Jejak Perjalanan: Belajar Digitalisasi Industri dari Negeri Tirai Bambu

Travelogue: Learning Industrial Digitalization from China

Januar Andi Lastanto, SP,MT
Pengawas Mutu Hasil Pertanian Ahli Pertama
Direktorat Hilirisasi Hasil Peternakan
Kementerian Pertannian

Awal Juli 2025 lalu, Saya mendapat kesempatan yang begitu berharga mengikuti Seminar on Manufacturing Digitalization and Upgrade for Developing Countries di Hangzhou, Provinsi Zhejiang, Tiongkok. Kegiatan diselenggarakan oleh Free Trade Development Board of Zhejiang Province, Tiongkok. Selama 21 hari, tanggal 8–28 Juli 2025. Bersama 26 peserta lain dari 8 negara, Armenia, Uruguay, Gambia, Panama, Uganda, Nigeria, Uzbekistan, dan Indonesia belajar langsung bagaimana Tiongkok membangun kekuatan industrinya melalui digitalisasi. Bagi kami, pengalaman ini terasa seperti membuka jendela ke masa depan. Apa yang selama ini hanya kami baca di artikel atau laporan, kini bisa lihat dan rasakan langsung di lapangan.

In early July 2025, I had the invaluable opportunity to attend the Seminar on Manufacturing Digitalization and Upgrade for Developing Countries in Hangzhou, Zhejiang Province, China. The event was organized by the Free Trade Development Board of Zhejiang Province, China. Over the course of 21 days, from July 8–28, 2025,with 26 other participants from eight countries —Armenia, Uruguay, Gambia, Panama, Uganda, Nigeria, Uzbekistan, and Indonesia—learned how China is building its industrial strength through digitalization. For us, this experience felt like opening a window into the future. What we had previously only read about in articles or reports could now be seen and experienced in the field.

Setiap pagi hingga sore, kami mengikuti sesi kelas yang menghadirkan pakar industri dan akademisi Tiongkok. Mereka menjelaskan konsep-konsep yang awalnya terdengar rumit, seperti digital twin, flexible manufacturing factory, digital factory, hingga AI driven smart manufacturing. Tetapi semakin lama, mulai melihat benang merah, intinya adalah bagaimana data, teknologi, dan manusia bersinergi untuk membuat proses produksi lebih cepat, efisien, dan cerdas. Namun, pembelajaran paling membekas justru terjadi di luar ruang kelas, ketika kami berkunjung langsung ke pelaku usaha dan kawasan industri.

Six Dragon Exhibition Hall, tempat ini menampilkan inovasi dari perusahaan-perusahaan rintisan Hangzhou yang dijuluki Six Little Dragons. Ada DeepSeek, didirikan oleh Liang Wenfeng pada 2023, yang fokus pada pengembangan model bahasa besar hemat biaya. Lalu Unitree Robotics, didirikan Wang Xingxing pada 2016, terkenal dengan robot berkaki empat lincah (robot dod). Deep Robotics, didirikan Zhu Qiuguo dan Li Chao pada 2017, mengembangkan robot quadruped untuk industri dan penyelamatan. ManyCore Tech Inc, berdiri sekitar 2011 oleh Huang Xiaohuang, Chen Hang, dan Zhu Hao, menggarap cloud design software.

Every morning and afternoon, we attended classroom sessions featuring Chinese industry experts and academics. They explained concepts that initially sounded complex, such as digital twins, flexible manufacturing factories, digital factories, and AI-driven smart manufacturing. But over time, we began to see a common thread: how data, technology, and people synergize to make production processes faster, more efficient, and smarter. However, the most lasting learning occurred outside the classroom, when we visited businesses and industrial parks.

The Six Dragon Exhibition Hall show innovations from Hangzhou startups, nicknamed the Six Little Dragons. There was DeepSeek, founded by Liang Wenfeng in 2023, which focuses on developing large, cost-effective language models. Then there was Unitree Robotics, founded by Wang Xingxing in 2016, known for its agile quadruped robots (dod robots). Deep Robotics, founded by Zhu Qiuguo and Li Chao in 2017, develops quadruped robots for industry and rescue. ManyCore Tech Inc., founded around 2011 by Huang Xiaohuang, Chen Hang, and Zhu Hao, works on cloud design software.

