University of St.Gallen
Institute of Technology Management



November 2022

Benchmarking Study: "Future of Production Systems"

Prof. Dr. Thomas Friedli
M. Grothkopp, J. Kaiser, L. Pirrone, T. de Liefde

"From insight to impact"

Preface



Production Systems or process improvement programs have been widely implemented and are mainly used to enhance the company's manufacturing operations and performance. Mostly influenced by Lean Management, companies tried to implement various well-known concepts such as Just-In-Time, Total Quality Management or Total Productive Maintenance. After early attempts of purely copying existing proven production systems like Toyota's failed, companies have understood that there is no one size fits all solution and developed company-specific Production Systems.

Over time companies became more mature on their production system implementation journey. Today, a rather large share of companies considers their Production System as a way of working instead of an umbrella term for a set of unrelated approaches. Therefore, more and more companies integrate a Lean Thinking philosophy in their daily operations overcoming a "lean as toolbox" understanding.

Even though this overall trend can be identified in the study, not a few companies still struggle to keep the momentum of initial efforts of Production System implementation. That is why we raised the question about how to successfully manage a Production System.

This benchmarking study provides insights into activities to successfully manage a Production System and thereby spans a theoretical frame with three dimensions. Those dimensions are:

Content – scope of the Production System
Process – implementation of the Production System
Structure – organizational infrastructure of the Production System

With 112 participants, the study provides an informative insight into Production System activities. This report gives an overall summary of the benchmarking study and its outcomes. The results can be used as a guideline for building competitive advantages through a sustainable implementation of one's own Production System.

Best regards,



Thomas Friedli
Director
Institute of Technology Management (ITEM-HSG)

Table of Contents

Executive Summary	4
Methodology	5
Guidelines	9
Recommendations	13
Contact	14

Executive Summary

SURVEY PARTICIPANTS
112 Participations

72%: 1 to 70 Production Sites
54%: 10'000+ Employees

73%: Make-to-Order or Make-to-Stock
65%: Batch or series production

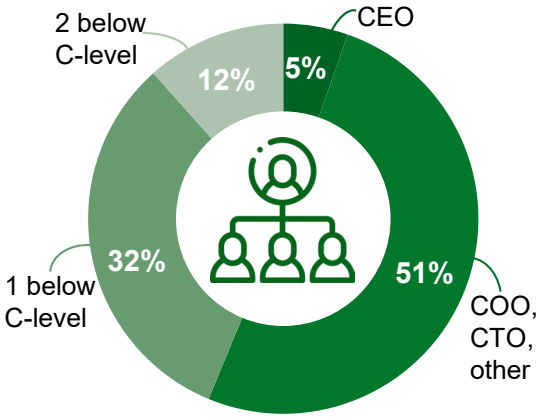
67%: Turnover of €1 Billion+
88%: Turnover grew over past 2 years

69%: Production System <10 years
54%: Currently in maintaining phase

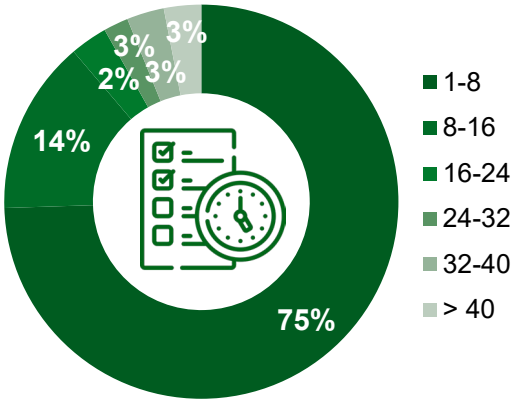
Compared to Followers, Successful Practice companies excel by …

1. Having committed and encouraging top management
2. Having mandatory elements of Production Systems to be implemented
3. Establishing corporate and site level Production System teams
4. Conducting regular maturity assessments
5. Defining well aligned roadmaps
6. Performing regular follow-ups on improvements and implementations
7. Assessing the skill level of employees and providing training and coaching
8. Having a systematic communication approach
9. Creating ownership for improvement at shopfloor level

