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NVIDIA Internal Analysis

Inbound Logistics

With one of its primary income-generators being the sale of computer Graphics Processing Units (GPUs), NVIDIA exists in a unique position, as all of its manufacturing (for all phases: wafer fabrication, assembly, testing, and packaging) is outsourced externally to world-class suppliers. As described in a statement from a 10-K filed by NVIDIA in 2018, “We utilize industry-leading suppliers, such as Taiwan Semiconductor Manufacturing Company Limited, to produce our semiconductor wafers. We then utilize independent subcontractors, such as Advanced Semiconductor Engineering, Inc., JSI Logistics Ltd., King Yuan Electronics Co., Ltd. and Siliconware Precision Industries Company Ltd. to perform assembly, testing and packaging of most of our products. We purchase substrates from IbidenCo., Ltd., Nanya Technology Corporation, and Unimicron Technology Corporation. We typically receive semiconductor products from our subcontractors, perform incoming quality assurance and then ship the semiconductors to CEMs, distributors, motherboard and AIB customers from our third-party warehouse in Hong Kong. Generally, these manufacturers assemble and test the boards based on our design kit and test specifications, and then ship our products to retailers, system builders or OEMs as motherboard and add-in board solutions.” This is referred to as a fabless manufacturing strategy, which allows NVIDIA to avoid many of the potential costs and risks that go hand-in-hand with the ownership and upkeep of manufacturing.

Operations

Because NVIDIA outsources all of its manufacturing externally, the brunt of the company’s operational activity exists in its other areas of focus. With around 70% of its workforce being engineers focused on Research and Development, there exist numerous markets outside of computer gaming that NVIDIA has expanded into. The most prominent and revenue generating market platform of these exists in the ever-growing data center business. Data centers have been increasingly leveraging graphics processing units (GPUs) like NVIDIA's to

power Artificial Intelligence (AI) workloads. As stated on the NVIDIA website, “Accelerated computing is the way forward for the world’s most powerful computers. More than 600 applications support CUDA (a programming model created by NVIDIA in 2006) today, including the top 15 in HPC. NVIDIA powers U.S.-based Summit, the world’s fastest supercomputer, as well as the fastest systems in Europe and Japan. More than 130 supercomputers on the TOP500 list are accelerated by NVIDIA, including five of the top 10.” Along with this, the world’s new fastest supercomputer *Leonardo* is going to be powered by NVIDIA architecture. This increasing influence over supercomputers and artificial intelligence worldwide is reflected in NVIDIA’s financials – for the first time ever in the history of the company, NVIDIA’s Q2 revenue from its data centers has grown a whopping 167% from the previous year to reach a record high of $1.75 billion, compared to the $1.65 billion earned from gaming in the same quarter. It is important to acknowledge, however, the seasonality that comes with the sale of computer graphics cards. When a new line of products is released (which is happening currently), the revenue will spike. Other than managing operations for its graphics cards and data centers, NVIDIA has also recently acquired (in September 2020) chip designer Arm Holdings from Japanese company Softbank for $40 billion. Arm is most notable for its chip architecture that powers over 95% of all smartphones, tablets, and Smart TVs worldwide.

Outbound Logistics

As was the case with Inbound Logistics, the majority of NVIDIA’s Outbound Logistics is handled externally through partnerships with third party distributors. These distributors in turn distribute the products to retail outlets and websites worldwide. This does not mean that NVIDIA does not process any orders at all; many of NVIDIA’s products are available through their website and shipped via contracts with delivery services.

Research and Development

As NVIDIA has enjoyed continued financial success in the past few years, it has taken the time to reinvest and continue much of its spending into Research and Development (R&D). NVIDIA research and development expenses for the twelve months ending on July 31, 2020 (July 31, 2019 – July 31, 2020) were $3.183B, a 20.98% increase year-over-year. The R&D

spending for the two twelve month periods prior to that (July 31, 2018 – July 31, 2019; July 31, 2017 – July 31, 2018) was $2.890B and $2.829B, respectively. In a 10-K filed in 2018 by NVIDIA, the following was stated about R&D – ”We believe that the continued introduction of new and enhanced products designed to deliver leading accelerated computing technology is essential to our future success. Our research and development strategy is focused on a unified hardware and software architecture. Our products take years to design and bring to market, and we concurrently develop multiple generations of our architecture. Our research and development efforts include software engineering, including efforts related to the development of our CUDA platform, hardware engineering related to our GPUs, Tegra processors, and systems, very large scale integration design engineering, process engineering, architecture, and algorithms.” NVIDIA is very focused on innovation and preparing for the future, so one can expect further increases in R&D spending in the coming years.

Marketing and Sales

As consequence of being so interconnected with nearly everything related to modern day computing, NVIDIA already has established a great word of mouth foundation for marketing. Previously, NVIDIA was known as a premier option in the PC building community; however, over the course of the last few years the company has expanded exponentially into rapidly growing market segments while also being a forerunner in the research and development of supercomputers and artificial intelligence. Despite this, NVIDIA continues to spend money on advertising their products via web, magazines, social media, community outreach events, partnerships with gaming companies, and more. Because a large portion of the target market for graphics cards is PC gamers, NVIDIA promotes its products by offering access to free games with their purchase, in a similar fashion to its main competitor AMD. Rather than a traditional sales force, NVIDIA focuses on maintaining channel relationships with distributors. These distributors are responsible for the micro-management of sales channels and retail relations, allowing NVIDIA to focus on promotion and advertising. In the most recent NVIDIA product launch (the RTX 3000 Series graphics cards in September 2020), NVIDIA held a special livestream event hosted by their CEO Jen-Hsun Huang where the new line of products was

revealed in an innovative and interactive way. Netting hundreds of thousands of concurrent viewers at once, this unique approach to advertising (combined with limited stock initial releases) was extremely effective at promoting the product line. NVIDIA has also been prominent in the news recently because of the massive increase in their financials and acquisition of other prominent tech companies. As mentioned previously, NVIDIA has experienced extreme growth in the data center business, which in turn further strengthens the NVIDIA brand name.