Ada pula BrainCo, didirikan oleh Han Bicheng yang memimpin di bidang brain-computer interface, serta Game Science yang didirikan oleh Feng Ji , studio gim yang mendunia dengan karya-karya berbasis mitologi Tiongkok Black Myth: Wukong. Melihat inovasi ini, serasa seperti berada di tengah laboratorium masa depan, di mana AI, robotik, dan teknologi digital berpadu dalam kehidupan nyata.

Kunjungan ke Wensli Group, perusahaan sutra Hangzhou, juga memberi pelajaran penting. Wensli berhasil menjaga warisan budaya sutra sekaligus bertransformasi dengan teknologi digital printing dan kolaborasi internasional, hingga produknya menembus pasar global. Semua ini menunjukkan bahwa tradisi dan modernitas bisa berjalan seiring.

Dari sinilah bisa belajar tentang konsep Digital Factory, sebuah ekosistem produksi yang terhubung penuh dari hulu ke hilir, mulai dari desain, pengadaan bahan baku, produksi, logistik, hingga distribusi. Semua dijalankan dengan dukungan teknologi digital seperti IoT, Big Data, AI, Cloud, dan Robotik. Keuntungannya sangat nyata: efisiensi biaya dan waktu, konsistensi mutu, transparansi proses, traceability, hingga fleksibilitas produksi sesuai kebutuhan konsumen.

Proses *digital factory* dibangun secara bertahap. Dimulai dari device layer dengan sensor dan mesin, lalu dikendalikan oleh control layer. Di lapisan ini, setiap elemen memiliki fungsi penting: PLC untuk otomatisasi mesin, SCADA untuk pemantauan real-time, DCS untuk kontrol terdistribusi, FCS untuk kendali instrumen lapangan, dan CDN sebagai jaringan data yang menghubungkan semuanya. Selanjutnya, di factory level, sistem mengelola logistik cerdas, pergudangan pintar, hingga eksekusi produksi. Semua aktivitas ini kemudian diintegrasikan ke enterprise layer, yang menghubungkan produksi dengan manajemen rantai pasok, pemasaran, dan layanan konsumen. Pada akhirnya, semua data disatukan di synergy layer, di mana Big Data, AI, dan Cloud bekerja untuk memberikan analisis cerdas dan simulasi optimisasi.

There's also BrainCo, founded by Han Bicheng, a leader in brain-computer interfaces, and Game Science, founded by Feng Ji, a game studio known for its Chinese mythology-based work, Black Myth: Wukong. Watching these innovations feels like being in a futuristic laboratory, where AI, robotics, and digital technology collide in real life

Hangzhou silk company, as part of Wensli group is being target to visit, also provided important lessons. Wensli has successfully preserved silk heritage while transforming itself with digital printing technology and international collaborations, enabling its products to penetrate the global market. This demonstrates that tradition and modernity can coexist. This is the place you can learn about the concept of the Digital Factory, a fully connected production ecosystem from upstream to downstream, from design and raw material procurement, production, logistics, and distribution. All of this is supported by digital technologies such as IoT, Big Data, AI, Cloud, and Robotics. The benefits are tangible: cost and time efficiency, quality consistency, process transparency, traceability, and production flexibility tailored to customer needs.

The digital factory process is built in stages. It begins with the device layer with sensors and machines, then is controlled by the control layer. At this layer, each element has a critical function: PLC for machine automation, SCADA for real-time monitoring, DCS for distributed control, FCS for field instrument control, and CDN as the data network that connects everything. Furthermore, at the factory level, the system manages smart logistics, smart warehousing, and production execution. All these activities are integrated into the enterprise layer, which connects production with supply chain management, marketing, and customer service. Ultimately, all data is unified at the synergy layer, where Big Data, AI, and the Cloud work together to provide intelligent analysis and optimization simulations.

