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Case Study

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Abstract

In today's hypercompetitive world, electronics manufacturing companies experience challenges to respond to increasing consumer electronics demand while combatting disruptive change in their industries. The revolution in manufacturing via Industry 4.0 has transformed the way that companies approach supply chain process to gain a stronger understanding of data efficiencies. This case study examines OptimalPlus to demonstrate how its services while tapping into today's technologies keep pace with competitors during disruptive change in the consumer electronics industry. OptimalPlus is a leader in providing the software solutions necessary for electronics manufacturers to get the most out of its supply chain process. This study explores the concept of Industry 4.0 and the benefits that manufacturers can gain from utilizing technologies. By understanding the benefits of using Industry 4.0, scholars and practitioners can better understand the way to innovate under the lens of disruptive change in the marketplace.

Keywords: Electronics manufacturing; Industry 4.0; OptimalPlus; Disruptive change; Software solutions; Industrial Internet of Things (IIoT); Data mining; Bid data; Supply chain.

1. INTRODUCTION

In today's hypercompetitive world, electronics manufacturing companies experience challenges to respond to increasing consumer electronics demand while combatting disruptive change in their industries. Industry 4.0 transforms the way that companies look at supply chain process to gain a much stronger understanding of how data can be used to create efficiencies. Innovative companies help to fuel the economy of the United States. OptimalPlus, a big data analytics software company, is one of these innovative companies. This business offers expertise in product analytics and manufacturing test operations. According to Manufacturing Intelligence Transforming Big Data into Actionable Insights in Real Time (2018), "OptimalPlus desires to limit warrant payments and fine-tune the capabilities of the supplier benchmarks." This company offers creative advancements for semiconductors and electronic companies. Relying on Industrial Internet of Things (IIoT) and Industry 4.0 creates many solutions for companies with the desire to improve efficiency, speed, and technological advances. OptimalPlus ensures maximum quality values with algorithms and methodologies. Bloomberg (2018) stated, "The company offers a semiconductor operations platform that comprises a suite of solutions for gathering, analysing, and transforming manufacturing operations data from multiple sources into actionable information." With the constant drive for improvement leads to financing and planning officers increasing gross margins. The concept of Kaizen, or constant improvement, makes this company to excel over their competitors. Along with this mentality, increased stakeholder communication with real-time reports that users can automatically generate and distribute allows for easy accessibility. With the backdrop of disruptive change in the environment, OptimalPlus has a "kaizen" mindset, striving for

continual improvement power analysis tools and 24/7 automated rule engines for the evaluation of product data. This case study examines OptimalPlus to demonstrate how its services while tapping into today's technologies keep pace with competitors during disruptive change in the consumer electronics industry.

1.1. Review of Literature: Disruptive Change

Disruptive change is becoming a serious problem to traditional institutions. Few individuals enjoy change in their environment. Managers favor predictable outcomes and processes. Thus, incremental change is welcomed more than instant change. In fact, Palmer, Dunford, and Buchanan (2017) suggested that organizational change is problematic to managers. Most practitioners would prefer incremental changes that can be planned with a sequence of logical solutions that include diagnosis tools and assessments. Disruptive changes are not incremental changes. Disruptive changes are in most cases unpredictable, time consuming, and costly. Disruptive changes are thus seen as transformational changes that can impact more people and provide greater risks for today's organizations (Palmer *et al.*, 2017). The technology sector is not immune to the unintended consequences of disruptive change. Disruptive change sometimes provides early warning signals to organizations too blind with day-to-day operations to notice these signals. Christensen, Anthony, and Roth (2004) argued that the first part of predicting industry change involves understanding when it is reasonable to expect innovation for creating new change, new industries, and new companies. Furthermore, disruption often means organizations must change their approaches. Sowcik *et al.* (2015) argued that a different type of leadership will be necessary to manage oversight of changes from all levels.

