

台湾・新竹サイエンスパークの発展経験 を踏まえた熊本県の半導体産業 クラスター形成と持続可能な地域戦略

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【要約】

本稿では、台湾積体電路製造（TSMC）の熊本県における先端半導体工場、ジャパン・アドバンスト・セミコンダクター・マニュファクチャリング（JASM）建設計画を核とする半導体産業のクラスター形成に関して、台湾の新竹サイエンスパーク（HSP）の発展経験を参照にし、持続可能な地域戦略を検討する。

はじめに、JASM 計画の概要と日本政府と熊本県の支援体制を紹介し、次に HSP の成立背景、成功要因、地域への影響と課題を分析する。HSP は政府の長期戦略、産業界の活力、学术界の連携が結実した成功例であるが、一方で環境問題やインフラ逼迫といった副作用も存在する。これらを踏まえ、熊本県の初期条件と HSP との比較から、水資源の持続性、人材不足、インフラ負荷、地域波及効果の限定性といった課題を明らかにする。最後に、これらを克服し持続可能なクラスターを形成するには、長期的地域計画、先行インフラ整備、人材育成、強靱な産業エコシステム、生活環境の向上、環境との調和が不可欠であると指摘する。特に水資源管理と産業多角化が重要であり、HSP の知見を生かしつつも、熊本独自の戦略が求められる。

キーワード：半導体産業クラスター、新竹サイエンスパークモデル、産業エコシステム、持続可能な地域開発、TSMC 熊本工場

熊本縣半導體產業集群的發展策略與 其地域轉型：台灣新竹成功經驗的啓發

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【摘要】

本文探討以台積電在熊本縣設立的先端半導體工廠（JASM）為核心所推動的半導體產業聚落發展，並參照台灣新竹科學園區的發展經驗，提出熊本在地永續發展的可能策略。

首先介紹 JASM 計畫的背景與規模，以及日本中央政府與熊本縣政府所提供的政策支持體系。接著分析新竹科學園區的成立背景、發展模式、成功關鍵與對地區社會經濟的影響，指出其雖成功促進產業與經濟發展，卻也伴隨環境負荷、基礎建設壓力及社會變遷等課題。本文進一步比較熊本的初始條件與潛在挑戰，包括水資源永續性、人力資源短缺、基礎設施壓力，以及區域經濟外溢效果的限制等。最後，為因應上述課題並實現永續聚落發展，本文建議熊本需擬定長期區域規劃、強化基礎建設、人力培育與產業生態系建構，並提升生活品質與環境調和，特別強調水資源管理與產業多角化策略的重要性。

關鍵字：半導體產業聚落，新竹科學園區模式，產業生態系統，區域永續發展，台積電熊本設廠

Sustainable Development Strategies for Kumamoto's Semiconductor Industry Cluster: Insights from Taiwan's Hsinchu Experience

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【Abstract】

This paper explores the formation of a semiconductor industry cluster in Kumamoto Prefecture, Japan, centered on the construction of TSMC's advanced semiconductor plant (JASM). Drawing on the developmental experience of Taiwan's Hsinchu Science Park (HSP), the study aims to propose sustainable regional strategies for Kumamoto.

The paper first outlines the JASM project and the support frameworks provided by the Japanese government and the Kumamoto prefectural government. It then analyzes the historical context, development model, and success factors of HSP, as well as its socio-economic impacts and challenges. While HSP demonstrates a successful case driven by long-term government strategy, industrial vitality, and academic collaboration, it also reveals issues such as environmental strain, infrastructure pressure, and rapid social transformation. Building on this comparison, the paper examines the initial conditions, opportunities, and challenges faced by Kumamoto. These include water resource sustainability, workforce shortages, infrastructure stress, and limited economic spillover effects. Finally, the paper proposes strategies for creating a resilient and sustainable cluster: long-term regional planning, proactive infrastructure investment, talent development, ecosystem building,

and environmentally harmonious development. Particularly, water resource management and industrial diversification are emphasized, with strategies tailored to Kumamoto's unique context while referencing lessons from HSP.

Keywords: Semiconductor Industry Cluster, Hsinchu Science Park Model, Industrial Ecosystem, Regional Sustainable Development, TSMC Kumamoto Fab

〈参考文献〉

朝元照雄、2023「なぜ TSMC は熊本に進出するのか：熊本工場が現地にもたらした役割」『世界経済評論 IMPACT』No. 3133。

Asamoto, Teruo. 2023. “Naze TSMC wa kumamoto ni shinshutsu suru no ka: Kumamoto kojo ga genchi ni motarashita yakuwari” [Why is TSMC expanding into Kumamoto? The Role of the Kumamoto Plant in the Local Community]. *World Economic Review IMPACT*, No. 3133.

