

Keysight Technologies

2014 Global PXI Instrumentation Growth Excellence Leadership Award

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Agilent Technologies

2014 Global PXI Instrumentation
Growth Excellence Leadership Award



F R O S T & S U L L I V A N



50 Years of Growth, Innovation & Leadership

Background and Company Performance

Industry Challenges

Introduced in 1998, PCI eXtensions for Instrumentation (PXI) is an open modular standard that imparts significant benefits to customers in the automated test and measurement market. The platform's measurement speed, small footprint, and low power consumption translates into the lower cost of test customers are looking to achieve in manufacturing applications. Meanwhile, its measurement speed and flexibility also makes it extremely attractive in the design validation and research and development environments, enabling customers to shorten their time to market and/or address the increasingly multichannel nature of the devices they are developing. As a result, the platform has witnessed significant success over the past 15 years, growing steadily at double-digit growth rates, due to customers gradually shifting from rack-and-stack test systems made up of traditional box instruments to PXI-based test systems.

While lowering the cost of test and reducing time to market is critical for customers of test and measurement equipment in automated test applications, vendors of PXI instrumentation first had to increase the capabilities and performance of PXI solutions to bring them on par or exceed that of traditional instruments. This challenge was overcome, with vendors even able to introduce products many thought would never be possible in the PXI form factor such as RF products. Adoption of PXI instrumentation has increased correspondingly to vendor product introductions however has been somewhat restrained by the conservativeness of test engineers that have used traditional box instruments effectively for decades and the more complex process associated with integrating a PXI test system in comparison to a rack-and-stack test system. Industries characterized by a rapid evolution of technologies, such as wireless communications, are especially challenged by this aspect of modular instrumentation. To boost the market growth and that of its revenue performance in this space, PXI vendors have to implement various strategies including partnerships.

Competing effectively in the PXI instrumentation market is also a key challenge for participants, especially tier-2 competitors and new entrants, due to the dominance of the company who pioneered the PXI standard, which benefits from an extensive product portfolio, and the presence of other established vendors, coupled with their dedication to this market. The growth of the PXI instrumentation market is also attractive to various companies who are making significant investments to capture the numerous opportunities emerging in that market. While participants face the challenge of picking the opportunities that offer the highest revenue potential among the large number of opportunities emerging in the space constantly, they also face the competition of technologically-superior companies who are pursuing these high-potential growth opportunities.

Companies able to devise innovative strategies that take into consideration the challenges faced by customers and compare them to the strategies and strengths of established competitors to identify the opportunities they can best address based on their core

competencies could grow their share significantly in this sought-after marketplace.

Customer Value Excellence and Growth Success

Growth Strategy Excellence

Prior to 2010, Agilent Technologies was considered a small participant in the PXI instrumentation market, holding less than 5% of the market revenues. To improve its position against much larger competitors, the company put forth significant efforts toward understanding the key reasons driving the shift from traditional box instrumentation to modular instrumentation in the automated test market as well as the customer pain points around modular instrumentation. Agilent also spent time reviewing the strengths and weaknesses of its top competitors. As a result of this analysis, the company's early entry into the PXI space involved a two-pronged strategy that consisted of focusing its efforts on a specific segment of the market rather than trying to build a large product portfolio, and offering more of a solution to customers rather than just components.

