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AWARDS

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2020 BEST PRACTICES AWARD

ELENIUM AUTOMATION

2020 ASIA-PACIFIC AIRPORT SELF-SERVICE TECHNOLOGY INNOVATION LEADERSHIP AWARD

Strategic Imperatives

Frost & Sullivan identifies three key strategic imperatives that impact the airline and airport industry: geopolitical chaos, disruptive technologies, and internal challenges. Every company that is competing in the airline and airport space is obligated to address these imperatives proactively; failing to do so will almost certainly lead to stagnation or decline. Successful companies overcome the challenges posed by these imperatives and leverage them to drive innovation and growth. Frost & Sullivan's recognition of Elenium Automation is a reflection of how well it is performing against the backdrop of these imperatives.

THE IMPACT OF THE STRATEGIC IMPERATIVE 8™ ON THE AIRLINE AND AIRPORT INDUSTRY
The following 3 strategic imperatives will ensure growth in the airline and airport industry.

SI8

GEOPOLITICAL CHAOS	DISRUPTIVE TECHNOLOGIES	INTERNAL CHALLENGES

Why

GEOPOLITICAL CHAOS
- In response to the COVID-19 pandemic, the industry is struggling to generate revenue and keep costs down despite reduced capacity and low passenger demand.
- Passengers' hesitance to travel and declining economic conditions in many countries hamper the volume of passengers traveling, both domestically and internationally.
- If the global crisis results in prolonged lockdowns and delayed vaccination development, the industry's financial position will take a major hit, triggering a significant change in the industry landscape.

DISRUPTIVE TECHNOLOGIES
- Airports are expected to aggressively move toward digitalization aimed at optimizing operational efficiency and contactless passenger flow inside terminals.
- Cloud computing will become critical for various airport processes, such as communication, file management, planning and budgeting, passenger processing, maintenance, and asset monitoring.
- Technologies such as blockchain, Internet of Things (IoT), and artificial intelligence (AI) will drive confidence in managing data security, privacy, and transparency to meet customer expectations.
- Location-based services and mobile applications will push relevant information to passengers' smart devices, which could potentially boost commercial revenue.

INTERNAL CHALLENGES
- The airline industry's top challenges include rampant price-shopping, revenue compression, and increased expectations from travelers.
- Industry incumbents face stiff competition from air freight market leaders (e.g., UPS, FedEx) and eCommerce firms that have their own in-house fleet and freight capabilities.
- Navigating the tech landscape and integrating technologies to yield better operational outcomes is another major industry challenge.

When

GEOPOLITICAL CHAOS
- The airline industry recorded a compound annual growth rate (CAGR) of 6.6% during 2010-2019 but is expected to experience negative growth for the next 2 years. Passenger numbers are estimated to reach pre-pandemic levels by 2023.
- Airlines and airports must keep operational costs down by optimizing resources and achieving operational efficiency with the help of digital solutions, contactless boarding, revenue management, and network planning during the next 1-3 years.
- In the short term, fiscal discipline, renegotiation of contracts to stabilize fixed costs, and protection of employee welfare will ensure business continuity.

DISRUPTIVE TECHNOLOGIES
- The aviation industry will require higher levels of collaboration between software and hardware providers and master integrators to meet business requirements and provide seamless services.
- IoT and Big Data analytics will play a major role in optimizing operations and ensuring efficient health screening at key touch points.
- Airports will witness growth in uptake of digital platforms that consolidate all data-driven functions and processes in the next 2-3 years.
- Adoption of biometrics, blockchain, automation, disruption management, operation control centers, and self-service solutions will accelerate in 5-10 years.

INTERNAL CHALLENGES
- Network planning, route optimization, and crew optimization tools with real-time data analytics will help generate higher revenue in the next 3-5 years.
- Enhancing dynamic merchandising and personalization efforts will drive up sales to offset a small portion of passenger revenue losses.
- Companies need to develop solutions to optimize fuel consumption and reduce their carbon footprint by utilizing technologies such as Big Data and machine learning.
- Low-cost carriers must rethink their corporate strategies in the wake of the pandemic by designing offers that will attract corporate customers.

Source: Frost & Sullivan

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated companies. Elenium Automation excels in many of the criteria in the airport self-service market space.