朝元照雄、2024「TSMC 熊本工場開所式の意義：日本における半導体ルネサンスの始まりか」『世界経済評論 IMPACT』No. 3340。

Asamoto, Teruo. 2024. “TSMC kumamoto kojo kaishoshiki no igi: Nihon ni okeru handotai runesansu no hajimari ka” [The Significance of the TSMC Kumamoto Plant Opening Ceremony: The Beginning of a Semiconductor Renaissance in Japan?]. *World Economic Review IMPACT*, No. 3340.

朝元照雄、2025「TSMC 熊本工場の進出による変化」『世界経済評論 IMPACT』No. 3721。

Asamoto, Teruo. 2025. “TSMC kumamoto kojo no shinshutsu ni yoru henka” [The Changes brought about by the expansion of the Kumamoto Plant of SMC]. *World Economic Review IMPACT*, No. 3721.

熊本県産業支援課、2025『くまもと半導体産業推進ビジョン』改訂版。

Industrial Support Division, Kumamoto Prefecture. 2025. “Kumamoto handotai sangyo suishin bijon” [Kumamoto Semiconductor Industry Promotion Vision]. Revised Edition.

経済産業省商務情報政策局情報産業課、2024「半導体に関する最近の政策動向について」6月。

Information Industry Division of Commerce and Information Policy Bureau, METI. 2024. “Handotai ni kansuru saikin no seisaku doko ni tsuite” [The Recent Policy Trends in the Semiconductor Industry]. June.

小中山彰、陳東瀛、2003「台湾新竹科学園區の発展に関する歴史的考察：産業クラスターに関する研究」『東海大学政治経済学部紀要』35：101-119。

Konakayama, Akira, and Tong-ying Chen. 2003. “Taiwan shinchiku kagaku enku no hatten ni kansuru rekishiteki kosatsu: Sangyo kurasuta ni kansuru kenkyu” [A Historical Study of the Development of the Hsinchu Science Park in Taiwan: A Study on Industrial Clusters]. *Journal of the Faculty of Political Science and Economics, Tokai University*, 35: 101-119.

ジャンマッテイ，グイド、ディヤナ・ジェリッチ、2023「米中ハイテク戦争：世界の覇権をめぐる戦い」『RBC ブルーベイ・アセット・マネジメント』5月。

Giammattei, Guido, and Dijana Jelic. 2023. “Beichu haiteku senso: Sekai no haken wo meguru tatakai” [The U.S.-China Tech War: A Battle for Global Hegemony]. *RBC Blue Bay Asset Management*. May.

田中麻理、谷口嘉那子、2025「復活目指す日本の半導体（前編）安定供給のため、公

- 的支援で後押し」『ジェトロ地域・分析レポート』2月19日。
- Tanaka, Mari, and Kanako Taniguchi. 2025. “Fukkatsu mezasu nihon no handotai (zenpen) ante kyokyu no tame, koteiki shien de atooshi” [Japan’s semiconductor industry seeks revival (Part 1): Public support ensures a stable supply]. *JETRO Regional and Analytical Report*. February 19.
- 肥後銀行産業イノベーション推進部半導体クラスター推進室、2025「TSMC 進出に伴う熊本県内の状況について」『財務省』、https://www.mof.go.jp/pri/research/conference/fy2024/naigai202501_2.pdf (閲覧日：2025/4/29)。
- Semiconductor Cluster Promotion Office of Industrial Innovation Promotion Department, Higo Bank. 2025. “TSMC shinshutsu ni tomonau kumamoto kennai no jokyo ni suite” [The situation in Kumamoto Prefecture following TSMC’s entry into the market]. *Ministry of Finance* (Accessed on April 29, 2025).
- 堀田祐一、2025「JASM 工場概要説明」令和7年1月27日開催、国内投資拡大のための官民連携フォーラム配布資料『内閣官房』、https://www.cas.go.jp/jp/seisaku/kokunai_toushikakudai_forum/dai6/siryou1.pdf (閲覧日：2025/4/29)。
- Hotta, Yuichi. 2025. “JASM kojo gaiyo setsumei” [Overview of the JASM Plant]. Materials from the Public-Private Partnership Forum on Increasing Domestic Investment, held on January 27, 2025 (Reiwa 7). *Cabinet Secretariat* (Accessed on April 29, 2025).
- 王仕琦、文仲瑄、朱月英、姚霞芬、2020『竹科40 突圍世界的領跑者』科技部新竹科學園區管理局。
- Wang, Shi-qi, Zhong-xuan Wen, Yue-ying Zhu, and Xia-fen Yao. 2020. “Zhuke 40 tuwei shijie de lingpao zhe” [40th Anniversary of the Hsinchu Science Park Global Pilot Technology Leader]. Hsinchu Science Park Bureau, Ministry of Science and Technology.
- 王永壯主編、2023「E 綠色園區 永續發展」『2022ESG 永續報告書』：28-55、國家科學及技術委員會新竹科學園區管理局。
- Wang, Yong-zhuang, ed. 2023. “E luse yuanqu yongxu fazhan” [E Green Park Sustainable Development]. *2022 Sustainability Report*, pp. 28-55. Hsinchu Science Park Bureau, NSTC.
- 王晴玲、2005「綠牡蠣悲歌 新竹香山海域重金屬污染」『我們的島』1月31日、<https://ourisland.pts.org.tw/content/2185> (査閲時間：2025/4/29)。
- Wang, Qing-ling. 2005. “lū muli beige xinzhū xiangshan haiyú zhongjīnshū wūrán” [The Tragedy of the Green Oyster: Heavy Metal Pollution in the Xiangshan Waters Off Hsinchu City]. *Our Island*. January 31 (Accessed on April 29, 2025).
- 朱麗芝、2015「菁英專訪：新竹科學工業園區歷35年繼續欣欣向榮—杜啟祥」『台灣玉山科技協會』、<https://www.mjtaiwan.org.tw/pages/?Ipg=1007&showPg=1481> (査閲時間：2025/4/29)。
- Zhu, Li-zhi. 2015. “Jing ying zhuanfang: Xinzhu kexue gongye yuanqu li 35 nian jixu xinxin xiangrong-Du qixiang” [Elite Interview: The Hsinchu Science Park continues to prosper after 35 years-Du qixiang]. *Monte Jade Science & Technology Association of Taiwan* (Accessed on April 29, 2025).

