



**2017 Global General Radiography
Product Line Strategy Leadership Award**

FROST & SULLIVAN

BEST
2017 **PRACTICES**
AWARD

GLOBAL GENERAL RADIOGRAPHY
PRODUCT LINE STRATEGY LEADERSHIP AWARD

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Background and Company Performance

Industry Challenges

General radiography used in diagnostic imaging applications is the oldest medical imaging modality, and the one that has given rise to the expansive medical imaging field as it is known today. Depending on the facility, general X-ray procedures represent between one-third and up to two-thirds of the volume of diagnostic imaging procedures performed. Globally, more than 700 million X-ray procedures are carried out annually. The modality is also the most popular in terms of clinical utilization, despite the ongoing developments and growth in advanced imaging modalities. However, radiation dose, patient safety, automation, flexibility, and positioning for image quality are some of the challenges faced by end users.

Further, the effect of the increased modularity of digital radiography (DR) equipment is being applied to analog offerings. This is because users with limited budgets split purchases into multiple years and instead considers using multi-functional radiographic/fluoroscopic (R/F) (systems with both radiographic and fluoroscopic properties) systems and mobile X-ray options with DR upgrade paths (upgrading existing analog, computed radiography to DR retrofit systems). Thus, multi-functional R/F systems are gaining in popularity among end users because vendors are targeting their features to applications in general for radiology, orthopedics, and vascular applications. Therefore, Frost & Sullivan believes that the uptake of multifunctional R/F systems provide stiff competition among the vendors because customers look for lower priced systems with limited features as opposed to premium offerings.

In light of this, companies are striving to offer products with innovative technologies to address these challenges and provide a high-value proposition for customers. By enhancing customer value, manufacturers can expand their customer base, offer a broader product line, increase market share, and build strong brand loyalty, paving the way for continued growth.

Product Line Strength and Customer Impact

Breadth

Shimadzu has made significant contributions to the field of diagnostic imaging and is considered a trendsetter in general radiography. In the past decade, the need for effective radiographic solutions has increased, as X-ray is the first diagnostic tool recommended for initial diagnosis. However, there is no one specific diagnostic imaging tool that gives a clear picture and, in some instances, the need for supplemental imaging through other sources becomes essential. The contemporary radiographic systems include fixed X-ray, fluoroscopy, mobile X-ray, and digital radiography. Shimadzu has the entire range of general radiography solutions, from fixed ceiling-mounted to floor-mounted systems and

mobile X-ray solutions with or without one to two arms, and all in entry-level to high-end configurations. By doing this, the company has made sure to produce radiography products that cater to every market segment and every type of user.

Most medical imaging companies have traditional general radiography products. In 2016, Shimadzu introduced innovative technologies such as digital multislice tomography which enables flexible positioning to view oblique cross sections of the spine and hip joints. Other products include SONIALVISION G4 (a fluoroscopy product with multi-functionality features), RADspeed Pro EDGE package (a high-performance general radiography equipment), and MobileDaRt Evolution MX7 Version (mobile X-ray with digitization features).

With this line of products, the company has developed the comprehensive portfolio of products required for radiographic solutions that focus on enhanced automation, efficiency, image quality, and cutting-edge application. They enhance clinical value by offering flexible positioning, reduced radiation dose, and versatility to view bone and soft tissue images. They can be used for orthopedics, general radiography studies, barium studies, endoscopy, urology, angiography, and other anatomies. This clinical offering helps to build a solid partnership with end users.

Technology Leverage

Shimadzu's technology utilizes advanced robotic capabilities and next-generation digital imaging technology.

General Radiography:

Its RADspeed Pro EDGE package, introduced in 2016, incorporates cutting-edge applications like tomosynthesis, speed stitch, and dual energy subtraction.

Tomosynthesis combines cone-beam CT reconstruction with digital image processing. With this, any number of cross-sectional images can be obtained. Additionally, flexible examinations while standing or supine are possible, and generally difficult images of elbows or knees can be easily imaged.

The system also incorporates "T-smart," which is the metal artifact reduction technology that reduces metal artifacts in orthopedic patients.

Speed stitch technology also called as auto-stitching combines multiple images that are captured while the X-ray tube is in motion at various angles.

Dual energy subtraction: These make use of dual energy subtraction—imaging algorithms that couple with low and high voltages and obtain the images of soft tissue and bone images separately.

