



University of St.Gallen



St.Gallen Production Systems Platform

Whitepaper 2025



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Dear readers,

digitalization and artificial intelligence are fundamentally changing the way companies manage their operations. Against this backdrop, the concept of operational excellence is sometimes perceived as outdated or out of fashion. However, our research efforts and industry collaborations at the Chair of Production Management at the University of St.Gallen demonstrate that operational excellence remains essential for successful operations. In today's dynamic and uncertain environment, production systems, which represent company-wide improvement programs, play a pivotal role in enabling change and transformation. To ignite and accelerate the necessary change and transformation, the operational excellence practices themselves must be continuously reviewed, adapted and strategically developed.

As such, the **Production Systems Platform (PSP)**, brings together globally operating manufacturing companies from different industrial sectors to **discuss and shape the future of production systems**, which we understand as corporate improvement programs [1]. The participating companies meet in four one-day sessions over the course of twelve months to engage with industry peers and exchange successful practices. Through site visits, workshops, input presentations, and research insights, we promote exchange between science and practice.

During 2025, the PSP covered four topics:

1) The continuous improvement of operations and the steering of improvement initiatives requires dedicated measurement of operational performance. How should operational performance measurement systems be designed?

2) Operational excellence is a key prerequisite to successful shopfloor digitalization. How can the production

system support the identification, selection and implementation of digital use cases?

3) Local differences between production sites challenge the roll-out of standardized production system practices. How should production systems balance the global adoption versus local adaptation of standards?

4) Further, many companies fall below aspirations with the implementation of the production system around the globe. How can a production system be implemented successfully?

This whitepaper focuses on the insights generated during the PSP 2025. We would like to further express our gratitude to all participants, within this exchange group.

St.Gallen, January 2026



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Performance Measurement

“Successful companies communicate performance data visually and regularly to shopfloor employees... [2]”

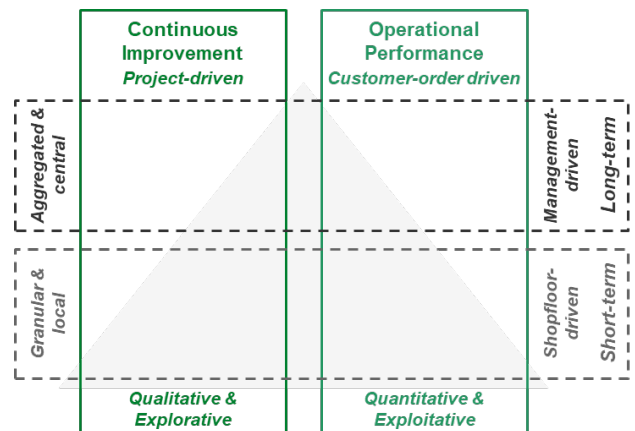
How should performance measurement systems be designed? How can they support the production system?

Measuring performance is crucial to successfully managing operations. Research has shown that firms that deploy performance management practices alongside operational excellence efforts tend to have higher operational and, ultimately, financial performance [2]. Using visual performance metrics, such as team boards, to educate shop floor employees is especially emphasized [2, 3]. Well-known operational excellence practices and methods, extend beyond performance measurement towards performance management. Methods such as PDCA or Hoshin Kanri are concerned with performance management at their core. Successful companies communicate performance data visually and regularly to shopfloor employees and all management levels [2]. Transparency about performance scores increases employee performance, helps identify waste, and fosters a continuous improvement mindset [2]. However, implementing accounting and data capture practices is a prerequisite for measuring performance.

Additionally, the anchoring of the production system itself is supported by performance measurement practices [3]. Three practices are crucial for the successful introduction of the production system: implementation teams as change managers, non-financial rewards to encourage behavior, and a performance reporting process [3]. This process is reflected in routines such as team meetings, which transparently show operational and financial performance. Therefore, shopfloor meetings should focus on performance reporting rather than operational "firefighting" [3].