呂采穎、張禎晏、林孟慧、游博翔等、2025「氣候變遷與基礎設施韌性：臺灣半導體產業水資源與電力使用分析報告」2月、科技民主與社會研究中心。

Lu, Tsai-ying, Chen-yen Chang, Meng-hui Lin, and Bo-xiang You, et al. 2025. “Qihou bianqian yu jichu sheshi renxing: Taiwan bandaoti chanye shui ziyuan yu dianli shiyong fenxi baogao” [Climate Change and Infrastructure Resilience: A Report on Water and Electricity Usage in Taiwan’s Semiconductor Industry]. February. Research Institute for Democracy, Society and Emerging Technology.

林冠年、2023「星球都市化：新竹都會區域發展的理論初探」『建築與規劃學報』23(1, 2) : 1-31。

Lin, Gary Guan-nian. 2023. “Xingqiu dushi hua: Xinzhu duhui quyu fazhan de lilun chutan” [Planetary Urbanization: A Preliminary Research on Hsinchu Metropolitan Development]. *Journal of Architecture and Planning*, 23(1,2): 1-31.

苦勞評論、2000「豬羊變色手段真高一竹科從『廢棄物的生產者』化身為昇利公司受害人」『苦勞網』7月22日、<https://www.cooloud.org.tw/node/56656> (查閱時間：2025/4/29)。

COOLLOUD Review. 2000. “Zhu yang bianse shouduan zhen gao-zhuke cong ‘feiqiwu de shengchan zhe’ huashen wei shengli gongsi shouhai ren” [A Clever Transformation: The Hsinchu Science Park Transforms from “Waste Producer” to Victim of Shengli Corporation]. *COOLLOUD*. July 22. (Accessed on April 29, 2025).

郭及天、2023「新竹市首座社宅開工 預計2024年完工」『工商時報』2月13日、<https://www.ctee.com.tw/news/20230213700689-430601> (查閱時間：2025/4/29)。

Guo, Ji-tian. 2023. “Xinzhu shi shouzuo shezhai kaigong yuji 2024 nian wangong” [Hsinchu City’s first public housing project begins construction, expected to be completed in 2024]. *Commercial Times*. February 13 (Accessed on April 29, 2025).

張宗良、林育旨、陳文欽、吳南明等、2012「新竹科學園區異味特性調查」2012年兩岸環境與能源研討會暨第一屆全球華人環境與能源研討會、新竹市：文化局。

Chang, Chung-liang, Yu-chin Lin, Wen-chin Chen, Nan-min Wu, et al. 2012. “Xinzhu kexue yuanqu yiwei texing diaozha” [Characteristics of odor in Hsinchu Science Park]. Paper presented at Cross-Strait Joint Conference on Environment and Energy in 2012 (CSEE 2012) and 1st Global Chinese Environment and Energy Symposium. Cultural Affairs Bureau, Hsinchu City.