Fluoroscopy

Fluoroscopy procedure volumes have been generally declining, but fluoroscopy is still mandatory to have in a hospital's service line. This means that fluoroscopy rooms and equipment tend to be under-utilized in most facilities, and that there is an opportunity for multi-purpose equipment that can be alternatively used for either fluoroscopy or DR.

To capitalize on the fluoroscopy market, Shimadzu launched its high performance multifunctional R/F system (radio/fluoro) (Sonialvision G4), which is capable of a wide range of examinations (radio/fluoro) and is ideal for inter-departmental shared services.

The field of view (FOV) flat panel detector (FPD) is available in 5 sizes. The largest FOV size available (43 cm X 43 cm) in the industry is available in this R/F. It provides an extensive imaging area, ultra-high definition and dynamic images, reduced radiation exposure, a ceiling-mounted telescopic arm, and a bucky wall stand with a portable FPD. These features make this set-up a complete and sophisticated multifunctional R/F solution.

It incorporates cutting-edge technologies such as the SUREngine-Advance, an image process technology that delivers high-quality fluoro and radiography images; SLOT Advance, an optimal technology for long-view images (e.g., full spine/legs) with a minimal X-ray dose; and T-smart, the latest tomosynthesis technology, which aids in iterative reconstruction with metal artifact suppression. Together, these features result in the excellent performance of Sonialvision G4.

Example: A case study by Takasago Municipal hospital in Japan applauded the clinical experience of using Sonialvision G4 as a multi-purpose R/F system for angiographic procedures. The system provided excellent quality resolution of the fluoroscopy image to visualize microcatheter ends and stents. Thus, the hospital found the Sonialvision G4 as a good alternative for traditional angiography systems.

Mobile X-ray

In addition to flexible ergonomics, the recently launched MobileDaRt Evolution MX7 incorporates a large LCD monitor and LED collimator light that increases brightness up to 40% and saves electricity by 80% when compared to its competing products. It also has a user-friendly design with wireless capability. The wireless capability of the MX7 systems provides extended applications, such as scheduling examinations or physicians being able to interpret images and diagnosing conditions in routine patient rounds, ICUs, NICUs, emergency rooms, and operating rooms. Frost & Sullivan's independent analysis depicts that Shimadzu's MobileDaRt Evolution MX7 is a much-needed enhancement for hospitals and imaging centers for extended clinical applications, thereby giving Shimadzu an edge over its competitors globally.

Customer Purchase Experience

Shimadzu aims to provide a unique value proposition to customers by offering a comprehensive toolkit that has been incorporated in its recently launched products.

Example:

Based on customer feedback, a sophisticated auto-positioning feature that could be controlled with remotes was introduced in the RADspeed Pro EDGE package. This helps the radiographer position the tube without much effort and fine tune this positioning, focusing on patient safety and a reduced radiation dose.

Additionally, the feature of removable grid that helps reduce radiation exposure during pediatric imaging was incorporated based on recommendations from end users. It also incorporated a dose area product meter on the collimator that measures the actual dose of radiation the patient is exposed to.

The research and development of new models (commercialized) is guided by an education steering committee comprised of key opinion leaders (KOLs). This is to help individuals at all levels learn more about the new features incorporated across the product range. The training and educational programs, expansion into international markets, engagement with KOLs, and leveraging of its product portfolio and cross-selling opportunities have been key strategies for excellence in Shimadzu's development and business growth.

Additionally, as a part of its continuous focus on research, Shimadzu and universities have partnered in performing research to optimize the existing systems and develop further innovations and efficiencies. Shimadzu's openness to understanding end-user needs, discussions with international channels, and a focus on gathering input from healthcare professionals (e.g., radiologists, interventional radiologists, radiological technologists, and healthcare facilities) are strategic measures the company executes to develop unique products that deliver a highly satisfying experience to its customers. Innovation at Shimadzu is achieved using diversified resources, such as scientists and engineers, with experience in robotics, image processing, and optics.

Customer Service Experience

In its bid to enable customers to make the right purchase decision when selecting radiography systems for advanced patient care, Shimadzu functions as a resource hub. Staying abreast of customer concerns and resolving them in a timely manner drive a company towards success, over and above its commitment to addressing changing user needs. Shimadzu, on a similar front, provides a stage for customers to meet every year and come up with ideologies or requirements that they intend to address in radiography products. Shimadzu has a dedicated field/service team in 76 countries with more than 1,000 employees that assists customers with installation, training, and post-sales support

services (software upgrade, technical support, 24X7 support, user-specific modules) for healthcare service providers.