But how should an effective performance management system be designed? Setting up such a system requires selecting the right metrics, defining performance targets, and consistently gathering the necessary data during

operations [4]. Performance measurement systems should comprise metrics (KPIs) that capture both short- and long-term performance. Short-term metrics to guide day-to-day operations and long-term metrics to ensure the company is pursuing its strategic targets [5]. As manufacturing companies strive to fulfill customer demand and aim for strategic development, a performance measurement system must track operational performance to align with customer needs. However, continuous improvement performance to drive excellence efforts is another subject for measurement. Hence, performance metrics should be established to capture continuous improvement success as well as operational performance from a long-term, aggregated and a short-term, local level perspective (as illustrated in the figure below). Metrics on each level commonly consist of safety, quality, delivery, cost, inventory, personnel, and other possible indicators (SQDCIP+).



Furthermore, performance management systems must evolve over time to adapt to changes in the environment [6]. They are based on effective communication systems, well-defined targets, employee involvement and connected to underlying improvement efforts [7].



Digitalization

“Therefore, clear governance for identifying, selecting, and implementing digital use cases is important.”

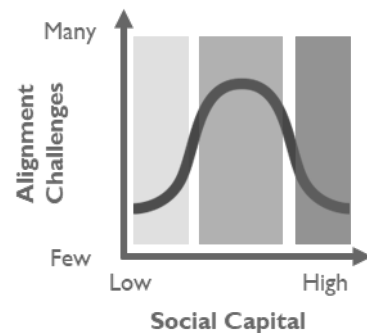
How can the production system support the identification, selection and implementation of digital use cases?

While the need for digitalization within operations and the digitalization of production systems is almost undisputed, identifying, selecting, and implementing the right digital use cases is challenging. Therefore, clear governance is needed to ensure that digital use cases actually pay off. Essential elements include shared objectives, dedicated integrator roles, an integrated governance process, a supportive organizational setup, and interpersonal relationships that bridge both worlds (see also [8]).

Digital use cases should be identified and prioritized based on clearly defined operational problems and *objectives shared* by the entire organization rather than technological advances. A common understanding of value creation ensures that use cases address real performance gaps and support strategic priorities. Clearly defined *integrator roles*, such as the production system manager, lead the translation of operational needs into viable digital solutions and prevent misalignment. Identification, selection, and implementation should follow a jointly *defined process*. For example, a shared project funnel and common evaluation criteria ensure that digital solutions build on lean and stable processes, as do operational or digital maturity audits. Strong *interpersonal relationships* between operational and digital teams foster trust, a shared language, and effective collaboration. High levels of social capital support conflict resolution, continuous improvement, and the sustained adoption of digital use cases. An *organizational setup* that closely links digital capabilities to the manufacturing function ensures that digital use cases remain grounded in operational reality. Hence, these five elements – shared objectives, integrator roles, a governance process, the organizational setup, and

interpersonal relationships – play a crucial role to ensure that digital use cases deliver the promised results.

In a recent research endeavor, the University of St.Gallen collaborated with lean and digitalization managers from ten pharmaceutical companies to study the challenges of aligning production systems with digitalization initiatives [9].



The study found that the alignment between the two programs follows a bell curve. A firm's social capital, e.g., the degree of interpersonal relationships and intensity of social structures within a firm, plays a crucial role here (see [10]). A high level of social capital enables the alignment of the two programs and supports the exploitation of high program synergies. However, the alignment challenges increase with higher levels of social interaction in the first phases of program alignment. Based on these research results, production system managers should focus particularly on the social links if they want to align the two programs more closely.

The full 2025 research paper by Lorenzo Pirrone, Matteo Bernasconi, Mark Grothkopp and Thomas Friedli can be found here [9]: [Riding the bell curve of lean and digitalisation programme alignment](#)



Global Adoption vs. Local Adaptation

“Thus, the right balance lies in setting a lower but appropriate level of detail within global standards thus leaving room for local improvements [14].”