The company realized quickly that its competitors had developed a significant product line addressing a wide range of requirements in the industry that could not be matched in a short period of time. However, its competitors were early participants in the radio frequency (RF)/ microwave (MW) market in which Agilent had tremendous expertise from decades of experience as a leader with traditional box instruments. This space presented Agilent the best opportunity for market penetration. The first part of its growth strategy in the PXI instrumentation market focused on using its core competencies in the RF, MW and high-speed digital space. The company introduced a number of products targeting this space in late 2009 and 2010, when it decided to more actively pursue the PXI instrumentation market. The number of Agilent modular products has doubled since 2009, reaching over 100, with a significant number of them being PXI products. While the company initially used partners to help it enter the market by introducing a large number of products at once, Agilent has now shifted to more organic means to further develop its PXI product portfolio. To this end, the company has been investing a higher proportion of its R&D investments in modular solutions. It now has an entire division focused on modular products and uses the expertise of its traditional box divisions in signal analyzers, network analyzers and other such instruments to develop its PXI offering. The designs of its PXI vector signal analyzers (VSA) and vector signal generators (VSG), for example, are based on the designs of its box instruments, enabling the company to go to market quickly with products of high quality. Agilent leverages its application software across product lines (box, modular, handhelds) to achieve faster time to market for its products, providing customers with measurement science consistency between Agilent's box offering and its modular solutions. The company is able to deliver the same measurement results across these different form factors, as well as across the product development lifecycle. As the only company with a significant play in box instrumentation, and now modular instrumentation, Agilent benefits from a key competitive advantage over other participants in the automated test market.

The other key aspect of Agilent's growth strategy in the PXI instrumentation market has been to provide solutions that go beyond the broad range of modular instruments and software previously available to customers. These solutions, called Reference Solutions, are a combination of hardware, software, and measurement expertise that delivers the essential components of a test system. Reference Solutions also include utilities such as example program source code, and are optimized for specific applications, which help users maximize the use of their test systems. Reference Solutions enable the quick evaluation of a test solution for specific applications, and dramatically reduce the amount of time it takes to integrate a new test system into a test environment.

Although the PXI instrumentation market has grown significantly since its inception, the ease of integration of traditional test systems has reined in the adoption of PXI test systems. It is typically more complex to integrate a PXI system than a traditional rack-and-stack system. There is a learning curve associated with the initial implementation of a PXI system, the need for a specialized interface between the controller and the chassis, and the need to integrate software drivers. Many customers, especially those in fast-changing markets such as wireless communications, are not interested in spending time engineering a system. By offering Reference Solutions, Agilent is saving customers a significant amount of time.

Ownership Experience

Reference Solutions are based on PXI, consist of hardware and software, and solve a particular test issue, such as transceiver testing or power amplifier test. While they are not complete solutions, they provide customers a starting point, saving them a considerable amount of time in a PXI test system integration, which is very valuable to many customers who cannot afford to spend time engineering a test system.

Offering the building blocks and software as a configuration significantly enhances the ownership experience for PXI products. However, partners, overall, play a significant role with modular instrumentation due to the complexity associated with configuring, installing and integrating a PXI system into a production line. Therefore, Agilent is also building a global network of partners to help it deliver complete solutions to customers. The company strives to keep its solution development environment as open as possible from both a hardware and a software perspective, allowing integration with products from other companies and multiple programming languages. The end goal is to enable its partners to solve customers' problems.

Another key and very valuable aspect of Agilent's PXI offering, in terms of user experience, is the measurement science consistency between its box instrumentation and its modular offering. As a leader in box instrumentation for RF/MW test cases, the company uses its expertise to provide the same measurement results from its modular products as is available from its box instruments. It leverages technologies as well as software across the different form factors, enhancing the customer experience with its products. The VSA/G solution, for example, is a PXI-based transceiver test solution that

runs the same application software that runs on Agilent's X-Series signal analyzers and MXG signal generators. Using the same application software on its modular products as its box instruments saves customers time when they switch from one form factor to the other as the customer might otherwise have to develop a lot of the software himself with a PXI solution. Measurement science consistency between Agilent's box instruments and modular products facilitates the transition from one form factor to the other as products move down the product lifecycle, which is of great value to customers because box instruments remain prevalent in the R&D environment, while modular instruments have seen much of their success in manufacturing applications.

Above-market Growth

The PXI instrumentation market is perhaps the fastest-growing segment of the test and measurement industry, typically witnessing double-digit growth on an annual basis. Agilent was estimated to hold less than 5% of the total market revenues in 2010. In 2013, Frost & Sullivan research indicates that Agilent held 13.3% of the total market revenues. In the span of three years, the company has been able to almost triple its market share by revenue. Although one could argue the company started from a low base, there is no denying that the company has witnessed tremendous growth over the past three years, much higher than any other company in the PXI instrumentation industry.