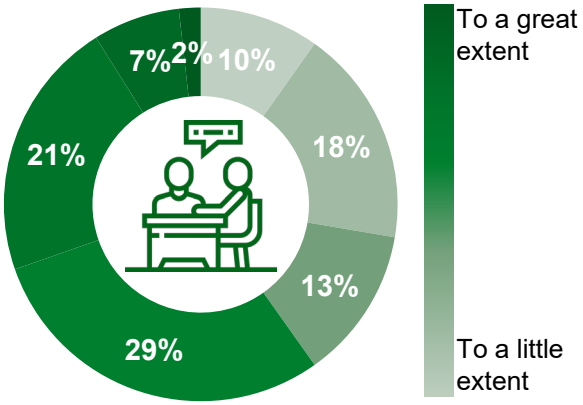
Production System team reports to



Number of Production System FTEs

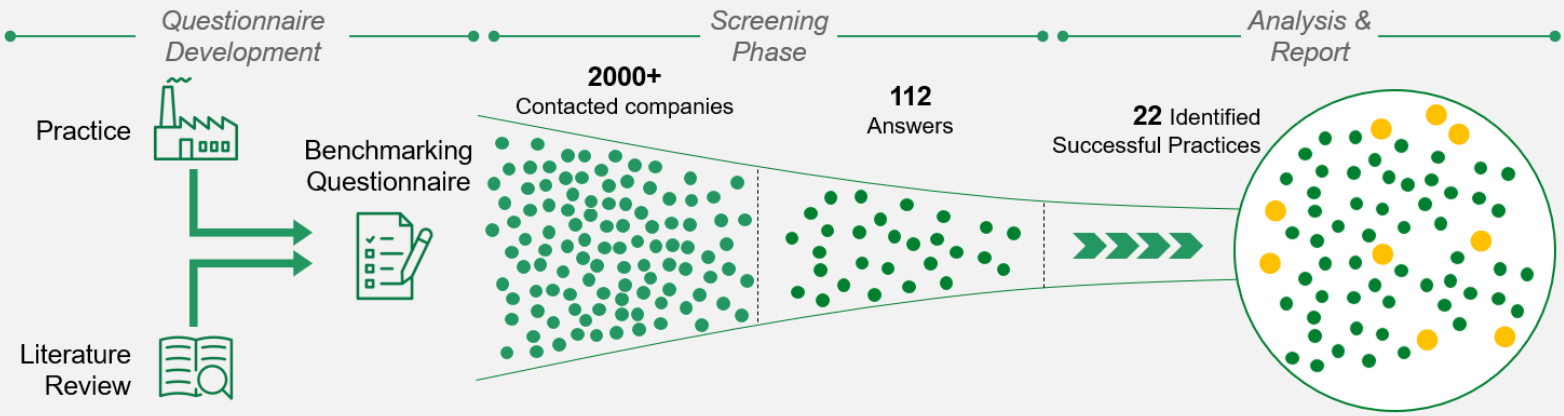


Companies Leverage External Support



Methodology

We conducted a unique benchmarking study on how companies manage their Production Systems



Our benchmarking followed a three-step approach. First, we designed an initial draft questionnaire based on an extensive literature review. A consortium group with practitioners from various industries reviewed the questionnaire and gave feedback. Hence, the resulting questionnaire provided a holistic baseline to benchmark companies from different industries on how they manage their Production Systems. Second, we reached out to more than 2000 companies. "Head of Production Systems", "COOs", and similar were contacted to be part of this unique survey. Over a period of 4 months, 112 companies responded to our request and filled in the questionnaire. In a third step, we validated and analyzed all respondents' replies in order to compile the results in this comprehensive report. The results provide insights in how successful practice companies (top 20%) distinguish themselves from the rest (lower 80%).