OptimalPlus finds itself using technological advancements for key data analytics on the backdrop of disruptive change. In today's ever-changing world, electronics and technology have come to play a significant role in critical organizational functions and processes. With technology at the fingertips of workforce employees, it creates even more data than ever before that can be mined and can take businesses to the next level. That is when companies such as OptimalPlus come into play. This business has brought disruptive innovation and change to the industry of data analytics by offering their customers "real-time insights and action" with products that are embracing the IIoT and Industry 4.0, helping them to analyze and solve problems faster than they ever could before (Overview, n.d.). Furthermore, Christensen (2018) noted that disruptive innovation transforms a product that was historically too expensive and complicated that only a few wealthy, talented individuals had access to this technology. Still, disruptive innovation makes technology more affordable and accessible to a much larger population. The success of business in doing this reflected in Carl Bowen's customer testimonial where he stated, "'We went from we can't afford to do this' to 'We can't afford not to do this'" (Customer Testimonials, n.d.). Companies are coming to the realization that these data can help to inform their team of what errors they are making and how they can leverage their lessons learned from the data to better their supply chain and their processes. What once may have been seen as an unneeded cost is now beginning to emerge as a business necessity for the organization to compete and succeed, and OptimalPlus is one of the business companies leading the charge. The company now needs to decide whether it wants to pursue the auto industry, in which they currently dominate, further or break into other sectors of the electronics/technical industry.

2. METHODS

To best evaluate OptimalPlus, case study analysis was fully utilized. This research uses qualitative content analysis for developing this specific case study involving Instagram.com, a social media platform. In the case study analysis, individuals imitate or simulate a real business situation to understand the larger population (Ellet, 2007). Business professors utilize case students in the classroom to provide students with a better understanding of the business world. Given the application of case studies in the classroom, students and instructors can move beyond theoretical concepts to actual application (May, 2013). Case study typically follows this pattern: (a) identify the critical issues in the case, (b) identify the key problems(s), (c) specify alternative(s), (d) evaluate each possible action(s), and (e) make the preferred recommendations (Laudon and Laudon, 2017). Additionally, Competitor, Political, Economical, Social, Technological, Legal, Environmental (PESTLE), and Strengths, Weaknesses, Opportunities, Threats (SWOT) analyses were also utilized to gain a better understanding of this social media platform.

2.1. Organizational Background

Technology has transformed the way that consumers interact with all facets of our world, and the result is a growing demand for electronics that can help consumers to take advantage of this technology. As noted by Gary Shapiro, president and CEO of the Consumer Technology Association, “Technology is improving our lives in more ways than ever—and consumer enthusiasm is growing just as quickly as companies can bring their innovations to market” (Cassagnol, 2018). For many of the electronics manufacturers in today’s economy, the challenge has become how to continue to efficiently and effectively deliver a quality product to their consumers. The structure of OptimalPlus is built upon the focus of customer care and retention. These companies are being forced to take a closer look at how efficiently they are dealing with their manufacturing process. The introduction of Industry 4.0 has allowed companies to increase their insight into their own supply chain process. Utilizing Industry 4.0 can be achieved by OptimalPlus. This company is an industry and its entire supply chain. The OptimalPlus open platform pairs unprecedented visibility into the entire electronics supply chain, “with advanced data science and domain expertise” (Strauss, 2018).

Electronics manufacturers can utilize the information provided by OptimalPlus to tighten up their manufacturing operations to ensure that they are operating as efficiently as possible. Data are being used in all kinds of ways in world, and manufacturing is no exception. By capitalizing on knowledge derived from data analytics on their manufacturing process, manufacturers can find new ways to close gaps and synergize processes. The insight OptimalPlus can provide to their clients will redefine the way the entire supply chain is viewed by electronics manufacturers. OptimalPlus has found thriving opportunities for Big Data in these fields: retesting monitors, identifying product drifts, focused analytics, Reliability, Maintainability, and Availability (RMA) prediction, RMA management, single data source, and Big Data correlation. “Optimal +” (n.d.) lists the current markets of influence in the United States, China, Hong Kong, Taiwan, South Korea, Japan, Singapore, France, Germany, and Italy. In the end, these manufacturers may be able to provide the supply of consumer electronics that can match the ever-increasing demand they experience today. With the strategy of streamlining the process of electronic manufacturing, this company competes heavily in the market of Big Data Analytics. OptimalPlus culture focuses on efficiency at the core.