Products that have driven the company's performance in the PXI instrumentation market include the M9391A Vector Signal Analyzer (VSA) and the M9381A Vector Signal Generator (VSG) that were later sold together as a transceiver test solution called VSA/G RF device PXI test solution. The company has been able to leverage its existing sales infrastructure, historically the leader in the traditional RF/MW test equipment market, as the sales growth engine of its modular product operation.

Increased Share of Wallet

Modular instrumentation has become a very attractive test solution due to the benefits offered by its small footprint, high throughput, and multi-channel test capabilities. With the introduction of its modular offering, Agilent has retained customers who might otherwise have had to change suppliers in order to adopt a modular test system.

In addition, the company has benefited from the emergence of new customers as a result its modular product offering. As an example, customers performing research on non-standard wireless technologies approached the company to build solutions that would enable them to download their waveforms into the test system and perform a test. These customers, who are in both the aerospace and defense and wireless communications end markets, see the benefits of Agilent's modular building blocks that they can use with Agilent software to build unique solutions.

Growth Sustainability

Agilent is continuing to make significant investments to introduce innovative PXI solutions

that will benefit its target markets- RF, microwave, and high speed digital test. Products expected to drive its performance in the market moving forward include the recently introduced RF power amplifier manufacturing Reference Solution, the newly introduced M9393A PXIe performance microwave signal analyzer, the M9037A PXIe controller, and the EXM wireless test set introduced in late 2013, which is a PXI-based one-box tester for wireless device testing.

From an application perspective, Agilent intends to provide PXI solutions across the product development lifecycle, including R&D, design validation, and manufacturing. The company has witnessed success in MIMO applications, with its PXI offering used by R&D customers for early antennae design. These customers find the PXI platform attractive mainly due to the nature of the device, as multi-channel synchronization coherency is more easily achieved with the PXI bus, due to module-to-module direct communication. Another attractive aspect of the platform in R&D applications is the smaller footprint, as the solution consists of a couple of mainframes, while with traditional box instrumentation, customers would have to stack numerous box instruments. Regarding design validation applications, Agilent is working closely with its Advanced Design Software (ADS) team to develop simulation tools. Agilent also intends to put a lot of its development efforts into speeding up manufacturing application measurements, in terms of both hardware and software. The company strives to be on the leading edge of speed. Its power amplifier test Reference Solution is an example of this endeavor, as it has been optimized for speed. Manufacturing applications represent the largest chunk of the market revenues for PXI instrumentation in electronic test applications today and that will continue to be the case into the foreseeable future. They are expected to be a significant revenue contributor to the growth of Agilent in the PXI instrumentation market over the next 5-7 years, notably due to the EXM wireless test set. Agilent is a historical leader in one-box testers for mobile phone testing. With the new EXM platform intended to replace Agilent's legacy one-box testers, the growth of Agilent's PXI business is expected to get a huge boost.

Product/Service Value

Across the board, Agilent is known for providing high quality products, which plays heavily into the company's value proposition overall and will be a key element of its success in the PXI instrumentation market as well. As previously mentioned, another key aspect of Agilent's value proposition for the PXI market is its offering of Reference Solutions, which enable quick evaluation of a test solution for specific applications and dramatically reduce the amount of time it takes to integrate a new test system into a test environment. A third aspect of note is Agilent's measurement science consistency across the product development lifecycle and across form factors.

The company has utilized its decades of experience in the traditional box instrument and software market for RF/MW test and measurement equipment to deliver modular hardware and related software that provide the same measurement results as its box instruments. The designs of its VSA and VSG products leverage technologies developed for its box instruments. For example, the company's latest PXI microwave signal analyzer,

introduced in March 2014, the M9393A, also uses the technologies from its box instruments to achieve breakthrough performance in terms of switching speed and amplitude accuracy, among other specifications. It is based on new solid-state technologies and algorithms that allow it to switch at 150 µseconds.

Agilent PXI products offer pricing that is comparable to the prices of its box instruments. The company is also price competitive with other competing PXI offerings.

