FROST & SULLIVAN

BEST PRACTICES

2026 SOUTH KOREAN WEB APPLICATION FIREWALL COMPANY OF THE YEAR

Penta SECURITY

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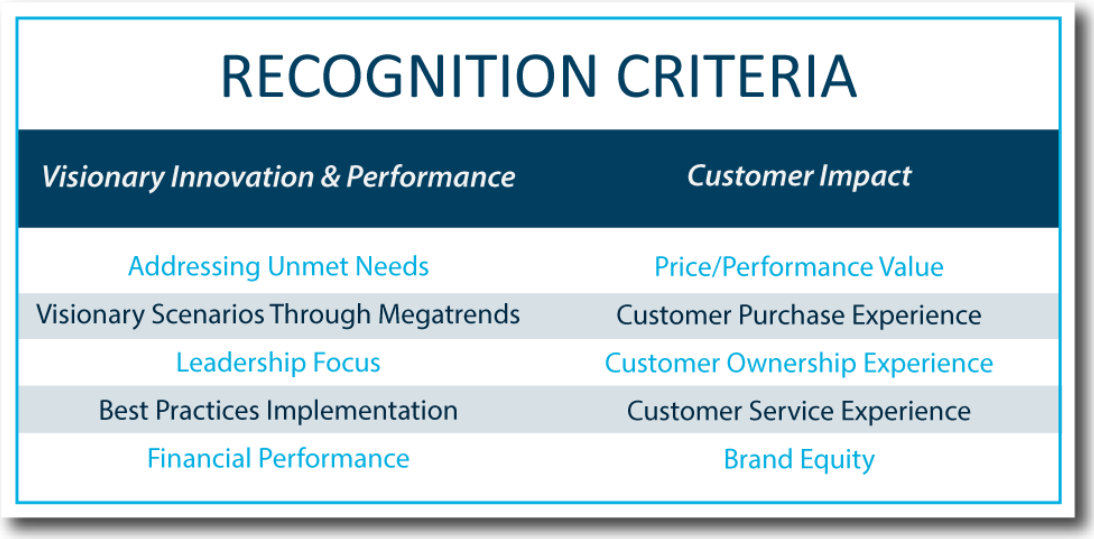
Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each recognition category before determining the final recognition recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Penta Security excels in many of the criteria in the web application firewall space.



The Transformation of the South Korea Web Application Firewall Industry

The South Korean web application firewall (WAF) market continues to evolve as cyberthreats become increasingly sophisticated and organizations accelerate digital transformation initiatives. The widespread adoption of cloud computing, application programming interfaces (APIs), microservices architectures, and distributed workloads has significantly expanded the attack surface, creating new opportunities for threat actors to exploit vulnerabilities across modern application environments. As organizations increasingly rely on digital banking, e-commerce platforms, public digital services, and cloud-native applications, securing web applications and APIs has become a strategic priority.

Traditional signature- and pattern-based security approaches are proving less effective against emerging threats. While conventional WAF solutions remain capable of mitigating known vulnerabilities such as structured query language injection and cross-site scripting, they often struggle to detect sophisticated bot activity, API abuse, application-layer distributed denial-of-service (DDoS) attacks, and previously unknown threats. API security has emerged as a particularly critical concern as abnormal call behaviors, authentication anomalies, and increasingly complex attack patterns challenge conventional detection methodologies.

As a result, organizations across government, financial services, healthcare, retail, and technology sectors are prioritizing more adaptive and intelligence-driven security strategies. The competitive landscape includes established providers such as Penta Security that continue to enhance their capabilities to address evolving security requirements and changing deployment preferences.

Several trends are reshaping the industry. Organizations increasingly seek web application and API protection (WAAP) platforms that integrate WAF, API security, bot mitigation, and DDoS mitigation within a unified architecture. At the same time, artificial intelligence (AI) and machine learning (ML) technologies are becoming important differentiators as enterprises look to improve threat detection accuracy, strengthen behavioral analysis, automate policy management, and reduce false positives. Cloud-delivered and software-as-a-service (SaaS) security models are also gaining traction as organizations prioritize scalability, deployment flexibility, and operational simplicity while maintaining continuous protection across hybrid and cloud-native environments.

Despite favorable growth conditions, the market faces several challenges. Organizations must secure increasingly complex hybrid and multi-cloud environments while defending against evolving application-layer threats and expanding API attack surfaces. Security teams also face pressure from cybersecurity talent shortages, integration challenges, and the need to balance security effectiveness with application performance and user experience.