3. RESULTS/ANALYSIS

OptimalPlus takes monopolization in solutions that reduce RMAs, drive IIoT connectivity, and enhance yield/productivity. The many investors comprise KKR, Pitango, Carmel, Evergreen, and Aviv. A competitive advantage of OptimalPlus is that they are the only solution in the market to manage the mutual sharing of product and manufacturing data between electronic Original, Equipment, Manufacturers (OEMs) and semiconductor. Manufacturing operations have a holistic view with product lifecycle warranty. PESTLE provides a great analysis tool for external forces to influence a company like OptimalPlus. Given this reality, the research attempted to evaluate the organization more closely by utilizing the PETSLE analysis (see Table 1).

Political: Working in a highly regulated environment provides political ramifications. With connectivity of factory testers to product engineering teams, there is “optimal performance.” With the long-term quality product enhancements, it provides a need for OptimalPlus in the market at large. Illing (2017) stated, “Like corporations, campaigns now know far more about their constituents than ever before—what they read, which movies they stream, which shows they watch, where they shop, which products they buy. For get-out-the-vote mobilization, campaigns use information that publicly listed about most voters like their party affiliation, history of participation in general and primary elections, their age and gender.”

Economical: The retail sales increased largely this year with \$321 billion in sales due to Big Data analytics utilization. The ways to add value to markets can range from impacts on Global Operations to Test Floor operations.

Social: With social networking technology platforms, there is rapid growth in information technologies. Can and Alatas (2017) stated, “New information technologies have led to the rapid and effective growth of social networks.” The spread of information and the acquisition of Big Data to resolve problems and find efficiencies will expand social networks and alter the political climate.

Table 1. PESTLE Analysis of OptimalPlus.

P (Political)	E (Economic)	S (Social)	T (Technological)	L (Legal)	E (Environmental)
<p>Campaigns now are more aware of constituent's consumer purchases, voting patterns, and streamed forms of information intake.</p>	<p>Semiconductors and electronics companies are growing in demand. With the use of technology in every aspect of major corporations, there need to be platforms that provide solutions.</p>	<p>Popular current phenomena exist with social networks using new information technologies.</p>	<p>An increased use of technology brings the importance of sound information systems used for data protection.</p>	<p>Most manufacturing data build platforms that are not sound and durable to last.</p>	<p>With big data analytics software, there can be overall waste reduction and a spread of awareness.</p>
<p>The use of data analytics can be hacked and easily attained.</p>	<p>Consumers in the United States prioritize technology retail with sales being driven by IoT this year to touch \$321 billion.</p>	<p>Social networks form sustainable development in decision-making processes.</p>	<p>Cutting edge communication technologies require data analytics companies.</p>	<p>Societal laws transformed with unprecedented data volumes.</p>	<p>With resolutions to efficiency, brings better environmental solutions.</p>
<p>Misuse of data can alter the course of history</p>	<p>Global operations and test floor operations help with real-time views of the testers.</p>	<p>Big data analytics companies increase the transfer of knowledge.</p>	<p>New market opportunities exist with Big data analytics companies.</p>	<p>The issues of privacy bring data mining practices.</p>	<p>Business plays a huge role on the impact of nature.</p>
<p>Data can be used to manipulate or mobilize voters. Many voters in elections do not realize that Big Data Analytics Software companies influence voters heavily through advertisements.</p>		<p>The policies influence consumer behavior. The encouragement of social learning is a practical strategy for problem solving.</p>	<p>Billing, marketing, customer relations, and time management can be manipulated with Big Data tools.</p>	<p>The disruption of law firms and the legal profession entirely.</p>	

Technological: Cutting edge communication technologies require data analytics companies to improve company efficiencies. According to “*Overview*” (n.d.), “Fields like billing, marketing, customer relations, time management can be manipulated with Big Data tools. With improved data mining, there are unforeseen technological advances.”

Legal: The legal manufacturing of data bolsters platforms and can actually interfere with societal laws, due to the misuse of the data. Once the Big Data volumes have been breached, the use is unknown and multiplied through as many channels before it is protected and brought to the light. There are prevalent legal ramifications for the misconduct and misuse of Big Data mining manipulation.

Without tools such as PESTLE and SWOT analysis, “*OptimalPlus Overview*” (n.d.) stated, “With the spread of important intel in environmental protections, awareness, and interventions, waste is reduced. With quicker communication channels, there are increased environmental improvements due to the better communication of this information and intel.”

