different indicators. For Key Conversion Metrics and Conversion Rate under Web Traffic Sources, conversion refers to turning a lead, or web user who might be interested in an offering, into a customer (LeadSquared). It's important to track conversion metrics so that the company can see how many individuals it is moving along each part of the Awareness-to-Loyalty Funnel from awareness to purchase and where it can improve its marketing to get individuals ultimately to purchase. Measuring social media channels is important as social media following is an organic measurement of the influence of a brand as users voluntarily follow and engage with accounts. Social media metrics show how Microsoft is doing in its social media posting. Evaluating the market share of Microsoft and its competitors in the tablet market is a critical real-time metric to see who Microsoft's top competitors are and how Microsoft compares in the market.

Through Campaign Performance and Email Marketing, Microsoft is able to track to performance of a certain campaign and of its emails to leads and customers. For Campaign Performance, click-through rate shows how many individuals are clicking on a call to action, cost-per-click shows how much Microsoft is paying for each click-through, cost-per-lead shows how much Microsoft is paying to earn a lead, and cost-per-conversion shows how much Microsoft is paying to get an individual to perform a certain action such as buying a product or sharing with a friend. For email marketing, evaluating the number of new subscribers, the number of people opening each email, and the number of people clicking on links and other conversion metrics helps Microsoft determine the success of this marketing channel.

To source this data, Microsoft must look both internally and externally. For social media likes and following, Microsoft can look real-time at its accounts. For sales, Microsoft needs to look at its sales statements. Microsoft would look at its digital analytics for web traffic sources, key conversion metrics, campaign and email performance. To determine market share, Microsoft would divide its tablet revenues by the industry total and do the same for its competitors that have publicized this information.

This data should be updated on a yearly, monthly, weekly or daily basis depending on the KPI. Social media is a metric that is easy to update in real time. Campaigns and email marketing are well suited for monthly updates as campaigns follow longer timeframes and may take longer for people to engage. Web traffic and key

conversion metrics should be updated monthly as well. Evaluating sales on a yearly basis helps Microsoft avoid making decisions based on temporary spikes from events such as holiday sales. Market share should be updated quarterly to measure periodic changes in the performance of the company.

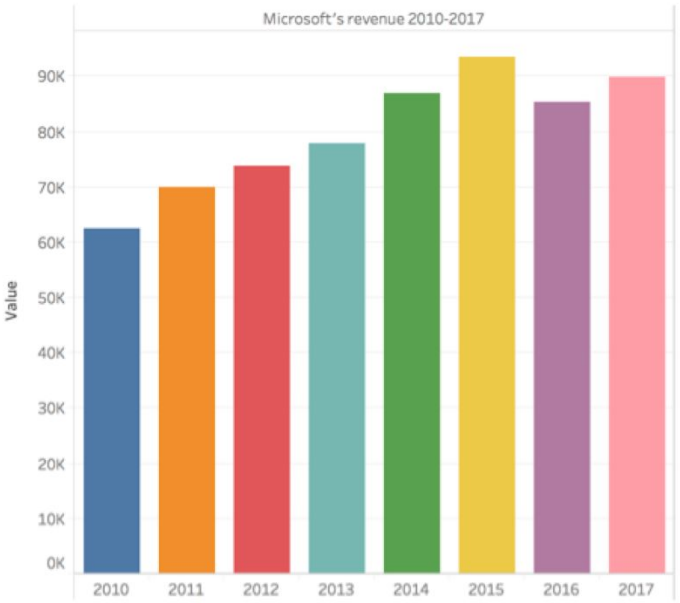
There are certain thresholds Microsoft should be alerted of in different KPIs. For social media, every time Microsoft hits a major number of likes/followers, such as 15 million likes on Facebook, the company should be alerted. In response, Microsoft should celebrate and promote this accomplishment on its social media accounts. When product sales surpass a major threshold, such as Xbox passing $10 million in sales, or when market share exceeds or dips below a competitor that Microsoft was previously above or below, Microsoft should be alerted. In response to passing a major sales threshold, Microsoft should continue to advertise the product and invest in innovation on it to make sure it stays competitive in the market. In response to a change in market share, Microsoft should continue to bolster its brand if it is above a competitor or strengthen its product lines if it dips below a competitor. Metrics such as web traffic sources and key conversion metrics are more variable and while Microsoft should stay up to date on these figures, they aren't major public accomplishments that would warrant notification. If one web traffic source surpasses another, the company should be alerted and should change its digital advertising spending to adjust for the top traffic source. If conversions pass a 35% or 40% threshold, Microsoft should be alerted so it can assess what it is doing right to get higher conversion metrics and apply this to other campaigns.

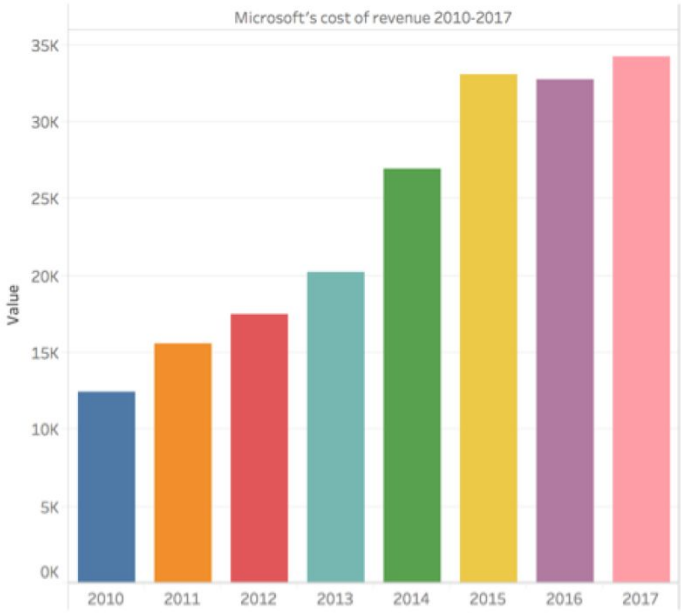
One metric that isn't tracked on this dashboard is bounce rate from website – this is not as important as people may leave a product page and return later to purchase. Quality of leads is not on the dashboard as it is a difficult metric to qualify. Where on the Awareness-to-Loyalty funnel a lead is is not on the dashboard because a lot of Microsoft's products require high consideration and individuals do not frequently purchase products such as Microsoft Office or a new tablet. Because of the time between purchases and because people may purchase some products in-store and others online, it's difficult to determine whether customers are at the higher end of the funnel.

