WALAILAK UNIVERSITY

SDG REPORT 2025-2026



Times Higher Education Sustainability Impact Ratings 2026

SUSTAINABLE DEVELOPMENT GOALS

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9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SDG 9 : INDUSTRY, INNOVATION AND INFRASTRUCTURE

STRENGTHENING RESEARCH IMPACT THROUGH INTELLECTUAL PROPERTY AND INNOVATION DEVELOPMENT



WU promotes the relevance of university research to society and industry by supporting the transformation of research findings and knowledge into intellectual property, innovation, and commercial applications. Through the Science and Technology Park, the university provides researchers, startups, and innovation-driven entrepreneurs, particularly those working with Deep Tech, with access to intellectual property protection processes, patent and petty patent guidance, funding opportunities, and legal knowledge. Besides, the university develops partnerships with the Department of Intellectual Property to strengthen pathways from research and innovation to practical applications.

The university continuously diagnoses the potential of research outputs with commercial and societal relevance and provides support for researchers to develop their research into protectable intellectual property and innovative products. This process involves engagement among researchers, students, entrepreneurs, industry partners, and external agencies, creating opportunities to exchange knowledge, develop prototypes, and move research beyond the academic environment toward practical and commercial applications.



Since 2021, WU has achieved 77 registered intellectual property works, including 17 new petty patents registered in 2025. These intellectual property outputs originated from the university's 16 academic schools, spanning a diverse range of fields, including food and food processing, pharmaceuticals and cosmeceuticals, herbal products, science and medical science, biotechnology, architecture and design, agriculture and agricultural technology, fisheries, and other disciplines. These achievements demonstrate the university's capacity to transform multidisciplinary research into practical innovations that contribute to industrial development and societal well-being. The breadth of these outputs demonstrates the university's capacity to translate research from multiple disciplines into innovations with potential value for society and industry.



One example is a the Rotating Star Chart for Determining Star Rise and Set Times Independent of Observer Latitude. It is a Petty Patent in astronomy designed for worldwide use, regardless of the observer's geographical location. The device consists of a double-sided rotating star chart made from circular cardboard, displaying the horizon coordinate system and azimuth angles, along with two transparent circular plastic sheets representing celestial objects in the equatorial coordinate system. This innovation was developed to overcome the limitations of conventional rotating star charts, which can determine star positions only at a specific observer latitude. The newly developed chart enables users to convert celestial coordinates from the equatorial coordinate system to the horizontal coordinate system, allowing them to determine the positions and rising and setting times of stars at different latitudes conveniently and accurately. It serves as a practical educational tool for teaching astronomy, astrology, and archaeoastronomy, making it suitable for upper secondary school students, university students, educators, and the general public interested in astronomy.

Another example is Nora Serum, a nanoemulsion serum developed from mangosteen and Garcinia atroviridis extracts. Based on research into natural bioactive compounds, the product demonstrated antioxidant activity, tyrosinase inhibition, and potential to reduce melanin production in skin cells. The research was further developed through clinical testing, student engagement, innovation competitions, prototype development, and regulatory registration. It received recognition including a Silver Medal at Thailand Research Expo 2020 and awards from the Walailak Entrepreneurial Ecosystem Development, Business Brotherhood, and Startup Thailand League programs. This pathway illustrates how university research can progress from scientific findings to prototypes, intellectual property, and products with potential market applications.

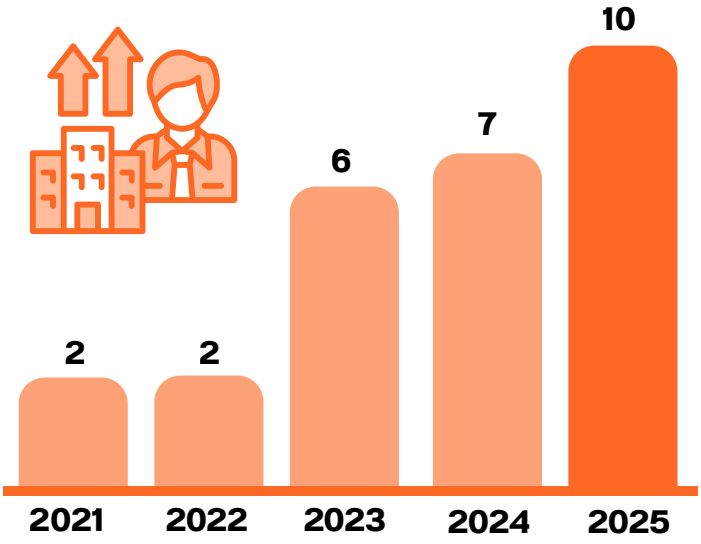


Through continuous diagnostics, development, engagement, and measurement, WU advances research into intellectual property, innovation, and commercialization, promoting industry collaboration, external application, and broader economic and societal impact.