Looking ahead, the market presents significant opportunities driven by continued cloud adoption, expanding API ecosystems, and increasingly stringent cybersecurity and data protection requirements across South Korea. Regulatory frameworks such as the Personal Information Protection Act, Information Security Management System-Personal Information, and Common Criteria Certification continue to encourage organizations to strengthen application security controls and adopt certified security solutions. In addition, government-led initiatives, including the National Cybersecurity Basic Plan and the National Protection Profile for Web Application Firewalls, are elevating security standards across public and financial sectors and reinforcing the importance of advanced application-layer protection. These developments, coupled with growing demand for intelligent and automated security solutions, are creating favorable conditions for market expansion. Vendors that successfully combine cloud readiness, AI-enhanced threat detection, regulatory compliance capabilities, and comprehensive application protection will remain well positioned to capitalize on South Korea's evolving cybersecurity landscape.

> *"Frost & Sullivan recognizes Penta Security's deep technical expertise and innovation strategy as a deliberate response to the growing complexity of modern application environments. These capabilities enable organizations to respond quickly to emerging risks and maintain resilient digital operations in increasingly dynamic digital ecosystems."*
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> ***- Nur Juliana Jusoh***
> ***Best Practices Research Analyst***

Securing Modern Application Environments Through Innovation and Operational Excellence

Founded in 1997 and headquartered in Seoul, South Korea, Penta Security has established itself as a leading provider of web application security solutions in the domestic cybersecurity market. The company addresses critical security challenges arising from the rapid adoption of cloud-native architectures, API-driven services, and distributed application environments. As organizations modernize their digital infrastructure, conventional WAF technologies often struggle to secure increasingly complex attack surfaces. Traditional signature-based solutions primarily detect known threats and offer limited protection against sophisticated or rapidly evolving attack techniques.

Since the launch of WAPPLES in 2005, Penta Security continues to leverage its WAF technology. Its proprietary Contents Classification and Evaluation Processing (COCEPTM) engine is leveraged to analyze intent using logical and semantic analysis. Rather than relying solely on predefined signatures, COCEP evaluates the context and behavior of web requests to determine malicious intent. This approach enables the platform to detect advanced web application attacks while significantly reducing false positives. As organizations expand their use of APIs and cloud-native applications, the company's logic-based detection methodology provides stronger protection against emerging threats that conventional technologies frequently miss.

In 2025, Penta Security strengthened its technology capabilities through major updates, including AI-based traffic analysis that classifies normal and abnormal behavior patterns, significantly improving detection precision. Additionally, WAPPLES was optimized for encrypted traffic environments by enhancing hypertext transfer protocol secure (HTTPS) processing performance, which accounts for the vast majority of web traffic, and supporting the latest web and security protocols such as transport layer security 1.3 and HTTP version 2. These enhancements enable organizations to maintain effective security controls without compromising application performance. The company also recently introduced a Pre-Policy Testing capability that allows customers to validate security policies before deployment. This feature reduces configuration risks, minimizes operational disruption, and helps organizations prevent security gaps before they affect production environments.

By combining real-time traffic analysis, log monitoring, and anomaly detection, the company develops optimized security policies that align with specific system architectures, minimizing operational complexity and enhancing overall security effectiveness. Frost & Sullivan recognizes Penta Security's deep technical expertise and innovation strategy as a deliberate response to the growing complexity of modern application environments. These capabilities enable organizations to respond quickly to emerging risks and maintain resilient digital operations in increasingly dynamic digital ecosystems.

Aligning Cybersecurity Innovation with Emerging Digital Transformation Trends

Penta Security demonstrates a strong ability to anticipate technology shifts and align its strategy with long-term market trends. The company recognized early that the traditional WAF market was evolving toward broader WAAP platforms as organizations expanded their reliance on APIs, cloud services, and distributed application architectures.

To capitalize on this transformation, Penta Security expanded its security capabilities beyond conventional web protection and increased its focus on API security. This strategic direction positions the company to address growing concerns surrounding API abuse, authentication vulnerabilities, and application-layer attacks. By aligning its roadmap with future security requirements, Penta Security enables customers to prepare for increasingly complex threat environments.

The company also aligns its strategy with South Korea's accelerating cloud adoption initiatives. Government agencies and enterprises continue to migrate workloads to cloud environments, creating demand for security solutions that operate seamlessly across modern infrastructure. Penta Security responded by expanding software-based deployment models and developing solutions optimized for

containerized and Kubernetes-based environments. These capabilities allow customers to secure cloud-native applications while maintaining operational flexibility.

Penta Security's roadmap demonstrates continued investment in future-ready capabilities with its focus shifting toward strengthening web vulnerability response and cloud-specialized features. Planned enhancements include support for Virtual Extensible Local Area Network-based environments and advanced traffic-processing architectures that improve scalability and service isolation. These developments position the company to support increasingly complex enterprise environments and large-scale digital services.