SWOT Analysis: In understanding the position OptimalPlus holds in the market, the researchers used the SWOT analysis tool to provide insight about OptimalPlus about the internal and external environments shaping the organization (see Table 2).

Strengths: OptimalPlus benefits through its recognition as “the established leader of lifecycle analytics for the electronics industry and its entire supply chain” (Strauss, 2018). The company provides services to manufacturers hoping to improve their existing supply chain. It is noted that “The insights generated by the system make it possible to weed out faulty components, correct production processes, and save the manufacturers a lot of money, and sometimes also embarrassment. In some sectors, such as the auto sector, detecting a faulty part is likely to save lives” (Shahaf, 2018). In doing so, the company likely has the attention of a lot of potential customers. Additionally, OptimalPlus has a well-established presence particularly in the automotive chip industry, where it currently holds 75% of the market share of manufacturers creating auto chips (Shahaf, 2018). The need for the service provided by OptimalPlus will continue to grow, as manufacturers continue to realize the vast benefits they can realize in adopting OptimalPlus’ service.

Weaknesses: It is important to establish areas where OptimalPlus could be holding itself back as well. Being one of the pioneers in their service and having their area of focus for chip manufacturers, they may lack initiative to go out and seek different client bases. There are growing competitors in their industry (Yieldwerx and MFG Vision) that can potentially eat into their existing market share or target clients in different chip industries outside of automotive. Staying current on what their competitors are offering to clients can help with this. The growing focus on the automotive industry for OptimalPlus may limit their desire to look elsewhere for clients. The company has expressed interest in increasing their existing hold on automotive chips (Shahaf, 2018).

Opportunities: If the hope is for OptimalPlus to continue to grow in the future, they must recognize opportunities for the organization to grow. As technology continues to grow, there will be a greater need for chips to power new devices. Shahaf (2018) stated, “OptimalPlus’s list of customers is currently composed of an impressive collection of chip manufacturers whose products operate computers, smartphones, servers, streamers, and smart loudspeakers. The list is only growing as the technology also penetrates more conventional sectors” (2018). OptimalPlus will need to ensure that they are staying current on industries and clients that can attract for their service if they hope to continue growth. More opportunities will continue

Table 2. SWOT Analysis for OptimalPlus.

S (Strengths)	W (Weaknesses)	O (Opportunities)	T (Threats)
Leader in lifecycle analytics for electronics industry	Lack of concern for growing competitors	Demand for electronics manufacturers to continue to produce chips for products	Humans looking to “unplug” can hurt demand for electronics and chips
Strong hold in market for automotive chip industry	Focus on automotive industry could allow for competitors to increase share in other markets	Potential to expand market share in industries outside of automotive	Tariffs can hurt import/export quantities and reduce demand

to present themselves for new clients if the company can provide its service to new clients and ways chips continue to be used.

Threats: There are currently some risks that exist for OptimalPlus to overcome and continue to grow. For one, as technology continues to evolve in our society, humans are beginning to seek ways to “unplug” from their devices. It has been noted that “A growing number of bloggers, academics, and entrepreneurs who brand themselves digital minimalists are trying to turn that familiar message into an actual movement” (Raphael, 2017). Further traction of the movement of digital minimalism could result in a decreased demand for electronics, thus potentially reducing manufacturing need for OptimalPlus’s clients.

In summary, key company success ideas would go unnoticed without tools such as PESTLE and SWOT analysis.

4. STRATEGIC IMPLICATIONS AND RESULTS

In this section, the strategic implications of OptimalPlus’s product analytics and semiconductor manufacturing operations were evaluated. A four-pronged framework described in Olson, Slater, and Hult (2005) for enhancing the OptimalPlus’s performance by adopting multiple emphases described in each of these prongs was utilized. The following strategic implications were observed.

4.1. Understanding Disruptive Change Is Critical Even for Industry Leaders

Disruptive changes will continue to reshape industries. If OptimalPlus does not watch the warning signs of change, the company may not be able to sustain its market advantages. OptimalPlus provides the data analytics necessary for manufacturing companies to provide the highest quality product to its consumers. Customer-oriented behaviors will ensure that OptimalPlus will keep a pulse on the changing preferences of customers. Recent reports suggest that staying away from electronic devices is becoming more and more mainstream (Lucero *et al.*, 2013), and companies such as OptimalPlus that depend on semiconductor devices would have to find novel ways to create growth while still staying conscious of consumer preferences. Additionally, competitor-oriented behaviors will help OptimalPlus to identify previously untapped markets both locally and globally and ensure that competitors with related resources in intellectual property, manufacturing, and supply chain logistics are not just competitors, but also collaborators in advancing the state of the semiconductor device industry.