FROM UNIVERSITY RESEARCH TO SUSTAINABLE SPIN-OFF BUSINESSES

WU actively develops an innovation ecosystem that transforms research, intellectual property, and technology into commercially viable enterprises through its Business Incubation Center under the Walailak University Science and Technology Park. The university identifies the potential of research outcomes and innovations, supports their development into products and business models, and connects researchers with industry, entrepreneurs, and communities to facilitate technology commercialization and innovation-driven entrepreneurship.

This development process has resulted in 10 university spin-off companies, defined as registered companies established to exploit intellectual property originating from within the university. The companies span the School of Science, School of Agricultural Technology and Food Industry, School of Allied Health Sciences, and School of Informatics. They include PEM Technology Co., Ltd. (2025), Walai Tricho Plus Co., Ltd. (2024), Oxakin Innotech Co., Ltd. (2023), Lakwalai Biotic Co., Ltd. (2022), Plankton WU Co., Ltd. (2021), Walai Biocontrol Co., Ltd. (2020), Mulberry AI Co., Ltd. (2020), EBSIM Co., Ltd. (2020), Baan Innov Co., Ltd. (2016), and WalaiSoft Co., Ltd. (2011).



Number of Spin-off @WU from 2021 - 2025

The university monitors the progress and sustainability of these enterprises by tracking the number of university spin-offs, their establishment dates, continued operation, and economic performance. Among the companies that have been operating for at least three years, three spin-offs generated measurable economic returns in fiscal year 2025. Together, Walai Biocontrol Co., Ltd., Lakwalai Biotic Co., Ltd., and Oxakin Innotech Co., Ltd. generated THB 10,154,992.63 in annual revenue and THB 1,491,442.92 in combined net profit. These results provide measurable evidence that university-generated knowledge and intellectual property can be translated into sustainable business activities and regional economic value.



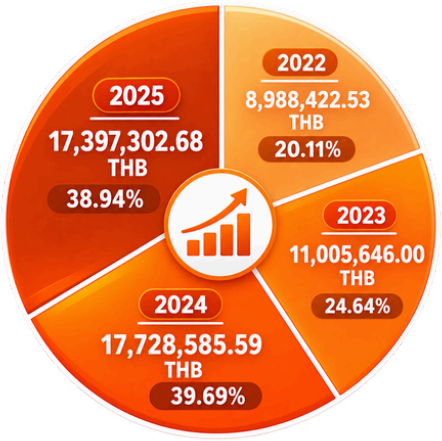


Through continuous diagnostics of research and innovation potential, development of technologies and business models, engagement with researchers, industry, entrepreneurs, and communities, and measurement of spin-off establishment, longevity, revenue, and profitability, WU strengthens the pathway from academic research to practical application. The continued operation and economic performance of its spin-off companies demonstrate the university's capacity to create innovation-based enterprises, support technology transfer, generate economic opportunities, and contribute to sustainable regional development.

STRENGTHENING RESEARCH-INDUSTRY COLLABORATION THROUGH RESEARCH COMMERCIALIZATION

WU, recognized as a Frontier Research University, strengthens the connection between university research and the needs of industry and commerce through its Science and Technology Park. The Park serves as a key mechanism for promoting science, technology, and innovation while supporting private-sector research and development (R&D). It connects researchers and experts from academia, government, and industry with businesses seeking solutions to local and industrial challenges, creating a pathway for research to generate practical and economic value.

The university continuously diagnoses research capabilities and industry needs to identify opportunities for collaboration and technology application. Researchers and external partners then develop research findings and innovations into products, technologies, and solutions that respond to real-world needs. This process is supported by active engagement among academic staff, researchers, private-sector partners, entrepreneurs, and the Science and Technology Park, enabling knowledge exchange, joint development, and the transfer of research into industrial applications.



The effectiveness of this approach is reflected in the growth of research income from industry and commerce generated through the application of innovation and research in the industrial sector. Income increased from THB 8,988,422.53 in 2022 to THB 11,005,646 in 2023, reaching THB 17,728,585.59 in 2024, before totaling THB 17,397,302.68 in 2025. Although income decreased slightly by THB 331,282.91 in 2025, it remained at a high level, demonstrating the university's continued ability to translate research and innovation into value for industry and commerce.

In 2025, the university's research income from industry and commerce by subject area was distributed across three major areas: STEM generated THB 11,368,925.71, Medicine generated THB 1,768,700, and Arts & Humanities generated THB 4,259,676.97. This distribution demonstrates that industry engagement extends beyond STEM and medical research to include knowledge and expertise from Arts and Humanities. The activities were supported by 846 academic staff, representing the university's research and teaching capacity across these subject areas.