AWARD CRITERIA

Technology Leverage	Business Impact
Commitment to Innovation	Financial Performance
Commitment to Creativity	Customer Acquisition
Technology Incubation	Operational Efficiency
Commercialization Success	Growth Potential
Application Diversity	Human Capital

The Future of Contactless Self-Service Systems

Self-service automation technology is quickly transforming the way airline passengers navigate through airport pre-boarding and boarding processes. Founded in 2015 in Melbourne, Australia, Elenium Automation (Elenium) brings the airport and airline markets its game-changing self-service automation technologies that comprehensively enhance the passenger experience and address any complications faced while operating self-service manual kiosks. Elenium's development of passenger self-service systems begins with understanding the challenges passengers face daily; essentially, the company focuses on providing state-of-the-art solutions that reshape how customers interact with and operate existing systems. A primary challenge that a passenger encounters is the time spent attempting manual operations through self-service systems that only offer ticketing retrieval functions. What may not seem so burdensome to most passengers is an essential problem for many who seek a more flexible and efficient solution, especially for passengers with disabilities, thus resulting in frustration. Unlike other self-service stations in airports, the company's self-serving kiosks are easy to install and operate, and deliver the utmost efficiency and passenger experience using artificial intelligence and advanced biometrics. Additionally, the company's system offers other self-service operations, such as bag tagging stations and off-airport check-ins, which make the passenger experience seamless.

Elenium uses revolutionary technology, such as advanced feature recognition through biometrics, and provides a completely touchless system with unmatched efficiency. Before the global COVID-19 pandemic, airports witnessed a growing increase in air travel and an overflow of passengers throughout airports, resulting in the need for self-service automation systems that not only enabled a seamless passenger journey but increased security measures. Frost & Sullivan's research identified early in 2020 that increasing security incidents underlined the need for a new approach to unique individual identities, which are attainably verified through software platforms, to increase the efficiency and

"The touchless kiosks can operate effectively with passengers wearing masks, glasses, hats, and who may have beards. Elenium's systems are highly intuitive, capable of working both in light and dark environments, and importantly in providing passengers with accessibility issues a seamless operation."

- Steven Lopez, Best Practices Research Analyst

efficacy of identity verification processes.[1] The challenges in managing identities in the modern world through conventional methods, such as identification (ID) cards and personal identification numbers/passwords, paved the way for exponential demand for biometrics-based ID management and access control systems.[2]

Aside from security, airlines face another challenge, which is finding ways to omit surface virus transmission by increasing digital solutions. The pandemic has drastically reduced the number of people flying, out of fear of contracting the virus. Frost & Sullivan's research recognizes that airlines and airports must seize digital opportunities to navigate this uncertain period and ensure the smooth re-establishment of air travel. Digital solutions will enable both airlines and airports to plan and align their resources with the sudden decline in demand.[3] By creating an effective method for reducing the spread of virus surface transmission through a contactless self-service system, Elenium provides passengers with a sense of assurance, as airports and airlines begin adapting to contactless self-service systems equipped with enhanced features and capabilities.

Commitment to Innovation

Elenium's self-service automation solutions create a user experience like no other system currently in airports. The company's self-service kiosks offer passengers increased speeds, seamless operation, and flexible applications. Elenium's kiosks bring a set of features that include voice recognition, facial recognition, biometrics, vital sign detection, and touchless interaction. Elenium's Touchless Self-Service kiosks are truly revolutionary and bring to the forefront cutting-edge capabilities that prove beneficial in the middle of a global pandemic.

The self-service system offers a touchless head tracking feature, allowing passengers who may have reduced-mobility due to a disability or injury to process their boarding information through precise head movement. A passenger can simply look into the direction (left or right) on the screen to choose "yes" or "no" icons in response to standard pre-boarding questions. The touchless kiosks can operate effectively with passengers wearing masks, glasses, hats, and who may have beards. Elenium's systems are highly intuitive, capable of working both in light and dark environments, and particularly in providing passengers with accessibility issues a seamless operation.

Voice as an authentication means has proven difficult due to interference in mitigating clarity and sample quality. The company's touchless kiosks use robust technology to drown out any background noise and focus on the passenger's speech, transmitting clear voice recognition. Elenium's enhanced level of voice recognition is possible using proximity sensors, high-resolution cameras, and various directional microphones designed to operate and capture an individual's voice despite high traffic and noisy environments.