Methodology

Evaluation Method

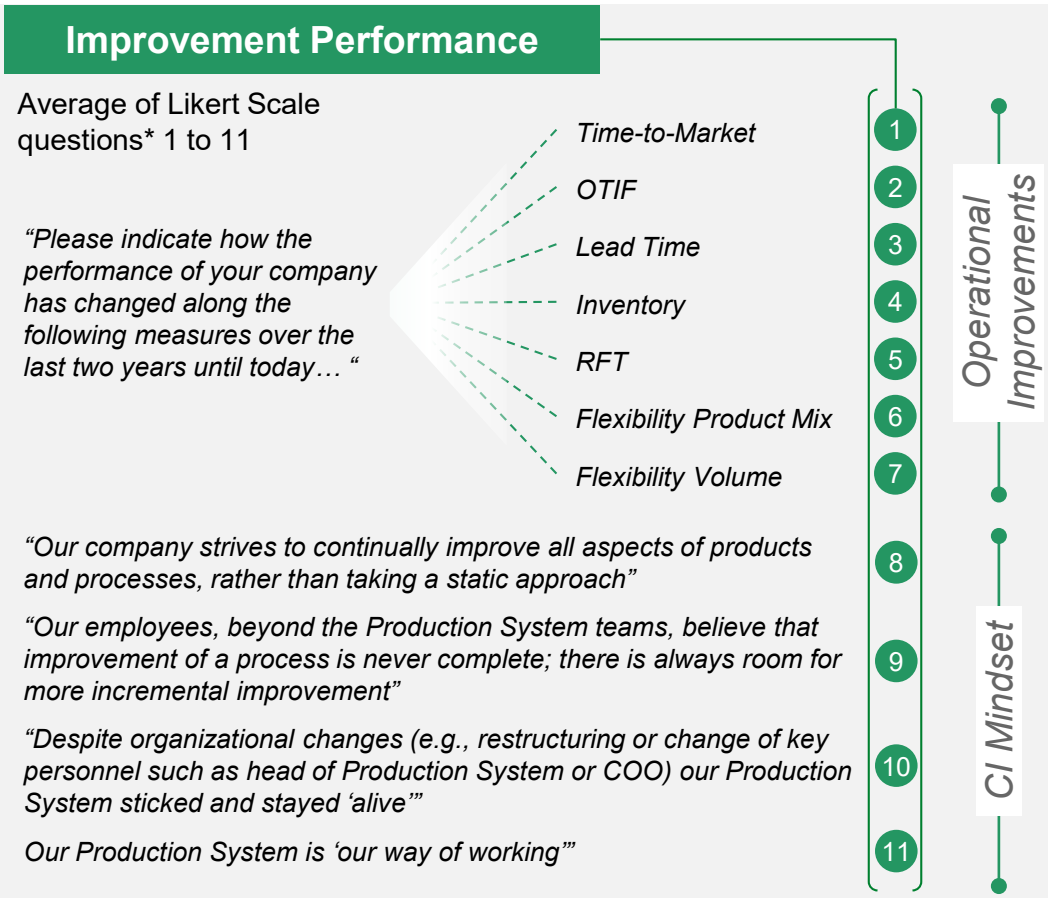
The graphs and conclusions in this report are all based on the results of the aforementioned survey. The sample was divided into groups to make the results clearer and make it easier to compare them. Therefore, most graphs are composed of the following groups:

- Successful Practices
- Followers

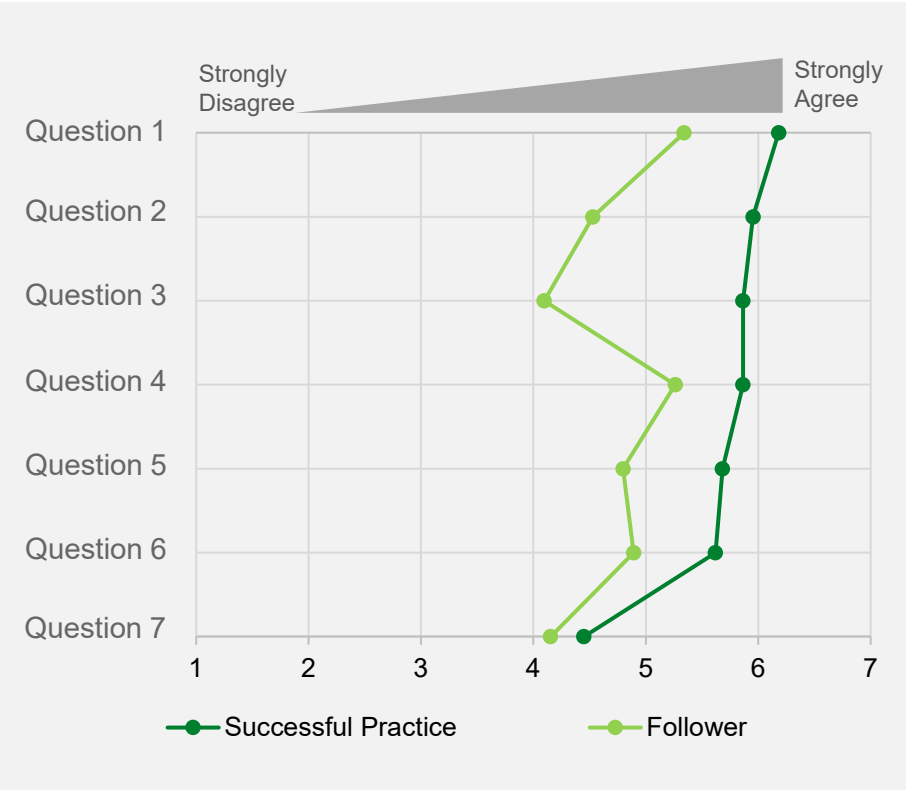
The survey participants received individualized reports containing further information relating to their industry and their own answers to the questionnaire.