Brand Equity

Shimadzu accomplishes its vision of excellence in radiology imaging with crucial breakthrough product lines—SONIALVISION G4, RADspeed Pro EDGE, and MobileDaRt Evolution MX7 Version. These innovative technologies are expected to increase penetration of Shimadzu's products in hospitals and radiology centers by both new and existing customers. This is demonstrated by the fact that RADspeed Pro EDGE and MobileDaRt Evolution MX7 found acceptance in more than 100 hospitals worldwide within one year of introduction. After years of intense development, the success of technology breakthrough aligns to Shimadzu's presence with integrated radiography solutions that support the vision and transition towards value-based healthcare. Frost & Sullivan agrees that this dynamic increases the overall brand presence of Shimadzu when compared to other competitors in the market.

Conclusion

As the radiography industry moves towards patient safety, reduced radiation dosage, and versatility with innovation as the key focus, solution providers must identify what solutions can enhance market penetration and ensure the greatest return on investment in this highly matured and competitive market. With over 140 years of experience and a global customer base, Shimadzu provides its customers with radiography systems that offer both versatile and improved functional capabilities. Through its innovations across its radiography product portfolio (general X-ray, fluoroscopy, mobile X-ray), Shimadzu has achieved successful global product penetration. Thus, the company has witnessed consistent above-average market growth in the year 2016 and is a strong global contender. Because of its strong overall performance, Shimadzu is recognized with Frost & Sullivan's 2017 Product Line Strategy Leadership Award.

Significance of Product Line Strategy

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. A full, comprehensive product line that addresses numerous customer needs and preferences is, therefore, a critical ingredient to any company's long-term retention efforts. To achieve these dual goals (customer value and product line strength), an organization must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Product Line Strategy Leadership

As discussed above, driving demand, strengthening brand, and differentiating from the competition all play a critical role in delivering unique value to customers. This three-fold focus, however, must ideally be complemented by an equally rigorous focus on building a superior and comprehensive product line.

Key Benchmarking Criteria

For the Product Line Strategy Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Product Line Strength and Customer Impact—according to the criteria identified below.

Product Line Strength

Criterion 1: Breadth

Requirement: Product line addresses the full range of customer needs and applications.

Criterion 2: Scalability

Requirement: Product line offers products at a variety of price points and functionality levels.

Criterion 3: Technology Leverage

Requirement: Demonstrated commitment to incorporating leading-edge technologies into product offerings results in greater product performance and value.

Criterion 4: Features

Requirement: Products offer a comprehensive suite of features to serve customers at multiple levels of functionality, ease of use, and applications.

Criterion 5: Supply Chain Reliability

Requirement: There is sufficient control over the supply chain to ensure availability of key components and thereby the availability of products in the product line.

Customer Impact

Criterion 1: Price/Performance Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 2: Customer Purchase Experience

Requirement: Customers feel they are buying the most optimal solution that addresses both their unique needs and their unique constraints.

Criterion 3: Customer Ownership Experience

Requirement: Customers are proud to own the company's product or service and have a positive experience throughout the life of the product or service.

Criterion 4: Customer Service Experience

Requirement: Customer service is accessible, fast, stress-free, and of high quality.

Criterion 5: Brand Equity

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify Award recipient candidates from around the globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> • Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates 	Matrix positioning of all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> • Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> • Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles 	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> • Share findings • Strengthen cases for candidate eligibility • Prioritize candidates 	Refined list of prioritized Award candidates
6 Conduct global industry review	Build consensus on Award candidates' eligibility	<ul style="list-style-type: none"> • Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates 	Final list of eligible Award candidates, representing success stories worldwide
7 Perform quality check	Develop official Award consideration materials	<ul style="list-style-type: none"> • Perform final performance benchmarking activities • Write nominations • Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best-practice Award recipient	<ul style="list-style-type: none"> • Review analysis with panel • Build consensus • Select recipient 	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform Award recipient of Award recognition	<ul style="list-style-type: none"> • Present Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance 	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10 Take strategic action	Upon licensing, company is able to share Award news with stakeholders and customers	<ul style="list-style-type: none"> • Coordinate media outreach • Design a marketing plan • Assess Award's role in future strategic planning 	Widespread awareness of recipient's Award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging, businesses and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.