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[1] *Global Demand for Biometrics in Security, Forecast to 2025* , (Frost & Sullivan, February 2020)
[2] Ibid.
[3] *Post-pandemic Growth Opportunity Analysis of the Global Airport & Airline Industry*, (Frost & Sullivan, May 2020)

Becoming a Much Needed Solution in the Midst of a Global Pandemic

The robust touchless technology behind Elenium's systems became and continues to remain a prominent innovation in the middle of the COVID-19 pandemic. Elenium listened to the feedback from airports regarding the virus and immediately focused on providing solutions that would help stop the spread in airports and identify persons who could potentially have flu-like temperatures. Elenium's touchless kiosks demonstrate exceptional flexibility and can immediately integrate numerous types of tools to read vital signs for a potential fever using biometrics, thermal cameras, and near-infrared technology. Moreover, the company's systems can seamlessly install into any third-party devices. Through its self-service solutions, Elenium helps airports establish and maintain public confidence in health screening as well as provide a streamlined method for passenger processing.

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>
> **- Steven Lopez, Best Practices Research Analyst**

Customer Impact and Driving Operational Efficiency

Elenium focuses on strengthen its social media presence since the virus outbreak and continues to increase customer acquisition by maintaining operational activity and providing its kiosk self-services to airports and airlines in the Asia-Pacific (APAC) region. The company commits to strengthening operational efficiency by increasing processing speeds and minimizing long passenger queues, providing its customers with the best value possible. Elenium utilizes its Flight Deck tool as an effective feedback mechanism. The Flight Deck tool monitors operational performance by gathering autonomous passenger data that can track specifications such as which kiosks people use the most during the day and which airlines use the kiosks more than others. Additionally, Elenium uses the data to analyze passenger flow, time a passenger spends navigating through the self-service process, and which terminals the most passengers board on a daily basis.

With the COVID-19 pandemic impacting business operations internally regarding communications, i.e., employees working from home, Elenium optimized its communications strategy by maximizing employee meetings every two weeks, focusing on monitored feedback, and increasing flexible communications between management and employees. The company has a substantial presence in the APAC region, with more than 250 self-service kiosks in Hong Kong International Airport, 170 kiosks in Sydney Airport, and 130 in Auckland Airport. Kempegowda International Airport in India, Avalon Airport in Australia, Queenstown Airport in New Zealand, Etihad Airways of the Middle-East, and Vietnam Airlines also trust Elenium's self-service systems.

As the COVID-19 pandemic causes swift reaction to implement digital innovations like Elenium's touchless self-service systems, the company prioritizes its commitment to reviewing, learning, and avoiding redundancy when it comes to adopting new technology. Frost & Sullivan agrees with Elenium's scope of the aviation industry that domestic travel will eventually ramp up within the next two to three

years. The company's current overall goal during the pandemic is to produce vital sign detection and enhance self-service processing and, most importantly, expand within these segments.

Conclusion

Self-service automation systems provide passengers with another option for conducting pre-boarding processes without human interaction. However, with a number of airports obtaining self-service kiosks, many self-service systems lack efficiency and can increase frustration levels for people who have difficulties using touchscreen interface systems. In a technological world where biometrics and voice recognition increase security levels and drive new possibilities for voice command and noise-canceling features, many systems cannot support this level of innovation. Moreover, with the global COVID-19 pandemic impacting the aviation industry, passengers, in particular, try to avoid surface contact as much as possible; because self-service systems require touch commands, there is still a high risk of transmission, especially in high traffic airports. Elenium Automation (Elenium) brings cutting-edge touchless self-service systems to the aviation market. The company equips its advanced state-of-the-art systems with robust voice recognition and biometric technology. Elenium's touchless kiosks provide passengers with a seamless and fast self-service experience that requires zero-touch functioning. Elenium's rapid response to the COVID-19 pandemic displays the company's innovation and readiness in a time of need.

With its strong overall performance and commitment to enabling the passenger experience, Elenium earns Frost & Sullivan's 2020 Asia-Pacific Technology Innovation Leadership Award in the airport self-service market.

What You Need to Know about the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create on-going growth opportunities and strategies for our clients is fuelled by the Innovation Generator™. Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous flow of Growth opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
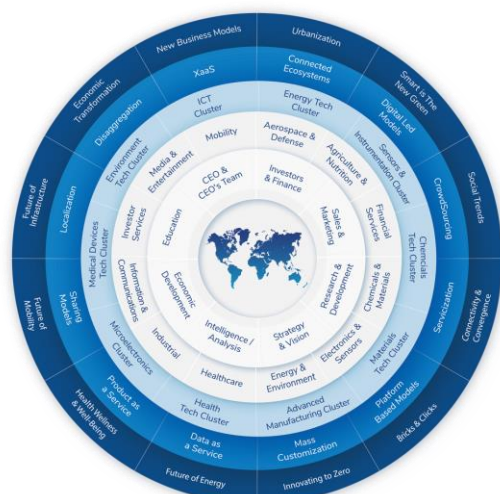- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our six analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)

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