Successful Practices are selected companies, which convince through their extraordinary improvement performance. We constructed and validated an overall improvement performance score (see right) which was used to determine the top 20% companies as Successful Practices. Followers refer to those companies that make up the remaining 80%. In addition, some questions offered the possibility of selecting one answer from various options. In this case, successful practice companies are highlighted with a star. Charts show the average of a group's responses.

Improvement Performance Construct



Methodology



Questions using a 7-point Likert Scale

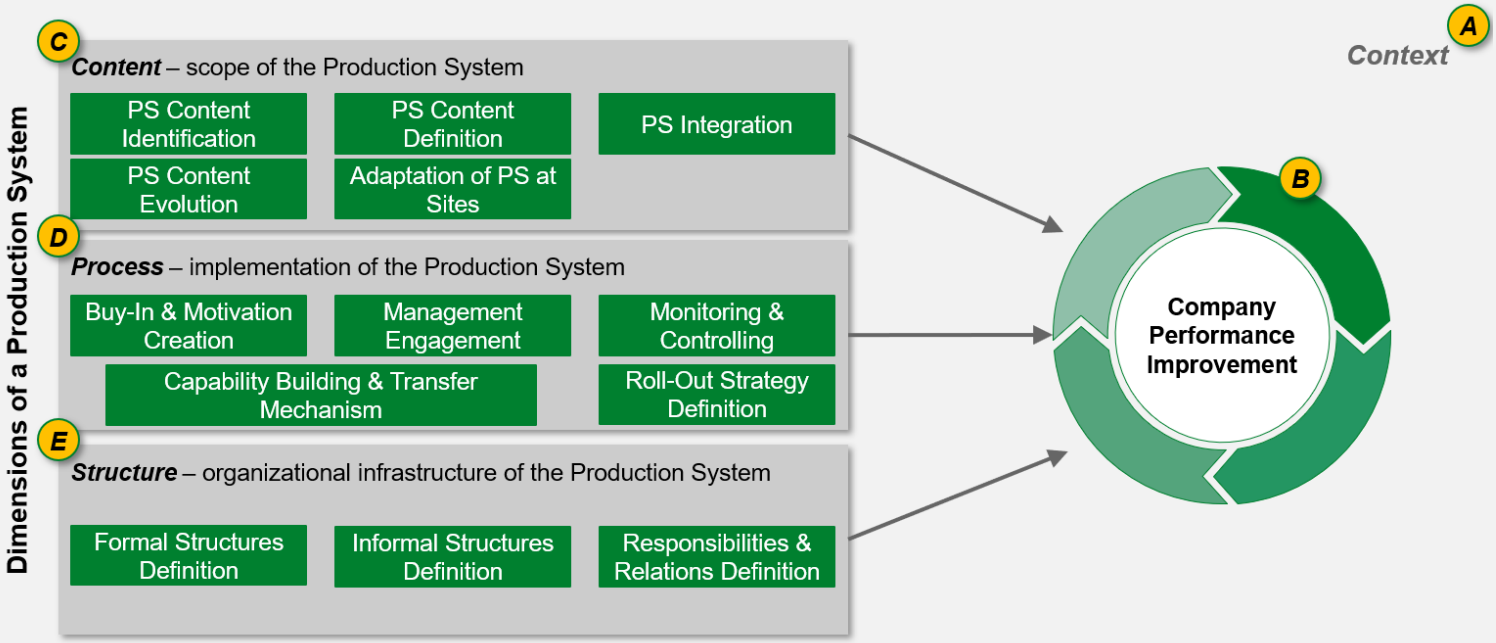
Answers to questions with a 7-point Likert scale are displayed using a line chart. Overlapping answer points can be deduced from the interconnecting lines.