A representative STEM innovation is the development of a rubber formulation and manufacturing process for a door-handle cover, developed by Asst. Prof. Dr. Prachid Saramolee from the School of Engineering and Technology. The innovation reduces direct contact with door-handle surfaces and helps minimize the risk of pathogen contamination. The technology can also be manufactured domestically, creating opportunities to add value to Thailand's rubber industry while addressing public-health needs.





Another example is “Bac-Tech,” an antimicrobial and wound-healing film spray, developed by researchers from the Center for Scientific and Technological Equipment with expertise from the School of Allied Health Sciences and the School of Medicine. The Science and Technology Park supported the team in advancing the innovation toward commercialization. Bac-Tech won the TED Youth Startup Championship 2025 - Southern Region and received an opportunity to join the FAST-TRACK program with THB 1.5 million in funding to further develop the innovation. This achievement demonstrates how collaboration among researchers, academic experts, and innovation-support units can transform research into market-oriented solutions.

The university measures the outcomes of these activities through research income from industry and commerce by subject area and the number of academic staff by subject area, providing both financial and capacity-based indicators of research-industry engagement. The increase in research income from 2022 to 2024, together with the 2025 income distribution across STEM, Medicine, and Arts & Humanities, provides measurable evidence of the university's ability to connect academic expertise with external demand and industrial application.

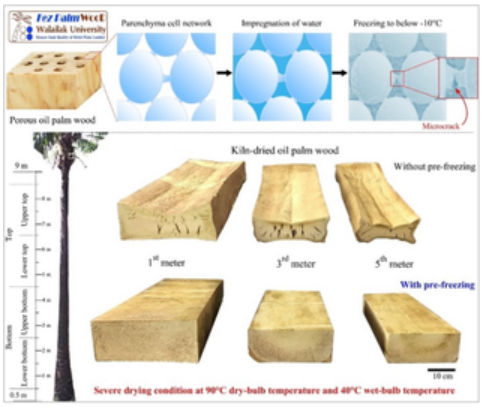
Through continuous diagnostics, development, engagement, and measurement, Walailak University strengthens the pathway from academic research to industrial application and commercial value. By connecting its 846 academic staff with industry and commerce, the university creates opportunities for multidisciplinary collaboration, technology transfer, innovation development, and research commercialization, contributing to regional economic development and strengthening the practical impact of university research.

TRANSFORMING OIL PALM WASTE INTO CREATIVE INNOVATION:ADVANCING SUSTAINABLE INDUSTRY AND COMMUNITIES

Each year, the oil palm industry in Southeast Asia continues to grow rapidly, particularly in southern Thailand, where oil palm cultivation and production capacity account for approximately 4% of the global total. However, when oil palm trees reach the end of their productive lifespan, they are often cut down and discarded or burned, generating approximately 4 million cubic metres of agricultural waste annually.

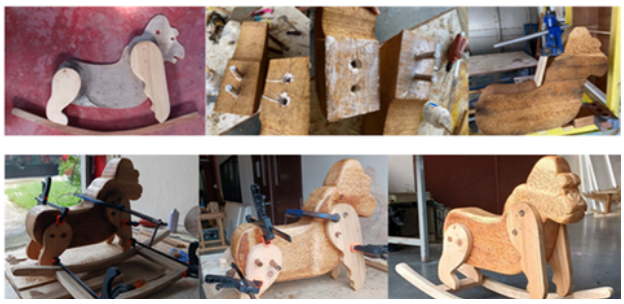
The research project “Design of an Oil Palm Wood Rocking Chair for Children Aged 3-5 Years” applies furniture design principles to transform discarded oil palm trunks into rocking chairs for children. The project provides a clear example of advancing Sustainable Development Goal 9 (SDG 9: Industry, Innovation and Infrastructure) by converting agricultural waste and residual materials into innovative, value-added products. Its contribution can be highlighted through the following dimensions.

Material and Process Innovation: Diagnostic and Development of Oil Palm Wood



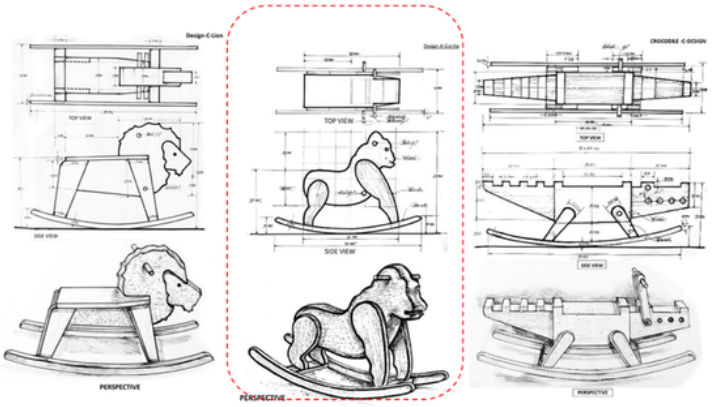
Oil palm wood has inherent structural limitations, including low density, high porosity, and a strong tendency to retain moisture, making the material susceptible to fungal growth and result in properties that are often below the standards required for furniture production. Consequently, oil palm wood has traditionally been underutilized as a furniture material. The research developed a pre-treatment process based on the diagnostic assessment of the material's structural and moisture-related limitations. The process involves injecting water into the oil palm wood, followed by freezing at temperatures below 263 Kelvin (K) to create microscopic cracks, or micro-cracks, within the wood structure. These micro-cracks facilitate rapid moisture removal during intensive drying, followed by heat treatment at an initial temperature of up to 473 K and 273 K in the final stage of the preparation process. This technology enables the wood to maintain its density without collapsing, while improving its strength and reducing moisture retention, fungal growth, and termite damage. The process represents a practical development and process innovation that can potentially be integrated directly into existing rubberwood-processing facilities.