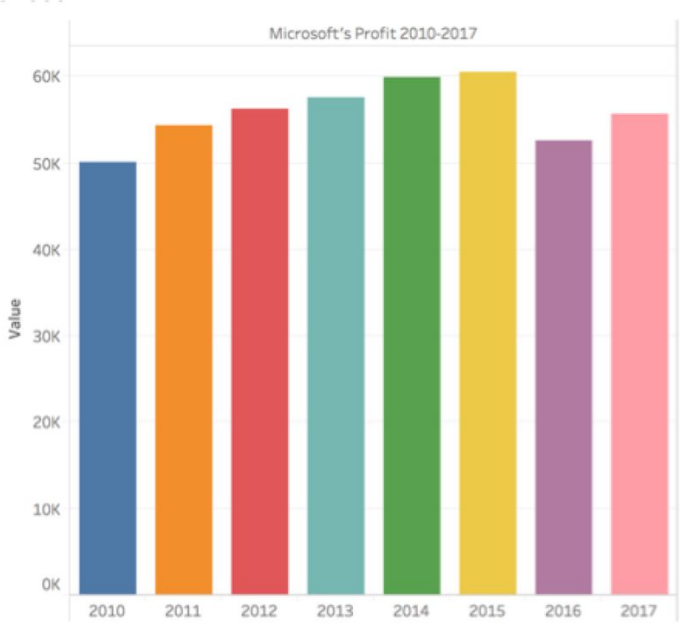
Companies in the fashion industry use marketing dashboards to determine their marketing and sales performance. Some KPIs this industry tracks are profitability of different brands, the number of sales per representative, the number of customers directly after a promotion, the percentage of customers who become repeat customers, and the shopping cart abandonment percentage (Proformative). The fashion industry is similar to tech in that individuals can purchase products online or in-store, so sales and marketing data should reflect both. Similarly to the tech industry, when the fashion industry analyzes these metrics it can evaluate which products are most popular.

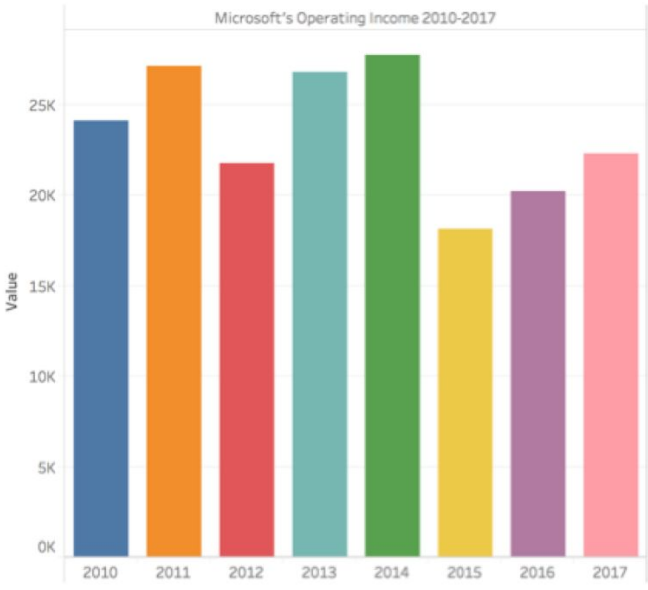
For the consumer packaged goods industry, some dashboard metrics are marketing spend, click-throughs, conversions, cart abandon rate, cost per click, message engagement rates, and cost per visitor (Ed Soehnel). Consumer packaged goods are purchased both online and in-store. As they are lower profit margin products and are purchased more frequently, companies in this industry use this data to determine the impact of certain messages within a shorter time frame.