How should production systems balance the global adoption versus local adaptation of standards?

Many manufacturing firms are tasked with more than just optimizing single plants – they must orchestrate a network of production sites. In addition to coordinating day-to-day operations between the sites, company headquarters aim towards implementing operational excellence practices throughout the network to improve quality, delivery, and cost on a global scale.

A common approach to implementing global improvement programs is to standardize successful manufacturing practices and deploy them globally – an approach also known as global adoption [11] or the copy-exactly strategy [12]. Managers expect this strategy to support corporate-wide strategic targets, leveraging technical advancements and rolling out successful practices globally [11]. Thus, improvements and learnings are generalized as global standards that facilitate the sharing of knowledge and lessons learned with other plants [13]. However, exclusively steering improvement programs by global standards may hinder the curiosity and improvement mindset of local employees, and corporate managers may fail to recognize their suitability to local culture, technical conditions, and other contingencies at the local plant [11]. In fact, adapting global standards to the national culture and creating an individualized training program for transferred practices are recommended [14].



Global Adoption
("Standardization")



*Continuum of different
degrees of adaptation*



Local Adaptation
("Localization")

Alternatively, companies may decide to fully adapt practices and standards to the local context, which may result in local management changing or rejecting practices – an approach

also known as local adaptation [11]. Adapting to local requirements can create a high level of adherence ("stickiness") to transferred practices, generate buy-in from local employees, and further ignite curiosity, openness, and an improvement mindset within employees [11, 14]. However, local adaptations can lead to overcomplicating the production system, as every standard may have local specifications. Additionally, global improvement potential is missed if operational practices are not aligned. Since both strategies – the global adoption of standards and their local adaptation – have their advantages, production system managers must decide when to standardize versus when to localize a practice.

An important aspect to consider is how local site management reacts to standards. This illustrates the 4A framework [11]: Subsidiaries may either fully adopt practices and standards (ADOPT) or completely adapt them to local requirements (ADAPT). However, a superficial adoption of practices to pretend compliance with headquarters is sometimes observed (ACT), as well as complete ignorance of the standards (AVOID).

Studies show that standardizing practices and enforcing them globally can enhance global learning and knowledge transfer [12, 13]. To ensure the successful implementation of operational excellence standards, it is recommended that mixed teams of corporate and local experts steer local adaptation and facilitate local training [14]. The transferred standards should not extend to every detail but rather include guidelines and rules that local management can adapt later [14]. Thus, the right balance lies in setting a lower but appropriate lower level of detail within global standards thus leaving room for local improvements [14].



Production System Implementation

“There are many different paths to rolling out a production system – there is no panacea.”



How can a production system be implemented successfully?

Implementing a production system in globally dispersed manufacturing networks is a highly complex task [15]. If this process is mismanaged, the system will not yield any operational improvements, failing to deliver competitive advantages [16]. Thus, applying the right rollout strategy is essential to succeed. As resources for its implementation are limited, deploying the production system simultaneously across all sites is not feasible. Instead, sequencing the approach prevents bottlenecks and avoids skin-deep results. The respective rollout sequence can either be deliberate, i.e., defined by the corporate production system team, or emergent, i.e., driven by the individual rate of progression of each site. The deliberate sequence approach is based on bottleneck prevention through centralization and a priori prioritization of sites, whereas the emergent sequence relies on bottleneck mitigation through decentralization and ad hoc prioritization of sites. Managers cannot only consider network size or manufacturing locations to choose between these rollout strategies. Rather, they must evaluate whether immediate commitment can be expected from the sites, whether these already possess the right capabilities to implement the production system autonomously, and whether they differ in their strategic positioning within the manufacturing network. Ultimately, companies must assess whether it is necessary to coerce sites to embrace the system or whether the sites can be expected to commit to it themselves. [17]