Value Creation and Industrial Development



The development of drying and wood-treatment processes for oil palm wood has the potential to generate up to THB 30 billion in economic value annually, while increasing farmers' income and creating added value for the wood-processing industry. With a low density of approximately 200 kg/m^3 compared with 600 kg/m^3 for rubberwood, oil palm wood is lightweight; the prototype rocking chair weighs only 7.9 kg. This lightweight property can improve transportation efficiency and reduce logistics costs, demonstrating strong potential for industrial applications.

Product Standardization, Safety and Performance Measurement

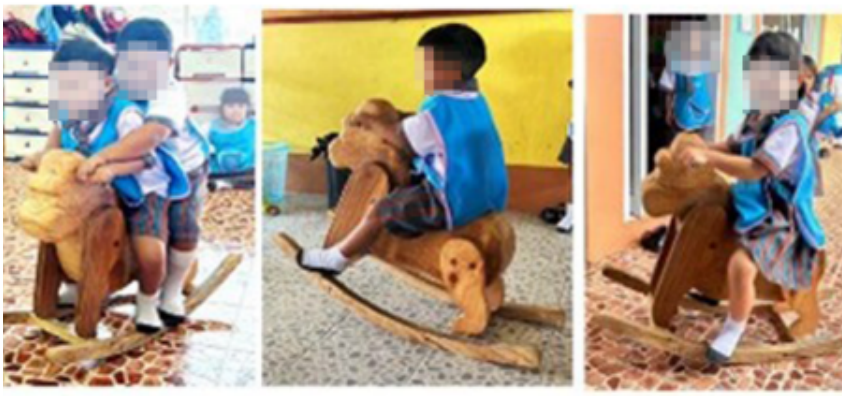


The gorilla-shaped rocking chair, made from transformed oil palm wood, was tested for strength, durability, and safety in accordance with the international ISO 8124 Toy Safety Standard and relevant Thai Industrial Standards (TIS). The product underwent static load, leg strength, and impact tests to evaluate its structural stability and overall performance. Following structural improvements after the initial impact test, the chair successfully passed all tests without structural failure.

These results demonstrate that agricultural waste and lightweight softwood can be transformed into safe, durable, and functional products that meet recognized safety standards. The standardization and performance testing also support the product's potential for industrial development, market expansion, and increased consumer confidence in sustainably produced products.

Community Engagement and Creative Industrial Development

The innovation is not limited to large-scale industrial production. The research also developed production approaches that support Industrial Craft processes within community enterprises, enabling local residents and community groups in southern Thailand to generate supplementary income beyond agricultural activities.



The approach emphasizes community engagement by making the production process accessible without requiring advanced machinery or highly complex technologies. This creates opportunities for local communities to participate in value-added manufacturing and potentially develop their products into OTOP (One Tambon One Product) enterprises.

This community-based development model demonstrates how technological innovation can be transferred from research settings to local production systems. Through engagement with community enterprises, local knowledge, craftsmanship, and modern material-processing techniques can be integrated to support inclusive and sustainable industrial development.

Furthermore, the project places emphasis on intellectual property development. Applications are currently being prepared for design patents covering three rocking-chair designs: a lion, a gorilla, and a crocodile. Protecting these designs can strengthen their commercial potential and create additional value for local oil palm wood-processing entrepreneurs.

Conclusion

This research provides a practical example of integrating materials science, ergonomic product design, industrial development, and community engagement into a single innovation pathway. By transforming agricultural waste with limited economic value into creative industrial products that meet internationally recognized safety standards, the project demonstrates how research and innovation can contribute to sustainable industrial development.

The combination of diagnostic assessment of material limitations, development of innovative processing methods, measurement of product performance, and engagement with community enterprises creates a comprehensive pathway for transforming waste into value. In this respect, the project directly supports SDG 9 by promoting innovation, sustainable industrialization, value creation, and inclusive technology development from the community level upward.