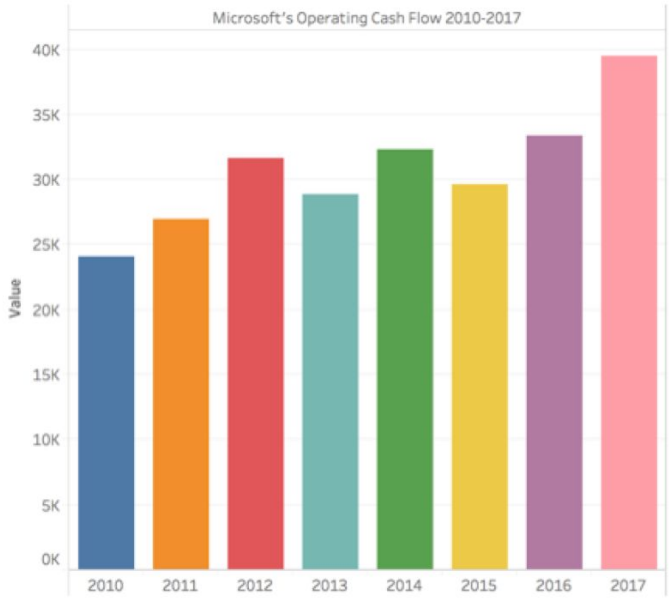
Caroline Fletcher: Finance

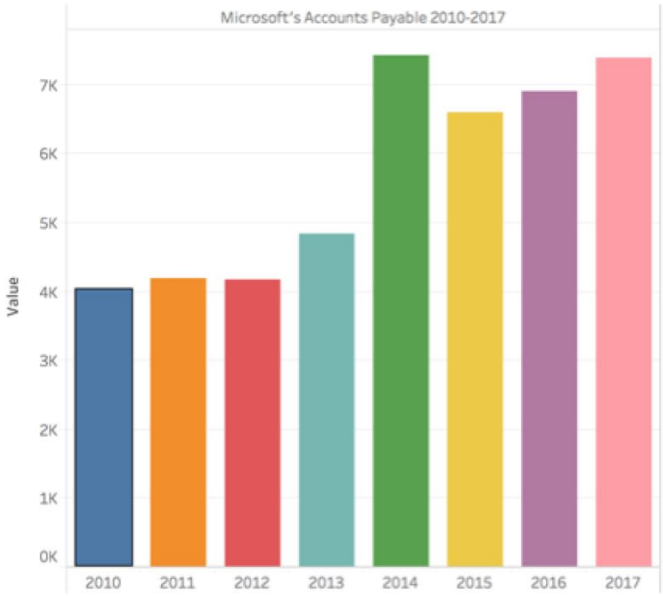


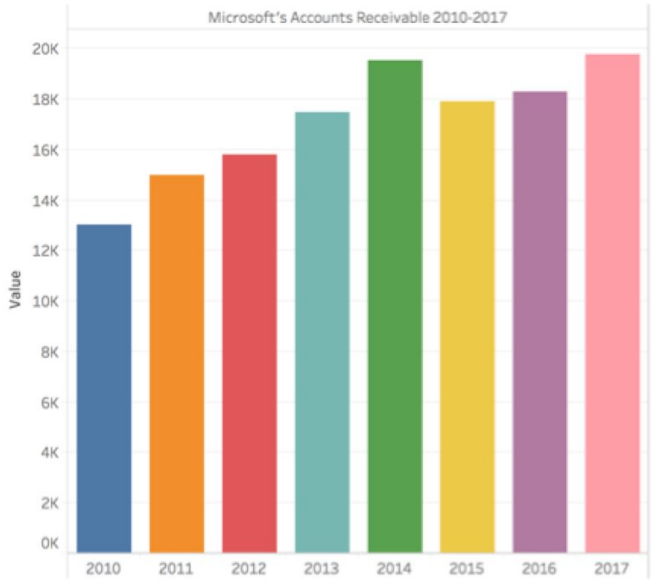


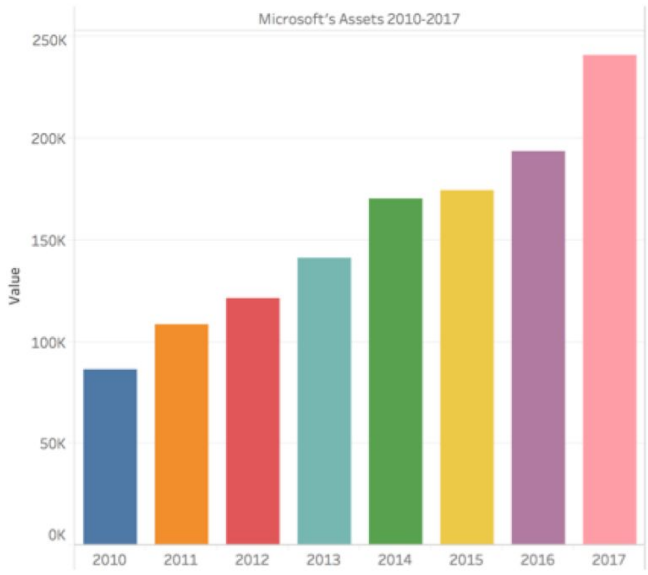












For most companies, it is logical to track revenue to monitor how much money it is receiving over time as the company grows. The technology industry has been growing in recent years, especially Microsoft. They have expanded their product offerings, particularly making them competitive with physical technology like computers and VR systems, and have acquired companies like LinkedIn. Thus, tracking the company's revenue over time is necessary to see if these strategic business decisions are beneficial in the long run. Similarly, cost of revenue is an appropriate indicator because it tracks the costs associated with manufacturing and delivering a product. The graph shows a noticeable jump in this from 2013 to 2014 and beyond, which is when the company started putting significant attention into improving their physical technology, like the Surface computer. Tracking profit, similar to revenue, is important to

note how much money the company is making after they have paid their expenses, taxes, etc. It is important to track this in addition to revenue because expenses could be abnormally high, thus making revenue an incomplete indicator. Additionally, operating income is an important metric to track because it is profit that does not include investments. For a large, multifaceted company like Microsoft, tracking bottom line income is important to having a full understanding of the company's health.

Microsoft's assets are important to track because, like previously stated, it is a large company with numerous holdings and branches, like LinkedIn, its software, computers, etc. Assets can be used to increase cash flow, so an increase in assets could indicate that a company is preparing to make a large purchase in the future, or that the company is struggling and needs more cash. Similarly, operating cash flow is a good indicator because it measures the amount of cash generated by the company, which is essential to keep its internal operations running. If the company is low on cash, this is not always a bad sign. It could mean that they have just made a large investment that will benefit them in the long run. Accounts payable is an essential indicator to monitor because it indicates if the company has a lot of debts it needs to pay, which could be an indicator of lack of funds, or just because it has invested in something that is taking a lot of its immediate cash. Finally, accounts receivable is equally as important because it indicates how much money the company is owed, which is unrealized profit.