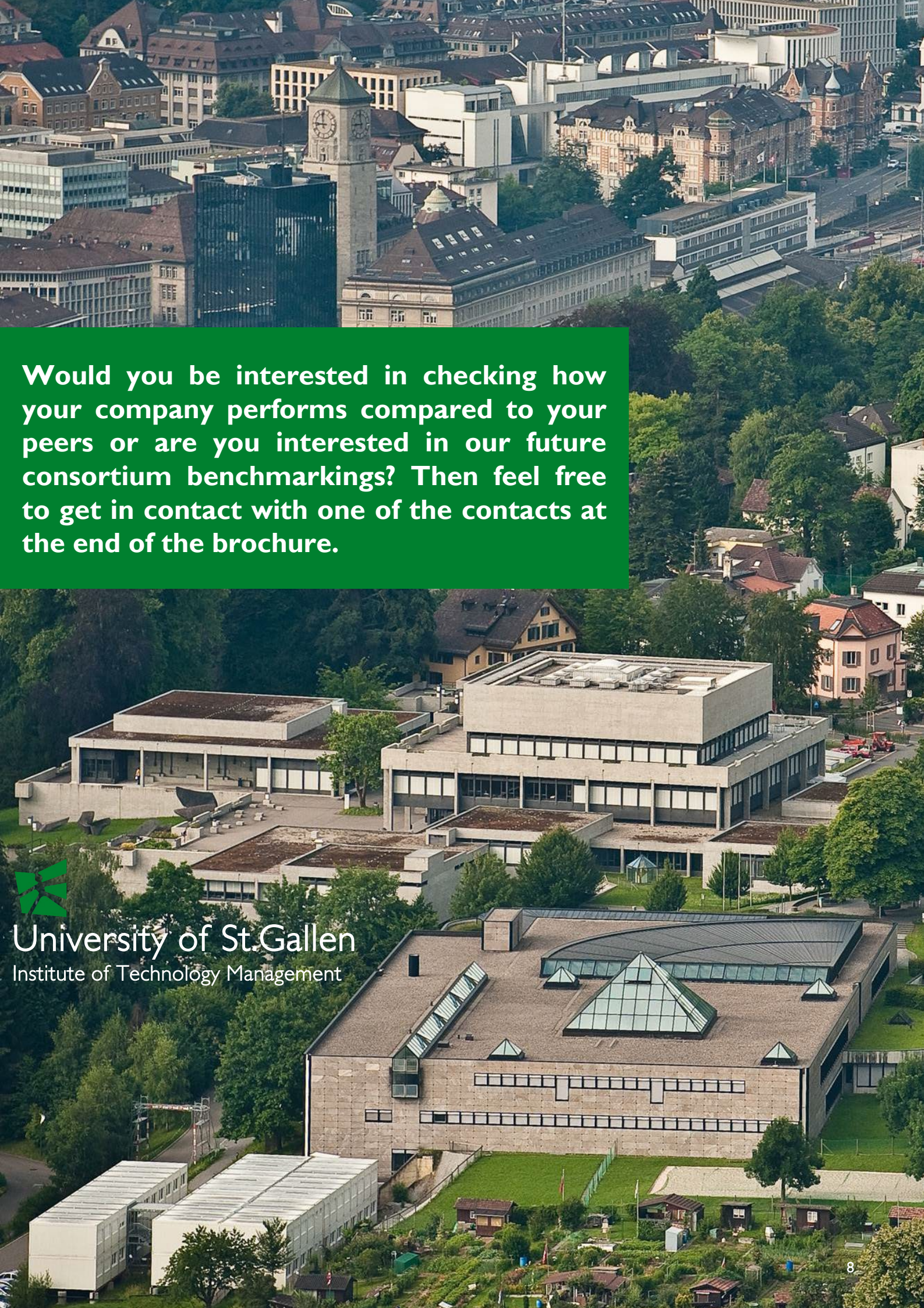
In the description on the right-hand side of each figure, a short explanation of the results is given. Moreover, the sample size, i.e. the number of companies who answered the question, is stated (n = …). It refers to the question with the most answers.