4.2. OptimalPlus Can Continue the Pursues of Disruptive Innovation

Christensen *et al.* (2004) suggested that watching three core customer groups is essential: (1) Customers not consuming any product or consuming only in inconvenience settings (noncustomers); (2) Consuming customers who are undershot meaning they are frustrated with the current product limitations and willing to pay more for enhancements; and (3) Consumers customers who are overshot meaning those buyers who stop paying for product improvements at premium prices. Christensen *et al.* (2004) maintained that these customer types create new market opportunities for businesses that are willing to apply disruptive innovation. OptimalPlus has a complete view of analytics to help brand owners and supply chain to create the best product in efficient ways to ensure that consumers are getting the best product. Although the market for embedded electronics is expanding through the integration of IoT devices, applications of Moore’s law and advances in the discovery of new semiconductor materials such as graphene will significantly impact the adoption of newer technologies. Multiple factors will have to be considered, including the mining of materials that are sourced sustainably while still limiting dependence on rarefied minerals that power most electronic devices (Prior *et al.*, 2012). For this purpose, OptimalPlus will have to develop new technologies to streamline manufacturing and operations internally (internal or cost-oriented behaviors) while also keeping an eye on social responsibility.

4.3. Developing New Strategies Will Be Essential While Facing Disruptive Changes

In fact, the strategic implications for scholars and practitioners follow bidirectional mode of *innovation-oriented behaviors*. OptimalPlus has the potential to benefit from the results of innovation-focused research in academic and industry labs. Creating a consortium of academic, industry-research labs through dedicated

conferences, industry internships, and fellowships will help OptimalPlus to avail the latest research findings, which will significantly impact the market offerings for various devices. Additionally, by participating in such events, OptimalPlus can help to drive the discussion around developing standards for devices that can operate across international markets and position itself as a world leader in semiconductor device manufacturing and research. Such innovation-oriented behaviors will also enable OptimalPlus to contribute to government and policy discussions for devices with embedded electronics and be a voice in the regulatory frameworks for the broad category of devices that use semiconductor devices in their operation, thereby pushing further innovation of new strategies.

5. CONCLUSION

In a disruptive world, electronics manufacturing companies experience an inherently complex and risky environment. As data needs of organizations shift into the need of more electronics as we become more connected via the virtual world and the Internet, more and more businesses will rely on electronics manufacturing to provide the devices to service this need. Electronics manufacturers will continue to rely on a strong manufacturing process to continue to produce the devices that consumers need. When using the 4.0 and IIoT applied to manufacturing, IIoT can provide companies with vast amounts of data to help them analyze and solve problems at a much faster rate than before. OptimalPlus seeks to outperform its competitors with state-of-the-art technology and optimal customer service. OptimalPlus is a leading Data Analytics company that focuses on efficiency and excels above many competitors.

With that said, OptimalPlus can evaluate the entire manufacturing line when assessing the performance of the manufacturing lines and looking for efficiencies, utilizing disruptive innovation where applicable. This research has limitations on the extent to the analysis tools used. Perhaps, other management analysis tools, such as a competitor's analysis, would delve deeper into the complexity of external forces affecting certain decision-making capabilities and ways of growth into bigger and more expansive markets. This study examined the concept of Industry 4.0 and the benefits that manufacturers can gain from utilizing technologies. Future research should review the efficiencies that can allow for growth in the Big Data Analytics market. By understanding the benefits of using Industry 4.0, scholars and practitioners can better understand the way to innovate under the lens of disruptive change in the marketplace.

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Rachel Stafford graduated from East Central University with a bachelor's degree in business administration with a concentration in finance. Rachel is a customer relations specialist at Enviro Systems, a Zodiac Aerospace company. She has worked in this role for over two years and for the company for over five years. She is currently pursuing her MBA with an emphasis in leadership at Oklahoma Baptist University.