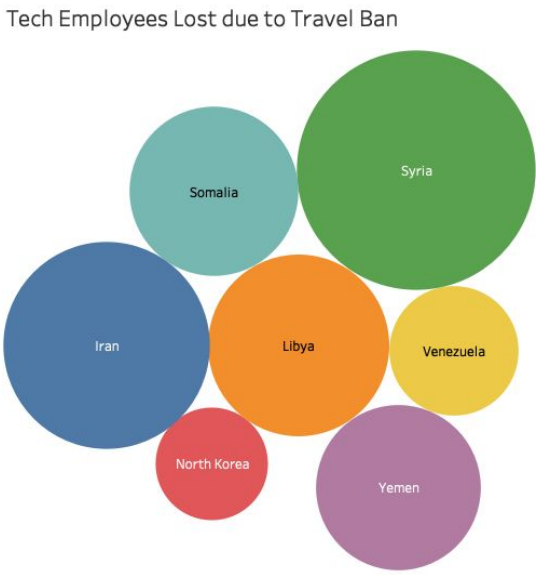
Additional metrics that are not being tracked but could be beneficial are debt to equity ratio and a current ratio. Debt to equity ratio is a way to measure how well a company is using its shareholder investments by dividing by total liabilities by total equity. If it is high, it indicates that the company is losing investments and acquiring debt instead of using the investments to create profit. This would be relevant to track for Microsoft because their stock has been steadily increasing the past six years, but the tech industry has recently seen a dip in stock prices. Current ratio is beneficial because it shows an organization's ability to pay all the financial obligations in one year. This is important for Microsoft because their accounts payable has been steadily increasing since 2012. While this indicator can be useful, it must be considered with a greater understanding of the company's overall goals, because they could intentionally have numerous years where this ratio is not ideal, but it is because they are trying to grow.

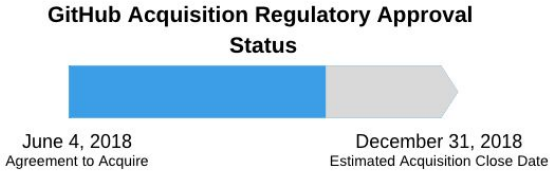
Microsoft's annual reports and 10k filings would be the only sources needed for all of this information. Because all of this data is pulled from annual reports, the major updates on it would come on a yearly basis. Because quarterly fluctuations are not always indicators of long term trends and are susceptible to seasonal lows and highs, like the holiday season for example, it would be more accurate to create reports based on yearly data.

Facebook is an excellent example of real-time tracking that has helped improve their business. While they are on a technology platform, their product is a social platform, not technology itself like cloud services or laptops like Microsoft makes. They are able to track users' preferred means of access, from laptop to tablet to cell phone. They can also track location, duration of sessions, time of use, activities (videos, likes, commenting,etc.) and much more. This helps them have a better understanding of why their consumer uses the platform and how to keep user engagement high. They also have been able to create a better understanding of their audience demographics which

is essential to targeting. While the information is crucial for Facebook to have for their purposes, it is also critical to showing advertisers, which is Facebook's source of income, that the platform will not waste their money. Advertisers know that their money is useless if their advertisements are not seen by the right people at the right time, so Facebook needs to be able to prove that their ads are effective.

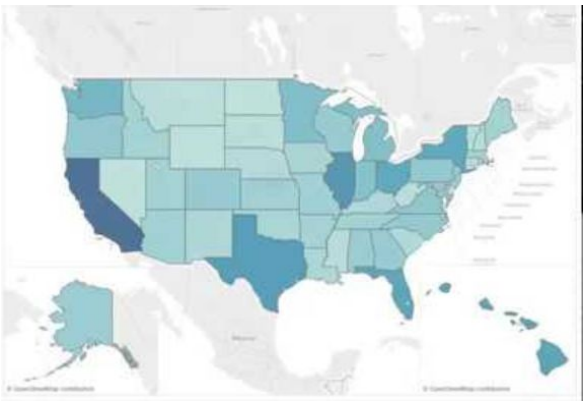
Everyone: Industry Regulations & Laws





Taxes Under the Tax Cuts and Jobs Act

One-time Transition Tax	15.5%
Federal Statutory Tax Rate	-14%
Net Charge	$13.7 billion



Level of data privacy protection by state

It is important to track how Microsoft's taxes look under the Tax Cuts and Jobs Act passed in December 2017 (Microsoft Annual Report 2017). This act affects Microsoft financially through a one-time transition tax and a cut in federal statutory tax rate. Tracking the financial impact of this act enables Microsoft to adjust its business in real time. In June 2018, Microsoft reached an agreement to acquire GitHub (Microsoft Annual Report 2017). However, the regulatory process of approving this acquisition takes time. It's important for the company to track the approval process so that it can easily integrate GitHub into its overall business strategy. The sources for this information would be internal tax data and external legislation for the tax impacts and

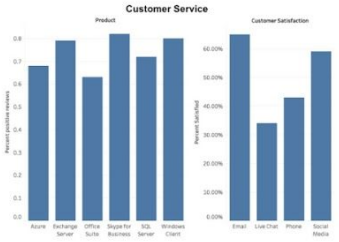
communication with regulatory bodies for the GitHub acquisition. The tax data should be updated as often as Microsoft learns its tax rates and the GitHub data should be updated as often as Microsoft learns its approval status is progressing. For the GitHub process, an important threshold is when the approval process closes. At this point, Microsoft should integrate GitHub into its overall business, but the company should be preparing for this well ahead of time. For the tax data, an important threshold is if the tax rate changes. The company should respond to this by integrating tax rate changes into its overall financial planning.