Within a Likert chart, the respective questions to each answer are displayed on the left-hand side of the chart in descending order with respect to the results of the Successful Practices.

The spectrum of possible answers is indicated by the horizontal axis.

Benchmarking Framework



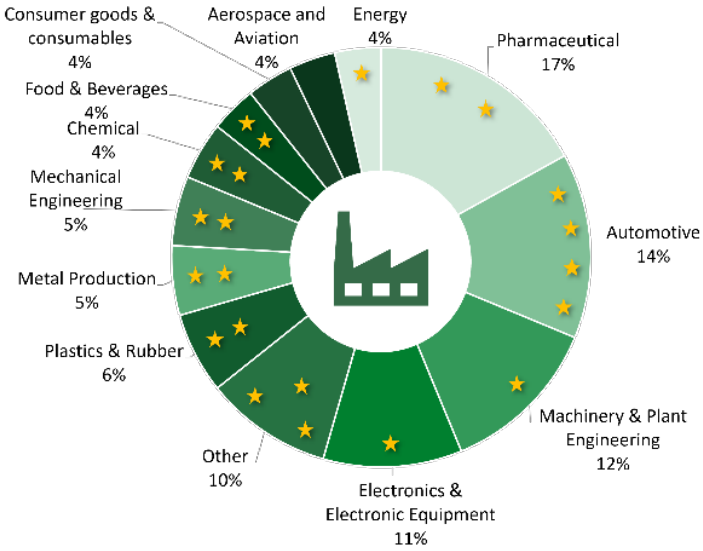


Would you be interested in checking how your company performs compared to your peers or are you interested in our future consortium benchmarkings? Then feel free to get in contact with one of the contacts at the end of the brochure.

University of St.Gallen
Institute of Technology Management

Context of the Participants

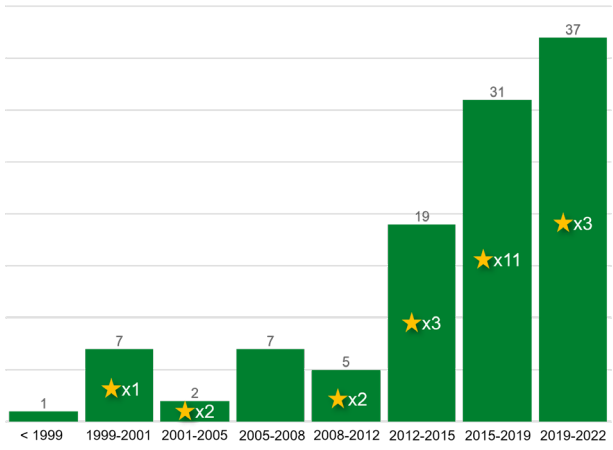
The benchmarking study began by taking a closer look at the current state the participants are operating in. By taking this data into consideration, it becomes possible to compare the performance of Successful Practices with the performance of follower companies. Additionally, the contextual data allows for a better understanding of the conditions that the production system is operated in.

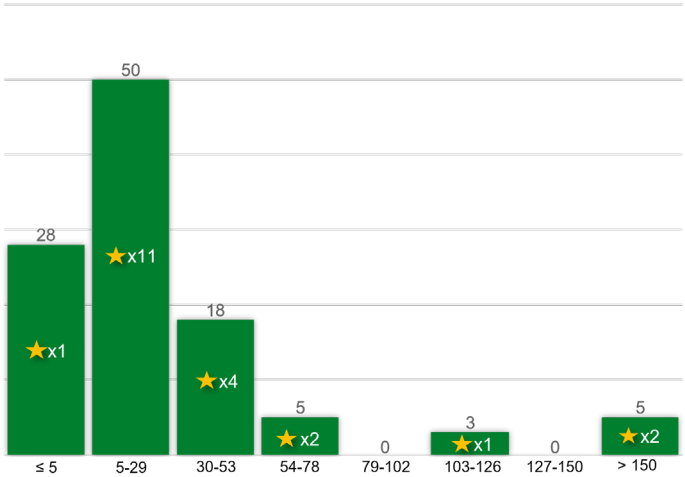


The sample of survey respondents is well-diversified and represents a good distribution of different industries. The largest sectors are pharmaceutical (17%), automotive (14%) and machinery & plant engineering (12%). The Successful Practices are evenly distributed among the industries.