> *"Frost & Sullivan believes Penta Security's sustained revenue growth, long-standing market leadership, and customer-centric engagement model reflect a strong execution capability that extends beyond product performance. By combining trusted market credentials with lifecycle-oriented customer support, the company reinforces its competitive position and strengthens its brand as a preferred cybersecurity partner in South Korea."*
>
> ***- Ying Ting Neoh***
> ***Industry Analyst***

The company strengthens its competitive position through continuous investment in AI and ML, embedding intelligent capabilities across its WAF portfolio. Penta Security has developed an internal ML infrastructure that analyzes traffic patterns by classifying data into normal and abnormal behaviors, enabling continuous refinement of its logic-based detection engine. This approach enhances detection accuracy and improves operational intelligence.

In addition, the WAF incorporates self-diagnostic capabilities designed to continuously monitor system conditions and maintain a stable operating environment. By collecting anomaly data generated during these self-monitoring processes, Penta Security further improves its diagnostic functions, enabling customers to identify irregularities early and respond proactively. Through this continuous cycle of data collection, analysis, and learning, the company enhances both detection precision and operational resilience, delivering a more reliable and secure environment. Penta Security complements its technical capabilities with strong price and performance value. The company offers appliance-based, cloud-based, and SaaS deployment options, allowing customers to select the model that best aligns with operational requirements and budget objectives. This flexibility enables organizations to optimize security investments without sacrificing functionality or scalability.

Frost & Sullivan recognizes Penta Security's ability to align its technology roadmap with the long-term evolution of cloud-native computing, API-driven services, and AI-enabled cybersecurity. By anticipating market transitions and delivering flexible deployment models, the company strengthens its relevance in emerging security architectures while maximizing value for customers across diverse operating environments.

Elevating Customer Satisfaction Through Best Practices and Exceptional Customer Support

Penta Security maintains a strong customer-centric approach by aligning its web application security solutions with evolving operational requirements, industry regulations, and South Korea's accelerating cloud transformation initiatives. As the government promotes public cloud adoption through frameworks

such as K-PaaS, organizations increasingly require flexible and scalable security solutions that can seamlessly operate across diverse IT environments. Penta Security's flagship solution, WAPPLES, supports multiple deployment models, including appliance and software-based, and Penta Security's flagship SaaS solution, Cloudbric, supports SaaS environments, allowing customers to adopt the most appropriate architecture for on-premises, hybrid, or multi-cloud infrastructures.

Beyond deployment flexibility, Penta Security enhances customer experience by delivering a comprehensive product lifecycle approach. Since 2025, Penta Security differentiates itself in the South Korean market by positioning its WAF as a comprehensive product lifecycle solution, extending beyond a standalone security offering to cover the entire customer journey from purchase through ongoing operations and optimization. At the pre-deployment stage, the company conducts in-depth assessments of each customer's infrastructure and service requirements to design optimal security architecture. This consultative approach ensures that customers can implement solutions that align closely with their operational and performance needs.

Penta Security further reinforces customer trust through robust support services, including real-time monitoring, rapid incident response, and structured technical assistance. These capabilities enable organizations to swiftly detect and respond to anomalies, ensuring system stability and minimizing service disruptions, which is critical for high-reliability sectors such as government and financial services.

A key differentiator lies in Penta Security's commitment to quality assurance and product reliability. Penta Security supports product excellence through a structured product release process that integrates planning, development, quality assurance, and engineering teams. The company aligns all stakeholders early in the development cycle, ensuring that product enhancements align with customer requirements and strategic objectives. Development teams conduct systematic design, development, unit testing, and integration testing activities before releasing beta versions.

The company further reinforces quality through rigorous validation procedures. Quality assurance teams establish detailed testing criteria and execute main testing and regression testing to verify functionality, stability, and performance. Following technical validation, engineering teams conduct General Availability verification to evaluate usability and operational effectiveness within real-world environments. This layered approach enables Penta Security to identify and resolve issues, such as functional defects, performance degradation, security vulnerabilities and deployment errors in advance before deployment, reducing the need for post-deployment support and maintenance.

The company's disciplined development framework delivers tangible benefits to customers. Customers experience greater operational stability, reduced maintenance requirements, and improved reliability across production environments. These advantages have contributed to strong adoption among enterprise and public-sector customers that require highly dependable security infrastructure, reflecting high levels of satisfaction and long-term trust. The company further enhances customer value through numerous certifications that validate product quality, security, and operational excellence. Certifications such as Payment Card Industry Data Security Standard, Common Criteria for Information Technology Security Evaluation, Good Software Certification, Internet Protocol Version 6 Ready, International Organization for Standardization (ISO) 9001 for quality management systems, and ISO 14001 for environmental management systems provide customers with independent assurance of product

reliability. Combined with multiple domestic and international industry awards, these achievements reinforce Penta Security's technological leadership across oth appliance-based and cloud-based WAF solutions as well as its credibility to deliver strong value relative to competing solutions.