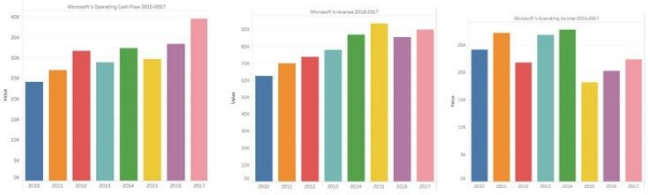
Online data privacy laws have started to become stricter in Europe, and some states in the U.S. have also started to adopt stricter laws on the collection and use of personal data by companies. Microsoft, like every tech company, needs to stay abreast of the legal landscape when it comes to data privacy. Tracking these laws by individual states will allow Microsoft to tailor its privacy policies based on location or adopt a blanket privacy policy that complies with the strictest laws. This data can be pulled from the websites of state courts and governments.

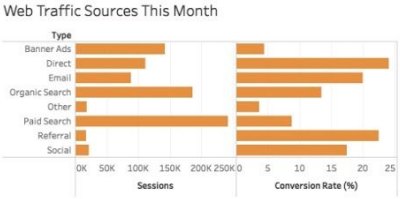
Another piece of legislation that impacts Microsoft is the “travel ban” put in place by President Trump. This legislation banned residents of seven countries from traveling to the United States. Tech companies are especially dependent on talent acquisition from foreign countries, and many have spoken out against the travel ban to protect their interest in remaining competitive. By understanding how many potential employees Microsoft is losing out on because of the travel ban, it can understand how the bottom line is impacted and use that information to lobby or petition lawmakers. This can be tracked by using census data from the impacted countries and by projecting how many tech sector jobs they would have imported based on data from previous years.