Services

While being relatively simple to install and maintain, graphics cards for desktop computers do require some knowledge of building PCs. As with all products that rely on the consumer/external services to install, there runs a risk of damage to the graphics card. Along with this, products may be handled improperly during delivery or come with defects. This is the crux of the service functional area for NVIDIA – for all products, NVIDIA offers a 3-year warranty that covers repair and replacement. As long as the cards are not tampered with or disassembled (which will void the warranty), all defective or mishandled products are guaranteed to be replaced. This guarantee assures consumers that they will receive a working product that performs as advertised. In the data center business, NVIDIA offers a variety of products and services, including but not limited to: Accelerated Data Center GPUs, DGX Systems (AI Supercomputers), HGX A100 (Accelerated Server Platform for Deep Learning, Machine Learning, and HPC), EGX Platform (Real-Time AI Platform), NGC (GPU-Accelerated software), and Virtual GPU Software. With the rapid growth currently occurring in sector, NVIDIA is in a prime position to expand and build upon offerings from its data centers.

Technology Development

As a result of the majority of employees at NVIDIA being engineers in Research and Development, NVIDIA has a heavy focus on developing new technologies and preparing for the future. Taken from the NVIDIA website, the technologies offered by the company are split into four primary groups: Enterprise and Developer Technologies, Gaming Technologies, Architecture Technologies, and Industry Technologies. These technologies range from the bread and butter

offerings of graphics processing units to new innovations in ray-tracing, 4K, deep learning, artificial intelligence, self-driving cars, and more. As NVIDIA continues to grow, so does its investment in the development of new technologies for the future.

Procurement

Because majority of inbound and outbound logistics are handled externally, NVIDIA's procurement focuses primarily on two things – the acquisition of land capital to develop into buildings and identifying unique ways to promote and advertise new products and services. As its success in the data center field increases, NVIDIA is likely to continue to develop such locations and use its resources to power supercomputers and neural networks worldwide.

Human Resource Management

NVIDIA offers many incentive packages and benefits for employees - the Human Resource Management team at the company focuses on supplementing employees and handling these various resources and benefits that the company provides employees. Apart from this, standard Human Resource Management tasks are performed. In 2017, NVIDIA's annual employee survey showed that 87% of employees are proud to work at the company. Employees at NVIDIA provide invaluable intellectual capital that helps to propel the company forward and provides a strong competitive advantage in a very intellectually demanding industry. NVIDIA also has a cross-functional team designed to refine and measure the company's diversity and inclusion programs. This team supports many employee driven groups, such as NVIDIA Women in Technology and NVPride (supporters and members of the LGBTQ+ community) with executive staff support and budgets for hosting sponsor and educational events.

Competitive Advantages, Strengths, and Weaknesses

NVIDIA is the industry leader in visual computing and continues to utilize heavy investments into Research and Development to further its reach in the market while simultaneously successfully expanding into new, rapidly growing markets. NVIDIA's high level of innovation and focus on creation of new technologies allows the company to set the standard

for premium graphics cards in the industry. Its main competitor AMD acts as the low-cost provider in the industry, and competition remains high because (due to the nature of technology) the newest generation of AMD graphics cards will always outperform the previous generation of NVIDIA graphics cards at a lower cost. Jen-Hsun Huang explained that “the company’s growth is being driven by its two-part business model: Platform and Network, Leverage and Scale.” In terms of tangible and intangible resources, NVIDIA possesses primarily financial resources, physical resources (tangible resources), and patents and proprietary rights (intangible resources). The company continues to grow within its sustainable growth rate and sustains high levels of profitability and positive sales growth. As the data center business continues to grow, NVIDIA will likely acquire more physical capital, and development of new technologies will lead to more patents and proprietary rights. NVIDIA maintains strong relationships within the technology, gaming, electronics, and computing industries, giving the company a high level of reliability. One major strength that NVIDIA possesses in the GPU market (compared to its main competitor AMD) is superior product differentiation. NVIDIA’s strong market position and reputation combined with the fact that the majority of manufacturing for graphics cards is outsourced to a strong, reliable network of manufacturers allows the company to maintain its superior product differentiation. NVIDIA has also expanded into various other markets with extreme success, such as the AI and Data Center markets, further extending NVIDIA’s superior product differentiation. As mentioned previously, a weakness for NVIDIA exists in the lower-end GPUs – because of the premium aspect of NVIDIA’s graphics cards, the lower cost AMD graphics cards provide marginally inferior performance at a more affordable price than the lower cost NVIDIA graphics cards. Another weakness for NVIDIA arises from the nature of the technology industry – there is always a chance that a new, superior technology will be invented that will render current technologies null and void. NVIDIA’s strong commitment to Research and Development and expansion into other fields partly offsets this threat.

Conclusion

NVIDIA is a company that currently exists in a very advantageous position within the field of technology. Its extreme focus on preparing and developing technologies for the future gives the company a strong foundation for success, which ties in directly with NVIDIA's distinctive competency – superior product differentiation. NVIDIA has enjoyed high levels of success from its initial area of focus within visual computing and has leveraged this success to expand and even lead within new technological markets through innovation and a dedication to excellence. NVIDIA's rapid technological advancements within fields such as artificial intelligence and data centers have set the foundation for the company to enjoy success for years to come, and the company is in a prime position to assist in the creation of the technology of the future.

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