Three fourths of respondents initiated or re-initiated their Production System in the last 10 years. The earliest Production System initiation in this data sample refers to the year 1950.

The year of (re-)initiation thus does not necessarily have to play a crucial role in the success of the Production System.





Overall, it can be seen that half of the Successful Practices operate between 5 and 29 production sites, while 5% operate less than 5 sites and 18% operate between 30 and 53 sites. Moreover 9% of Successful Practices operate with 54-78 sites, 5% with 103-126 sites and another 9% with more than 150 sites.

Guidelines and Recommendations

For the production system to have a positive impact on its company, certain mentalities and habits can be installed with the management and employees. Through our benchmarking study, we found certain patterns and methods that distinguish Successful Practices from followers, making their production system more effective.
In the following, we will describe the general recommendations for production system improvements, which have been based on the benchmarking study.



Have a committed and encouraging Top Management but do not let it drive the Production System on its own

For the production system to be an encouraging and supporting tool, it should be fully supported by top management. Managers should be committed to the system and believe in its improvement opportunities. If there is no upper belief, it is difficult for employees to drive the production system on their own. Between Successful Practices and followers there is a distinct difference regarding Top Management support. In Successful Practices, Top Management regularly requests information on the implementation status of the production system.

The most notable difference is the fact that Top Management is strongly involved in the development and improvement projects but has different incentives to push for its success. As leaders and owners of the production system, global acceptance of the system is the main goal of top management. Furthermore, side-line encouragement is an easier task than hands-on change, They also show strong encouragement to employees to drive the production system through strong leadership and commitment. This is in line with the amount of time Top Management spends to drive Production System implementation.

Followers do see their managers more involved in improvement projects, in contrast to their Top Management. Unlike Successful Practices, Followers' managers play a relatively more active role in these improvement projects.

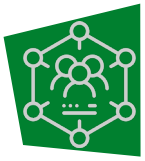
"The Production System has been established across the whole company, and it is impossible to imagine work without it. It is lived by the executives and employees across all hierarchies, and we are yet eager to improve"

What distinguishes Successful Practices from Followers in the roll-out of the Production System is importance of roadmaps and their content. Successful Practices develop certain elements that are mandatory to be implemented at each site and develop a roadmap that is fully aligned with the strategy of each site. This allows for central organization of certain elements while individualizing the system for each site, maximizing its effectiveness.

Pilot projects are considered valuable by both Successful Practices and Followers. This allows for trial and error for the site. Successful Practices appear to translate those pilots to other areas with link to its strategy.



Make the implementation of certain Production System elements mandatory



Establish Production System teams at corporate and site level with defined roles and responsibilities

The production system of a company cannot run as a silo on the corporate or site level only, it should be integrated into the overarching strategy of the company. It is thus important that there exists both a corporate and site product system teams to run the design and implementation of the system appropriately.

What distinguishes Successful Practices from Followers is the fact that successful practice sharing is driven both on the corporate and the site level. Followers, on the other hand, mostly focus on successful practice sharing from a corporate perspective and are not as focused on the site level. This can lead to a discrepancy of information and motivation between the corporate and site level, and thus negatively impact the Production System.

A strong majority of the Successful Practices have a corporate team of dedicated employees managing the Production System. Some Followers, on the other hand, do not have any centrally organized team and rely more on a site-level management of the Production System.

Over half of the respondents have under 6 FTEs dedicated for the corporate Production System team, and one fourth of respondents have between 6 and 16 FTEs for the Production System. A similar distribution appears with the Successful Practice companies, with 45% of them dedicating between 1 and 6 FTEs to the Production System. What is notable is that 18% of Successful Practices dedicate between 11 to 16 FTEs to it, and 23% over 21 FTEs.

"We have installed the Production System into the heads of many managers that we have decentralized responsibility at this level. At the same time, we have a strong central unit that holds the Production System together, and is the link to the Executive Board"



Conduct regular, ideally internal and external maturity assessments

To ensure that the production system is still relevant and up-to-date, it is important to regularly assess its maturity and adjust it accordingly. It is thus recommended to conduct both internal and external maturity assessments.