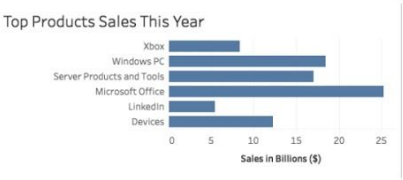
Section IV: Executive Dashboards

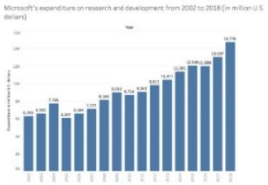
Microsoft Executive Dashboard

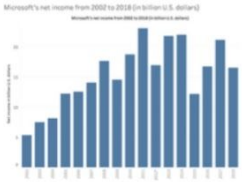


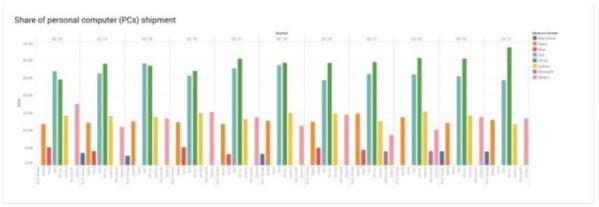




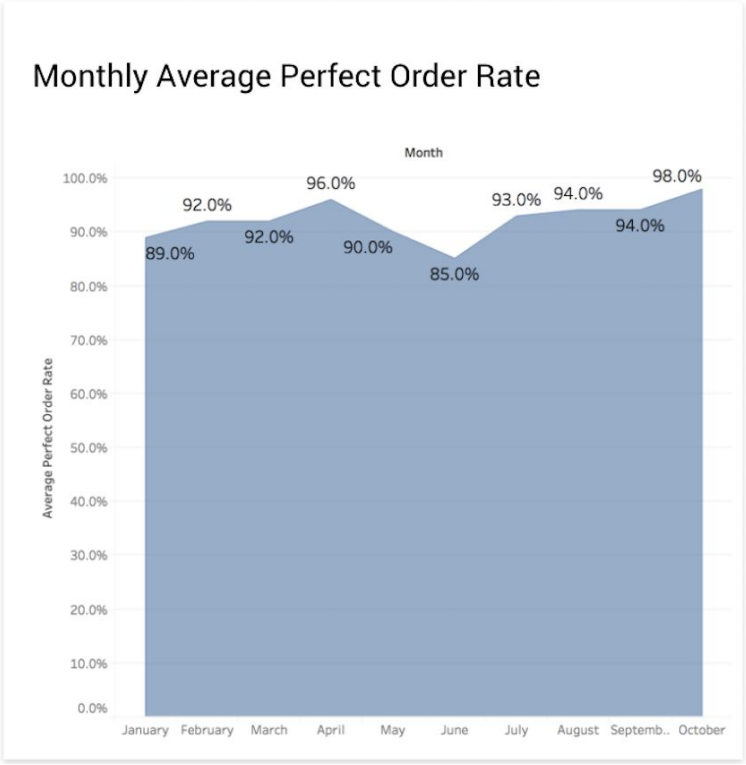


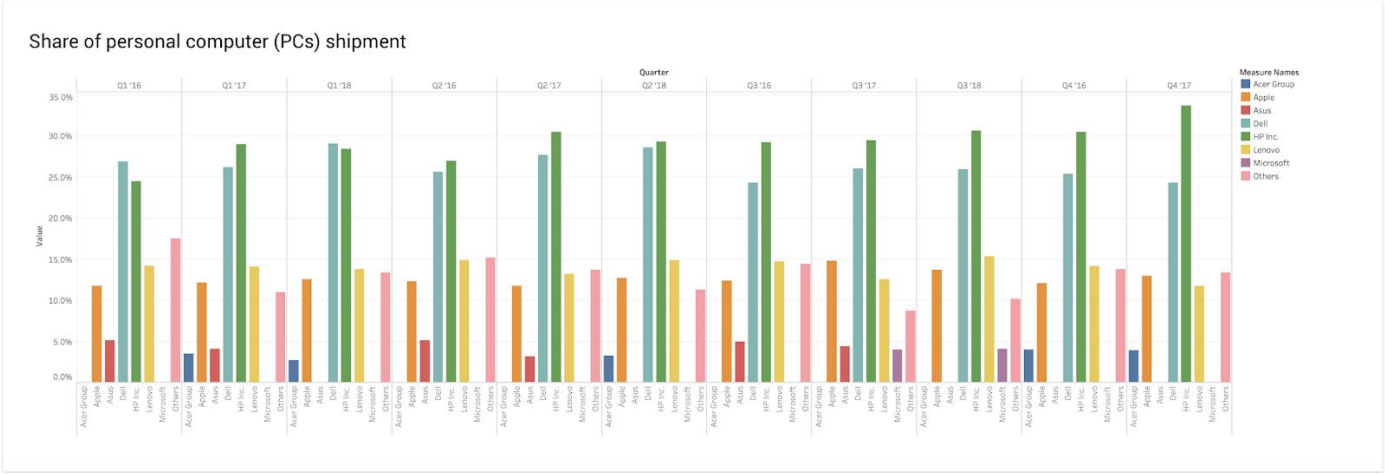






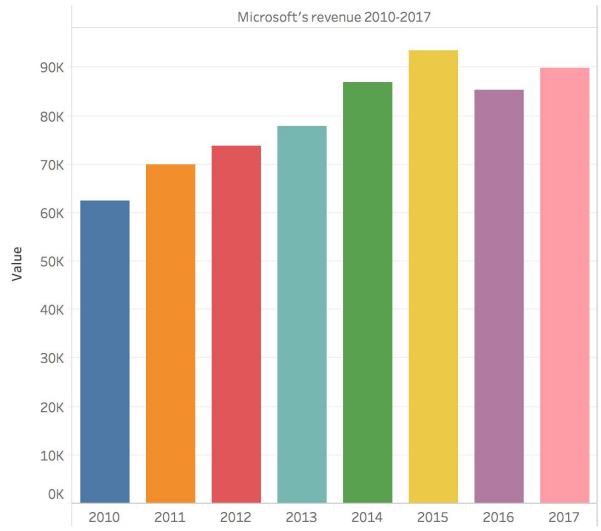
Manufacturing and Supply Chain Inventory

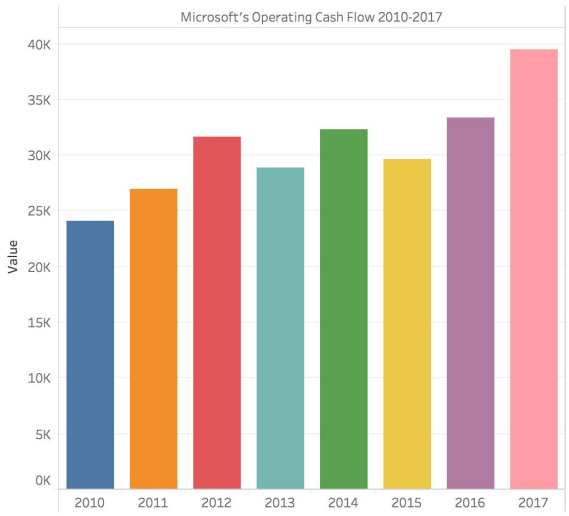




For executive dashboard, perfect order rate and competitor shipping units are two major indicators need to be considered. From inside KPI perspective, perfect order rate provides well-round analysis on how well Microsoft manufactures and delivers products. From external KPI perspective, competitor shipping unit oversees the market trend and competitor manufacturing performance. By having real-time result on those information, C-suite is able to understand how current Microsoft manufacturing performs and generate strategy based on market and competitor trend.

Finance

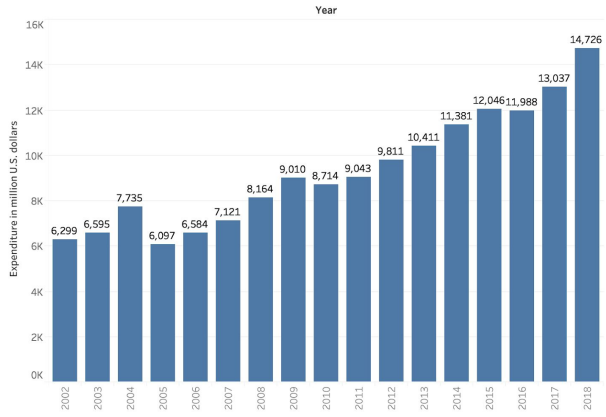


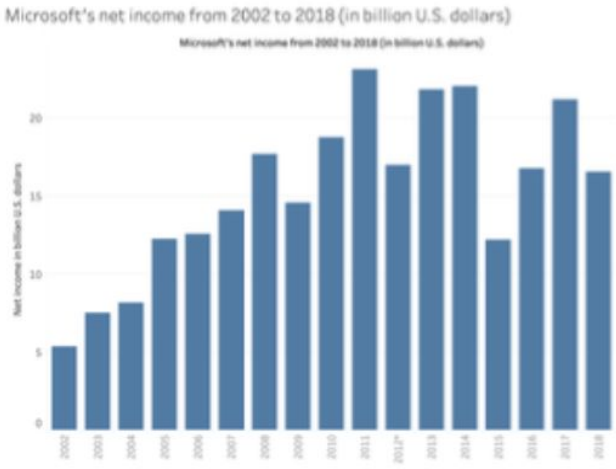


Monitoring revenue and operating income are two of the most important indicators for a growing company with many facets. Revenue is essential to keep an eye on because it gives a baseline indicator of how the company is doing overall. Because the company has many different operations areas, ranging from cloud services to laptops, it is important to monitor overall performance because one area could be thriving while the other is struggling. Operating cash flow is also a good overall measure because it focuses on just the cash from operations, not other sources like investments. This keeps a close eye on the physical part of the business, which Microsoft has been focusing on improving recently through making their laptops more competitive.