During the implementation, sites must be supported by the corporate production system team. However, as resources are not inexhaustible, companies must make cautious decisions on how much support they give where. On the one hand, this is determined by each site's priority and

maturity. The former relates to the site's strategic importance (i.e., size, manufactured products, served markets), revenue, and general business needs. The latter relates to the degree of production system integration. On the other hand, the support is defined by each site's capacity, i.e., its ability to facilitate the rollout, as well as its accessibility, i.e., the feasibility of allocating dedicated resources to the implementation. Finally, the definition of the level of support must account for contextualities, such as site-specific needs or different cultures. As the rollout progresses, corporate and site production system teams take on different roles, which characterize their dynamic interplay and outline their responsibilities during the implementation process. For the corporate team, these subsequent roles are PREPARE, ENABLE, and CONFIRM, whereas for the site teams these are ENGAGE, LEARN, and EXECUTE. These reciprocal roles translate to three distinct support phases. While the PREPARE/ENGAGE phase extends over a relatively short amount of time (~3 to 6 months), the ENABLE/LEARN and CONFIRM/EXECUTE phases span a greater timeframe (~24 to 36 months). In their respective PREPARE and ENGAGE roles, the corporate team is, for example, tasked with introducing the production system to the site, whereas the site plans the logistics of the deployment. Moreover, the corporate team may even provide funding to backfill positions that become vacant as site employees are re-allocated to support the deployment. Subsequently, the ENABLE/LEARN phase revolves around building the corresponding capabilities of site production system personnel. Finally, responsibility for facilitating the rollout shifts from the corporate team to the site towards the CONFIRM/EXECUTE phase. [17]



Managerial Implications

“The challenge is no longer purely technical or methodological – It is about effectively integrating and deploying operational excellence principles.”

The findings of the Production Systems Platform 2025 have clear implications for managerial practice. As organizations navigate increasing operational complexity and accelerating digitalization, the challenge is no longer purely technical or methodological – It is about effectively integrating and deploying operational excellence principles.



I. From performance measurement to performance management: Managers should not treat performance metrics as a passive reporting tool but as an active management mechanism. Visual, regularly communicated performance metrics embedded in organizational routines such as shopfloor meetings enhance transparency, align employees' work and foster a continuous improvement mindset.



II. Performance measurement plays a central role in anchoring the production system. Managers should deliberately link metrics to change initiatives. In addition, they should deploy implementation teams, non-financial incentives, and structured performance-reporting process to support the introduction of operational excellence principles.



III. A clear governance framework ensures that digital use cases deliver real operational value. Building upon shared operational objectives rather than technological opportunities allows for prioritizing the right use cases. Defining dedicated integrator roles to match operational needs with digital solutions and designing supportive structures and processes (such as common project funnels and evaluation criteria) helps setting up the right use cases.



IV. To align operational improvement and digitalization programs more closely, social ties between program representatives play a critical role. Overall, interpersonal relationships prove to play a key role in the successful transformation towards digital operations.



V. Achieve a balance between global standardization and local adaptation. Managers should not treat global adoption and local adaptation as mutually exclusive strategies. Explicit decisions about when to standardize and when to localize are recommended rather than applying a uniform approach across the network.



VI. Design global standards as guidelines that leave room to capture local benefits. To successfully implement operational excellence practices, define global standards at an appropriate level of abstraction, allowing for local improvements if beneficial. Alternatively, managers should design global standards with mixed teams of corporate and local experts.



VII. Deploying a production system is a dynamic and maturity-contingent process, which must be adjusted continuously to the respective stage of the implementation. Production system managers must pay careful attention to ensure that the rollout activities are suitable for the current implementation progress.



VIII. Successfully rolling out a production system is subject to contextual influences. The corporate production system team must account for resource availabilities, sites' previous lean exposure, their capabilities, and initial engagement, as well as global and local needs.



IX. Site accountability is the key to achieving sustainable implementation results. While sites must take on a driving role during the rollout of the production system, the corporate unit must provide the necessary means for the sites to embrace this position.