Conclusion

Over the past three years, Agilent Technologies has made great strides in the global PXI instrumentation market for electronic test applications, nearly tripling its market share by revenue. The company was able to identify growth opportunities for itself for which it could leverage its core competencies in RF/MW test equipment. In addition, Agilent capitalized on the demand for Reference Solutions from customers in the fastest-growing segment of the market – RF wireless. Its expertise in RF/MW test equipment, the development of its Reference Solutions portfolio, and the introduction of innovative products as a result of significant investments being made in modular product development, is expected to further fuel the growth of the company's PXI business in the foreseeable future. As a result of the aforementioned factors, Agilent is deemed the worthy recipient of the 2014 Growth Excellence Leadership Award in the PXI Instrumentation market.

Significance of Growth Excellence Leadership

Growth Excellence Leadership is about inspiring customers to purchase from your company, and then to return time and again. In a sense, then, everything is truly about the customer, and making those customers happy is the cornerstone of any long-term successful growth strategy. Companies that truly excel in Growth Excellence Leadership are best-in-class in three key areas: meeting customer demand, fostering brand loyalty, and carving out a unique, sustainable market niche. This three-fold approach to growth excellence is explored further below.



Defining Growth Excellence Leadership

As discussed on the previous page, customer demand, company brand, and market differentiation all play a critical role in achieving Growth Excellence Leadership. This three-fold focus lays a foundation for companies to focus on the most critical activity of all: delivering unique value to customers. Companies that creatively and profitably deliver value to customers ultimately set up their businesses for long-term, rapid growth.

Frost & Sullivan's Global Research Platform

Frost & Sullivan maintains more than 50 years in business and is a global research organization of 1,800 analysts and consultants who monitor more than 300 industries and 250,000 companies. The Company's research philosophy originates with the CEO's 360 Degree Perspective, a holistic research methodology that encourages us to consider growth challenges, and the solutions companies employ to solve them, from every angle. This unique approach enables us to determine how best-in-class companies worldwide manage growth, innovation and leadership. Based on the results of our research in Growth Excellence Leadership, Frost & Sullivan is proud to present the 2014 Global Growth Excellence Leadership Award in PXI instrumentation to Agilent Technologies.

Key Benchmarking Criteria

For the Growth Excellence Leadership Award, we evaluated the total client experience and growth success according to the criteria detailed below.

Customer Value Excellence

- Criterion 1: Total Customer Experience
- Criterion 2: Product/Service Value
- Criterion 3: Purchase Experience
- Criterion 4: Ownership Experience
- Criterion 5: Service Experience

Growth Success

- Criterion 1: Above-Market Growth
- Criterion 2: Increased Share of Wallet
- Criterion 3: Growth Strategy Excellence
- Criterion 4: Growth Diversification
- Criterion 5: Growth Sustainability

The Intersection between 360-Degree Research and Best Practices Awards

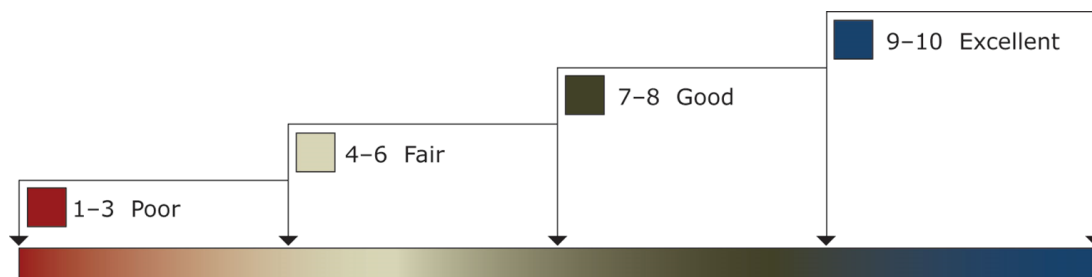
Research Methodology

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 players and for identifying those performing at best-in-class levels.