Research & Development

Microsoft's expenditure on research and development from 2002 to 2018 (in million U.S. dollars)

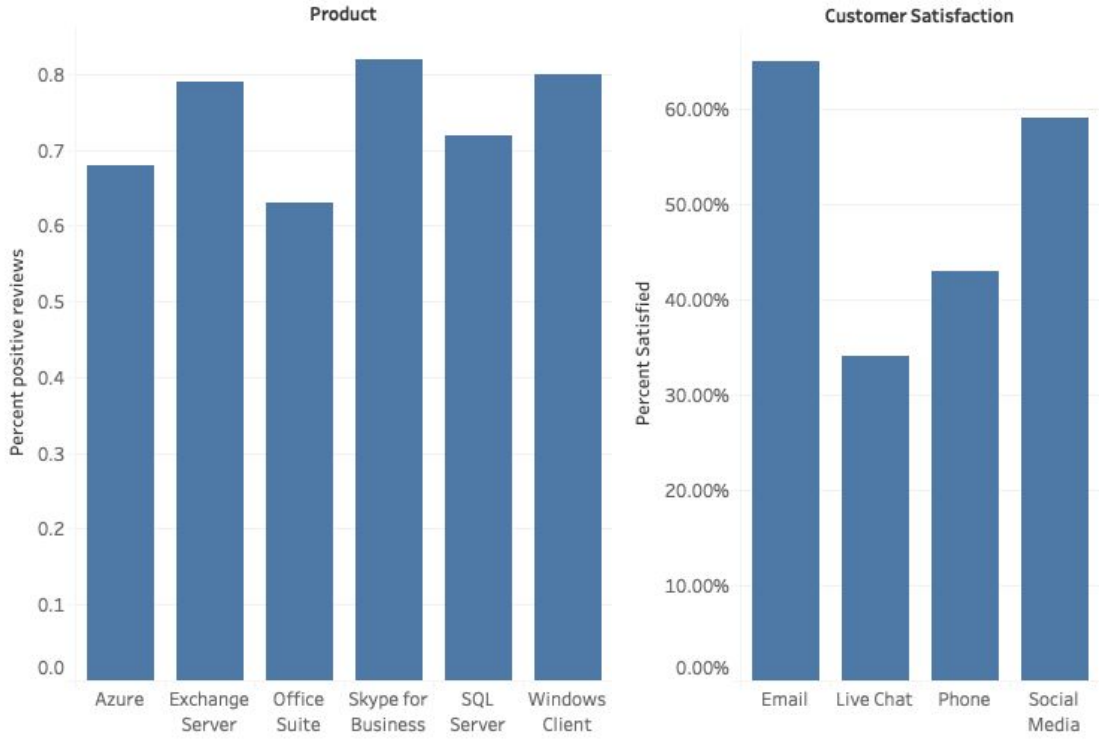




It is crucial that Microsoft's executives monitor R&D expenditures and their relation to net income to determine how many R&D dollars need to be allocated

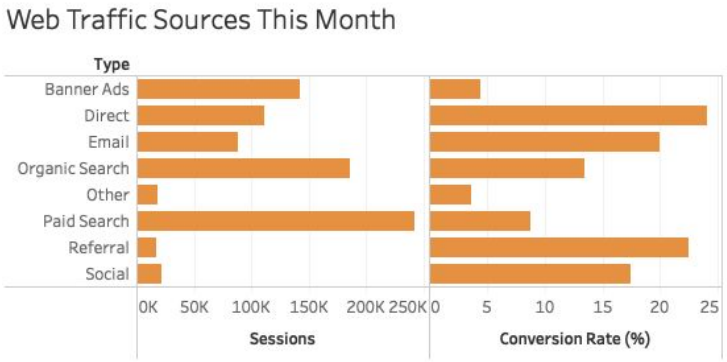
quarterly. Comparing these two KPIs will allow Microsoft's executives to see if there is a correlation between increased R&D spending and increased net income. If spending more R&D dollars yields a greater income, Microsoft's executives can be assured that their money is being spent efficiently. If R&D spending is not having the desired effect on income, Microsoft's C-suite will then know to adjust investment in R&D to bring the figures more in line with their goals.