Manfaat digital factory ini antara lain otomatisasi transportasi bahan, proses muat-bongkar, pemrosesan otomatis, pemilihan program pemrosesan terbaik, hingga AGC (Automatic Guided Cart) yang mengantar bahan antar bagian pabrik tanpa hambatan. Semua ini membuat produksi lebih cepat, hemat biaya, dan nyaris tanpa kesalahan.

Pertanyaannya kemudian, apa relevansinya bagi UMKM di Indonesia?

Banyak peluang yang bisa dilakukan. Tidak semua UMKM harus langsung punya robot atau AI canggih. Dari pengalaman di Tiongkok, transformasi digital bisa dimulai dengan hal sederhana seperti dashboard digital untuk memantau produksi, sistem barcode atau QR untuk melacak produk, hingga digital marketing. Contoh paling inspiratif datang dari Nanfang Pump Industry. Perusahaan ini memulai digitalisasi dengan biaya rendah, menggunakan integrasi data sederhana, perbaikan proses, dan pelatihan karyawan. Dari situ, mereka perlahan naik kelas hingga mampu bersaing secara global. Diharapkan UMKM Indonesia pun bisa menempuh jalur serupa, mulai kecil, konsisten, lalu berkembang.

Namun perjalanan ini tidak hanya tentang teknologi. Kami juga diajak menyelami budaya Tiongkok. Dari keindahan West Lake yang penuh legenda, kabut tipis di pagi hari yang menciptakan nuansa mistis, hingga matahari senja yang memantulkan siluet pagoda di permukaan danau. Tak heran UNESCO menetapkannya sebagai Warisan Dunia. Pertunjukan cahaya futuristik di City Balcony, hingga nuansa klasik di Anchang Ancient Town, semua meninggalkan pesan bahwa kemajuan tidak harus melupakan akar budaya. Justru, teknologi dan tradisi bisa berjalan beriringan.

Bagi kami, pengalaman mengikuti pelatihan ini bukan hanya soal melihat pabrik pintar, robot, atau AI. Lebih dari itu, ini adalah perjalanan untuk memahami bahwa digitalisasi adalah keniscayaan. Bukan sekadar tren, tetapi pondasi agar industri, termasuk UMKM di Indonesia bisa bertahan dan bersaing di masa depan. (jal)

The benefits of this digital factory include automation of material transportation, loading and unloading processes, automated processing, selection of the best processing program, and AGC (Automatic Guided Cart) that seamlessly transports materials between factory sections. All of this makes production faster, more cost-effective, and free of virtually error.

The question, is it relevance for Small and Medium Enterprises (SMEs) in Indonesia?

There are many opportunities. Not all Small and Medium Enterprises (SMEs) need to immediately have robots or sophisticated AI. Based on experience in China, digital transformation can start with simple things like a digital dashboard to monitor production, a barcode or QR code system to track products, and digital marketing. The most inspiring example comes from Nanfang Pump Industry. This company started digitalization at a low cost, using simple data integration, process improvements, and employee training. They gradually rose to the level of global competition. It is hoped Indonesian Small and Medium Enterprises (SMEs) can follow a similar path, starting small, remaining consistent, and then growing.

But this journey isn't just about technology. We also delve into Chinese culture. From the legendary beauty of West Lake, the morning mist creating a mystical atmosphere, to the sunset reflecting the silhouettes of pagodas on the lake's surface. It's no wonder UNESCO designated it a World Heritage Site. From the futuristic light show at the City Balcony to the classical atmosphere of Anchang Ancient Town, all convey the message that progress doesn't have to forget cultural roots. In fact, technology and tradition can go hand in hand.

For us, the experience of participating in this training wasn't just about seeing smart factories, robots, or AI. It was a journey to understand that digitalization is inevitable. It's not just a trend, but the foundation for industry, including Small and Medium Enterprises (SMEs) in Indonesia, to survive and compete in the future. (jal)