游智文、2025「高房價受不了！首季2萬人『脫北』、園區客也驚見外移」『經濟日報』4月24日、<https://money.udn.com/money/story/5621/8695484> (查閱時間：2025/4/29)。

You, Zhi-wen. 2025. “Gao fangjia shoubuliao! Shou ji 2 wan ren ‘tuo bei’, yuanqu ke ye jing jian wai yi” [Housing prices are unbearably high! In Q1, 20,000 people fled the northern areas, and even residents of the industrial park were seen moving out]. *Economic Daily News*. April 24 (Accessed on April 29, 2025).

新竹市政府主計處、2023「新竹市及新竹科學園區營利事業銷售概況」9月、file:///

- C:/Users/User/Downloads/111%E5%B9%B4%E6%96%B0%E7%AB%B9%E5%B8%82%E5%8F%8A%E6%96%B0%E7%AB%B9%E7%A7%91%E5%AD%B8%E5%9C%92%E5%8D%80%E7%87%9F%E5%88%A9%E4%BA%8B%E6%A5%AD%E9%8A%B7%E5%94%AE%E6%A6%82%E6%B3%81_1120918%E5%AE%9A%E7%A8%BF. pdf (査閲時間：2025/4/29)。
- Department of Budget, Accounting and Statistics, Hsinchu City Government. 2023. “Xinzhushiji xinzhukexue yuanqu yingli shiye xiaoshou gaikuang” [Sales Overview of Profitable Enterprises in Hsinchu City and the Hsinchu Science Park]. September (Accessed on April 29, 2025).
- 陳悅婷、石振國、2015「新竹科學園區交通問題解決方法之規劃研究」『中華行政學報』17：119-135.
- Chen, Yueh-ting, and Chen-Kuo shih. 2015. “Xinchukexue yuanqu jiaotong wenti jieju fangfa zhi guihua yanjiu” [A Research of Solution Planning for Traffic Problem of Hsinchu Science Park]. *The Journal of Chinese Public Administration*, 17: 119-135.
- 鐘藝方、2024「氣候變遷下的水資源供應與產業發展-以新竹科學園區為例」國立臺灣師範大學地理學系碩士論文。
- Chung, Yi-fang. 2024. “Qihou bianqianxia de shuiziyuan gongying yu chanye fazhan-yi xinzhukexue yuanqu weili” [Water Resources Supply and Industrial Development Under Climate Change: A Case Study of Hsinchu Science Park]. MA thesis, Department of Geography, National Taiwan Normal University.
- Chung, Chi-Nina. 2001. “Markets, Culture and Institutions: The Emergence of Large Business Groups in Taiwan, 1950s-1970s.” *Journal of Management Studies*, 38(5): 719-745.
- Chen, Chia Yi, Yu Ling Lin, and Po-Yong Chu. 2013. “Facilitators of national innovation policy in a SME-dominated country: A case study of Taiwan.” *Innovation: Management, Policy & Practice*, 15(4): 405-415.
- Fukugawa, Nobuya and Kuo-I. Chang. 2025. “Science Parks in Taiwan and Their Value-adding Contributions.” *RIETI Discussion Paper Series*, 25-E-005.
- Hu, Mei-Chih. 2011. “Evolution of knowledge creation and diffusion: the revisit of Taiwan’s Hsinchu Science Park.” *Scientometrics*, 88(3): 949-977.
- Lee, S. J., Grace T. R. Lin, and P. H. His. 2017. “Industrial Cluster Development and its Contribution to Economic Growth in Taiwan-Hsinchu Science and Industrial Park.” *Journal of Scientific & Industrial Research*, 76: 273-278.
- Lim, Sirirat Sae, Hong Ngoc Nguyen, and Chia-Li Lin. 2022. “Exploring the development strategies of science parks using the hybrid MCDM approach.” *Sustainability*, 14(7): 4351.
- Lin, T. C., and P. J. Chen. 2011. “Power shortage risks and mitigation strategies for the semiconductor industry in the Hsinchu Science Park.” *Energy Policy*, 39(10): 6503-6510.
- Saxenian, Annalee, and Jinn-Yuh Hsu. 2001. “The Silicon Valley-Hsinchu Connection: Technical Communities and Industrial Upgrading.” *Industrial and Corporate Change*, 10(4): 893-920.
- Saxenian AnnaLee. 2001. “Taiwan’s Hsinchu Region: Imitator and Partner for Silicon Valley.” *SIEPR Discussion Paper*, No. 00-44.

- Saxenian, AnnaLee. 2006. *The New Argonauts: Regional Advantage in a Global Economy*. Harvard University Press.
- Tsai, You-Lin. 2015. “Behind the Economic Success of Taiwan’s Hsinchu Science Industrial Park: Zoning Technologies under Neo-liberal Governmentality, Ongoing Primitive Accumulation, and Locals’ Resistance.” *Journal of Comparative Asian Development*, 14(1): 47-75.