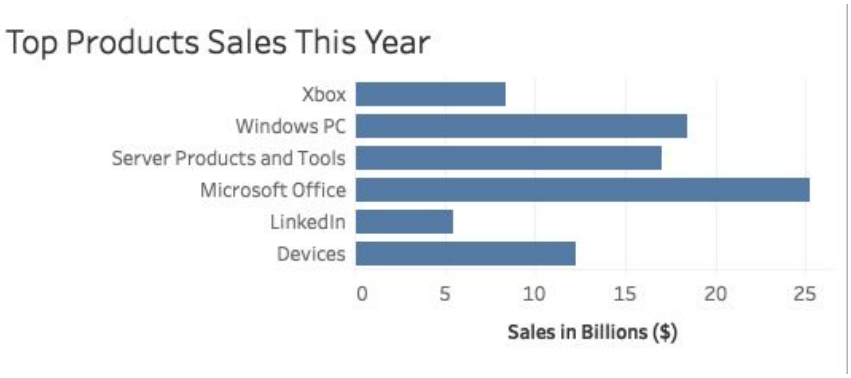
Customer Service



Company leaders are often not looped in to the day-to-day interactions that customer service representatives have with customers. Therefore, it is critical that Microsoft's C-suite track the overall customer satisfaction with the company as well as monitoring specific products for potential issues. These two indicators of customer service quality are the most relevant to the C-suite because they provide digestible overviews of the company's performance and ranking among consumers in the industry. Knowing what customers think of the company and its products will aid Microsoft's decision-makers in deciding where to allocate valuable internal resources.

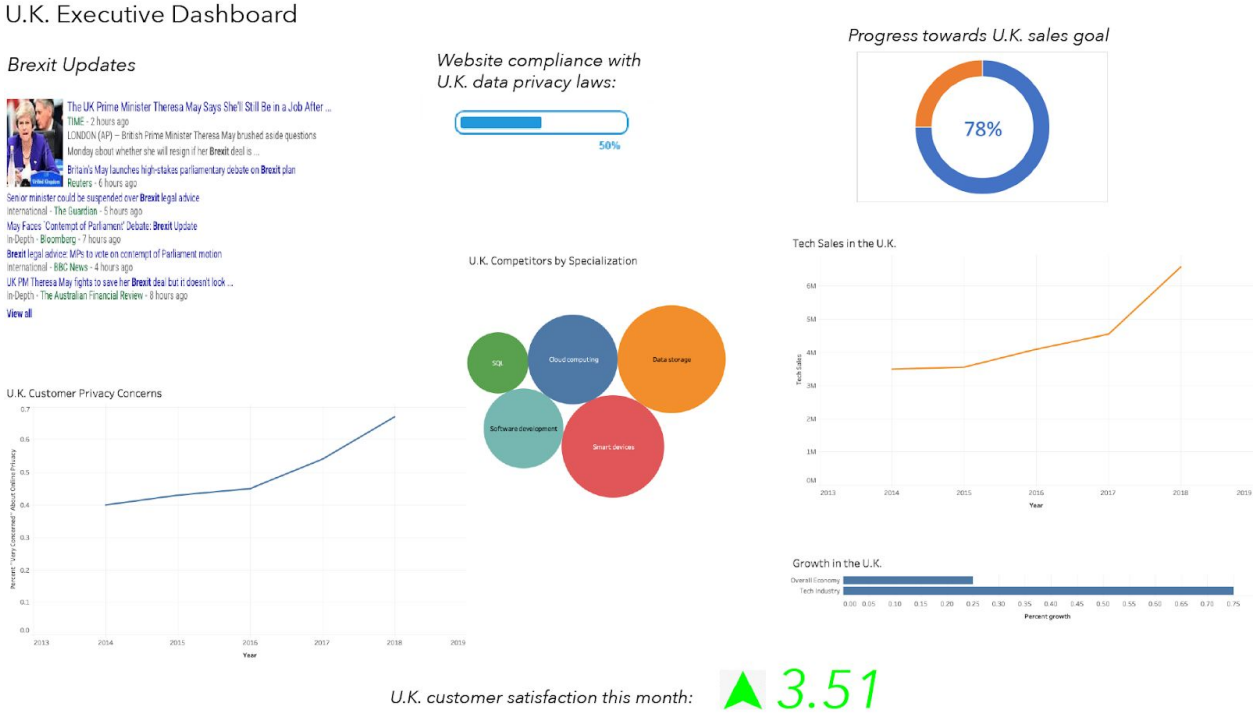
Marketing





Top product sales and web traffic are vital marketing and sales KPIs. Tracking top product sales lets Microsoft identify its most successful products and the products it may need to drop or invest in more. Tracking web traffic sources lets Microsoft see the effectiveness of different digital advertising efforts.

U.K. Dashboard - Sara Edwards



In the U.K., the tech industry is experiencing tremendous growth at 2.5 times faster than the country's overall economy (Tech Nation, 2018). While there is major growth, there are also factors to look out for when conducting business in the U.K. Microsoft should pay close attention to the political and legal landscape in the wake of Brexit and significant changes to the country's data privacy law. With those factors in mind, Microsoft should feel optimistic about its success in the U.K., although it also needs to keep an eye on the local tech competition.

This country-specific dashboard is particularly important for the U.K., as the political and legal landscape has changed dramatically in just a few years. Executives should be presented with up-to-date information about events as they evolve, as well as fluctuations in the local economy and tech industry, since this region operates so differently from the U.S. In this way, Microsoft will be provided with the most pertinent information for making marketing and research decisions to capitalize on the local tech boom while avoiding legal ramifications.

China Dashboard - Maddie Omeltchenko

The China dashboard would be different from a U.S. dashboard as it would analyze how Microsoft is performing among Chinese customers, how it is comparing to other tech companies in China, and how it deals with Chinese regulation. It is also different in that all financials are in the Yuan rather than the USD. It is similar to a U.S. dashboard in that it still measures sales and expenditures, just in a different region.

It is important to have a country specific dashboard as it lets Microsoft narrow its performance focus to just that country. Microsoft may have some customer service or regulatory issue that is just in one country, or it might need to up its R&D to compete with another company in a certain country. By focusing regionally, Microsoft is able to identify these local pain and success points and act accordingly.

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