References

- [1] Netland, T. H. (2013). Exploring the phenomenon of company-specific production systems: one-best-way or own-best-way? *International Journal of Production Research*, 51(4), 1084–1097. <https://doi.org/10.1080/00207543.2012.676686>
- [2] Fullerton, R. R., Kennedy, F. A. Widener, S. K. (2014). Lean manufacturing and firm performance: The incremental contribution of lean management accounting practices. *Journal of Operations Management*, 32(7-8), 414-428. <https://doi.org/10.1016/j.jom.2014.09.002>
- [3] Netland, T. H., Schloetzer, J. D., Ferdows, K. (2015). Implementing corporate lean programs: The effect of management control practices. *Journal of Operations Management*, 36, 90-102. <https://doi.org/10.1016/j.jom.2015.03.005>
- [4] Bititci, U. S. (2015). *Managing Business Performance – The Science and the Art*. Wiley & Sons. ISBN 978-1-119-02569-6
- [5] Möller, K. (n.d.). SPM - St. Galler Performance Management Modell. University of St.Gallen. Institute for Accounting, Control and Auditing. <http://www.spm.ch/de/index.html>
- [6] Kumar, U., Kumar, V., de Grosbois, D., Choisine, F. (2009). Continuous improvement of performance measurement by TQM adopters. *Total Quality Management & Business Excellence*, 20(6), 603–616. <https://doi.org/10.1080/14783360902924242>
- [7] Cunha, F., Dinis-Carvalho, J., Sousa, R. M. (2025). Analysis of barriers for performance measurement system effectiveness in a company: perceptions across hierarchical levels. *International Journal of Lean Six Sigma*, 16 (2), 542–559. <https://doi.org/10.1108/IJLSS-12-2023-0205>
- [8] Grothkopp, M., Gese, S., Stathi, E., Lang, F. (2025). Integrating Operational Excellence and Digitalization. Whitepaper. ETH-HSG Manufacturing Alliance
- [9] Pirrone, L., Bernasconi, M., Grothkopp, M., & Friedli, T. (2025). Riding the bell curve of lean and digitalisation programme alignment – a social capital perspective. *International Journal of Production Research*, 1–20. <https://doi.org/10.1080/00207543.2025.2558133>
- [10] Nahapiet, J., & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *The Academy of Management Review*, 23(2), 242–266. <https://doi.org/10.2307/259373>
- [11] Netland, T. H., & Aspelund, A. (2014). Multi-plant improvement programmes: a literature review and research agenda. *International Journal of Operations & Production Management*, 34(3), 390–418. <https://doi.org/10.1108/IJOPM-02-2012-0087>
- [12] Terwiesch, C., & Xu, Y. (2004). The copy-exactly ramp-up strategy: trading-off learning with process change. *IEEE Transactions on Engineering Management*, 51(1), 70-84. <https://doi.org/10.1109/TEM.2003.822465>
- [13] Ferdows, K. (2006). POM Forum: Transfer of Changing Production Know-How. *Production and Operations Management*, 15(1), 1-9. <https://doi.org/10.1111/j.1937-5956.2006.tb00031.x>
- [14] Danese, P., Romano, P., Boscari, S. (2017). The transfer process of lean practices in multi-plant companies. *International Journal of Operations & Production Management*, 37(4), 468–488. <https://doi.org/10.1108/IJOPM-12-2014-0571>
- [15] Demeter, K., & Losonci, D. (2019). Transferring lean knowledge within multinational networks. *Production Planning & Control*, 30(2–3), 211–224. <https://doi.org/10.1080/09537287.2018.1534272>
- [16] Secchi, R., Camuffo, A. (2019). Lean implementation failures: The role of organizational ambidexterity. *International Journal of Production Economics*, 210, 145-154, <https://doi.org/10.1016/j.ijpe.2019.01.007>
- [17] Klinkner, F. (2026). Rolling out Company-specific Production Systems – A Network Perspective. Dissertation. University of St.Gallen

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