Decision Support Scorecard and Matrix

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard and Matrix. This analytical tool compares companies' performance relative to each other. It features criteria unique to each award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the associated importance of each criterion according to Frost & Sullivan. This tool allows our research and consulting teams to objectively analyze performance, according to each criterion, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are illustrated below.



Best Practice Award Analysis for Agilent Technologies

Decision Support Scorecard: Customer Value Excellence

The Decision Support Scorecard, shown below, includes all performance criteria listed and illustrates the relative importance of each criterion and the ratings for each company under evaluation for the Growth Excellence Leadership Award. The research team confirms the veracity of the model by ensuring that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

Finally, to remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players in as Company 2 and Company 3.

DECISION SUPPORT SCORECARD FOR GROWTH EXCELLENCE LEADERSHIP AWARD (ILLUSTRATIVE): CUSTOMER VALUE EXCELLENCE

Measurement of 1-10 (1 = poor; 10 = excellent)	Award Criteria					
	Total Customer Experience	Product/Service Value	Purchase Experience	Ownership Experience	Service Experience	Weighted Rating
Customer Value Excellence						
Relative Weight (%)	20%	20%	20%	20%	20%	100%
Agilent Technologies	9.0	9.0	9.0	8.0	9.0	8.8
Company 2	9.0	9.0	9.0	8.0	9.0	8.8
Company 3	8.0	8.0	8.0	7.0	8.0	7.8

Criterion 1: Total Customer Experience

Requirement: Customers receive exceptional impression at every stage of the purchase cycle

Criterion 2: Product/Service Value

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

Criterion 3: Purchase Experience

Requirement: It is as simple for salespeople to sell the product or service as it is for the customer to buy the product or service

Criterion 4: Ownership Experience

Requirement: Customers are proud to own and use the company's product or service

Criterion 5: Service Experience

Requirement: Customer service is accessible, fast, and stress-free

Decision Support Scorecard: Growth Success

DECISION SUPPORT SCORECARD FOR GROWTH EXCELLENCE LEADERSHIP AWARD
(ILLUSTRATIVE): GROWTH SUCCESS

Measurement of 1-10 (1 = poor; 10 = excellent)	Award Criteria					
Growth Success	Above-Market Growth	Increased Share of Wallet	Growth Strategy Excellence	Growth Diversification	Growth Sustainability	Weighted Rating
Relative Weight (%)	20%	20%	20%	20%	20%	100%
Agilent Technologies	10.0	9.0	10.0	9.0	9.0	9.4
Company 2	9.0	9.0	10.0	9.0	9.0	9.2
Company 3	6.0	8.0	7.0	6.0	6.0	6.6

Criterion 1: Above-Market Growth

Requirement: Company's growth rate exceeds the industry's year-over-year growth rate

Criterion 2: Increased Share of Wallet

Requirement: Customers allocate a greater percentage of their total spend to purchasing products or services produced by the company

Criterion 3: Growth Strategy Excellence

Requirement: Executive team has a shared vision for the organization's future growth, and has designed processes that support the efficient and consistent implementation of that vision

Criterion 4: Growth Diversification

Requirements: Company pursues organic and inorganic growth opportunities, company maintains a multi-front search for growth, equally able to pursue organic (e.g., distribution channel optimization, new product innovation) or inorganic (e.g., acquisitions, partnerships) opportunities whenever they suit the long-term interests of the organization

Criterion 5: Growth Sustainability

Requirement: Company has consistently sought out opportunities for new growth, enabling the organization to build on its base, with no lost ground, year over year

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which are not yet operating at best-in-class levels.



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

Our awards team follows a team 10-step process (illustrated below) to evaluate award candidates and assess their fit with our best practice criteria. The reputation and integrity of our awards process 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	• 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	• Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates	Matrix positioning all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	• 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	• 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	• 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	• 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	• Perform final performance benchmarking activities • Write nominations • Perform quality review	High-quality, accurate, and creative presentation of nominees' successes
8 Assemble board of advisors	Finalize the selection of the best-practice award recipient	• Present candidates to a Board of Advisors • Build consensus • Select winner	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform award recipient of award recognition	• 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	Share award news with stakeholders and customers	• 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

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 almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.