Penta Security's commitment to customer success and operational excellence has translated into strong commercial performance and sustained market leadership. In 2025, the company achieved 14.7% year-over-year revenue growth in its WAF business, with total revenue increasing from KRW 33.2 billion in 2024 to KRW 38.1 billion in 2025[1]. This performance reflects growing customer adoption of the company's security solutions and its ability to address evolving application security requirements. Penta Security has also maintained the No. 1 average annual procurement market share in South Korea's WAF market for 18 consecutive years, underscoring its strong reputation among public-sector organizations and reinforcing customer confidence in its technology, reliability, and service capabilities. Furthermore, the company has established a broad customer base across government, financial services, and enterprise sectors, demonstrating its ability to support diverse security requirements in mission-critical environments.

Frost & Sullivan believes Penta Security's sustained revenue growth, long-standing market leadership, and customer-centric engagement model reflect a strong execution capability that extends beyond product performance. By combining trusted market credentials with lifecycle-oriented customer support, the company reinforces its competitive position and strengthens its brand as a preferred cybersecurity partner in South Korea.

Conclusion

Penta Security exemplifies the qualities that define market leadership in today's rapidly evolving cybersecurity landscape. The company combines advanced technological capabilities, forward-looking strategic direction, and a strong commitment to customer success to create a compelling competitive advantage. Through continuous innovation, effective market execution, and sustained investment in product excellence, Penta Security has strengthened its position as a trusted security partner for organizations across South Korea. Its ability to address emerging security challenges while delivering operational value has reinforced customer confidence and market relevance. Supported by strong commercial performance and a respected industry reputation, the company continues to raise the standard for web application security.

With its strong overall performance, Penta Security earns Frost & Sullivan's 2026 South Korea Company of the Year Recognition in the web application firewall industry.

[1] Frost and Sullivan Discussion with Penta Security (May 2026)

What You Need to Know about the Company of the Year Recognition

Frost & Sullivan's Company of the Year Recognition is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

Best Practices Recognition Analysis

For the Company of the Year Recognition, Frost & Sullivan analysts independently evaluated the criteria listed below.

Visionary Innovation & Performance

Addressing Unmet Needs: Customers' unmet or under-served needs are unearthed and addressed to create growth opportunities across the entire value chain

Visionary Scenarios Through Megatrends: Long-range scenarios are incorporated into the innovation strategy by leveraging megatrends and cutting-edge technologies, thereby accelerating the transformational growth journey

Leadership Focus: The company focuses on building a leadership position in core markets to create stiff barriers to entry for new competitors and enhance its future growth potential

Best Practices Implementation: Best-in-class implementation is characterized by processes, tools, or activities that generate consistent, repeatable, and scalable success

Financial Performance: Strong overall business performance is achieved by striking the optimal balance between investing in revenue growth and maximizing operating margin

Customer Impact

Price/Performance Value: Products or services offer the best ROI and superior value compared to similar market offerings

Customer Purchase Experience: Purchase experience with minimal friction and high transparency assures customers that they are buying the optimal solution to address both their needs and constraints

Customer Ownership Excellence: Products and solutions evolve continuously in sync with the customers' own growth journeys, engendering pride of ownership and enhanced customer experience

Customer Service Experience: Customer service is readily accessible and stress-free, and delivered with high quality, high availability, and fast response time

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty, which is regularly measured and confirmed through a high Net Promoter Score®

Best Practices Recognition Analytics Methodology

Inspire the World to Support True Leaders

This long-term process spans 12 months, beginning with the prioritization of the sector. It involves a rigorous approach that includes comprehensive scanning and analytics to identify key best practice trends. A dedicated team of analysts, advisors, coaches, and experts collaborates closely, ensuring thorough review and input. The goal is to maximize the company's long-term value by leveraging unique perspectives to support each Best Practice Recognition and identify meaningful transformation and impact.

		VALUE IMPACT	
STEP		WHAT	WHY
1	**Opportunity Universe**	Identify Sectors with the Greatest Impact on the Global Economy	Value to Economic Development
2	**Transformational Model**	Analyze Strategic Imperatives That Drive Transformation	Understand and Create a Winning Strategy
3	**Ecosystem**	Map Critical Value Chains	Comprehensive Community that Shapes the Sector
4	**Growth Generator**	Data Foundation That Provides Decision Support System	Spark Opportunities and Accelerate Decision-making
5	**Growth Opportunities**	Identify Opportunities Generated by Companies	Drive the Transformation of the Industry
6	**Frost Radar**	Benchmark Companies on Future Growth Potential	Identify Most Powerful Companies to Action
7	**Best Practices**	Identify Companies Achieving Best Practices in All Critical Perspectives	Inspire the World
8	**Companies to Action**	Tell Your Story to the World (BICEP*)	Ecosystem Community Supporting Future Success

*Board of Directors, Investors, Customers, Employees, Partners

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 Generator™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fueled 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 6 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:

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