Close to two thirds of the Successful Practices conduct both internal and external maturity assessments of their Production System. There is a preference for external (33%) over site self-assessment (5%). Only 5% of Successful Practices do not conduct any maturity assessment whatsoever.

38% of the Followers also conduct both external- and self-assessments, but have a slightly weaker preference for third party maturity assessments. 22% do not conduct any maturity assessment.

It thus appears that the combination of both internal and external Production System maturity assessments bring the most benefits as their share is the highest for Successful Practices. Successful Practices make use of both kinds of assessments to a larger share compared to the Followers. There is an overall preference for external maturity assessments in case both internal and external assessment are not conducted together. One in five Followers does not conduct maturity assessments at all.



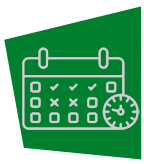
Have clear, well aligned roadmaps in place

Clear, well-defined and guiding roadmaps offer great assistance to the roll-out of production systems. It allows both managers and employees to understand what their tasks and objectives are. It is thus recommended to develop such a roadmap before rolling out a production system and ensure that every aspect of it complements the overarching strategy of the company.

While Followers only slightly agree to roadmaps, Successful Practices see a strong benefit in them and put a lot of effort in developing them.

For the roll-out to be successful, designing a roadmap following a top-down approach with a sequential deployment seems to be most successful. In contrary to followers, Successful Practices develop certain product system elements that are mandatory for each site and develop a roadmap that is fully aligned with the strategy of each site. This individualization maximizes the effectiveness of the system.

"While at the beginning there were still individual methods, in the meantime a fully established program with performance measurement and a clear roadmap has been defined and deployed."



Regularly follow-up on the implementation of Production Systems and related improvements

Along with regular maturity assessments being performed by internal and external actors, it is important for companies to regularly follow-up on any improvements or adjustments made to the production system. Although assessments will give an indication of what functions and what doesn't, if the production system teams do not understand or do not act on this knowledge it loses its purpose. It is thus important for the corporate and site system teams to regularly follow up on any improvements and adjustments that they make, to ensure they are being implemented appropriately.

Successful Practices apply more discipline when checking improvement implementation status and regularly conduct follow-ups. Followers thus should conduct these assessments more regularly.

"The PDCA Cycle is also followed by our Production System. […] we also adapt our Production System"

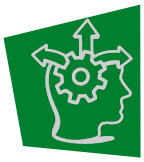


Create ownership for improvements at shopfloor level

Employees ultimately decide how effectively the production system will run in the company, as they must follow and implement it. If the acceptance rate of the system is insufficient, the effectiveness will not be maximized. It is thus important for the production system teams to give ownership of improvements and recommendations to the employees, and incentivize them to further develop the system.

For Successful Practices, once the Production System is deployed, employees follow and enforce the new program and own the improvements. Followers do not show such behaviors. Consequently, the employees get less motivated and the production system becomes less effective with lower acceptance levels.

Ambassadors for the Production System do not seem to be necessary for an effective program. Clear communication and goals have a better effect than leading by example.



Assess the knowledge and skillset of employees and put high emphasis on training and coaching

For the production system and its objectives to be fully implemented in the working culture and overarching strategy of the company, it is important that all employees understand its functions. Managers and employees should thus get additional training and coaching on the implementation of the production system, and these should be followed up by knowledge assessments after a certain amount of time. It is only with a full understanding and adequate skillset that the production system can run effectively.

Regularly assessing the knowledge of employees is a weakness for Followers. Successful Practices leverage these more regularly. This knowledge gap leads to the production system running less effectively and may even cause frustration with the employees.

Both Successful Practices as well as Followers consider successful practice sharing through informal communities of practice a means to share knowledge within the community. This is one method of ensuring that knowledge and skillsets are aligned with the production system.

"In the last years we translated our standard methods and tools into end-to-end perspectives. A lot of effort was done with respect to qualification and a 360°training. For example, the production engineer was trained in OPEX, SCM, Quality and if applicable Leadership"



Do not underestimate a systematic communication approach to create understanding and buy-in

Frequently communicating with the employees allows for the transfer of knowledge and ensuring that the targets are clear and opportunities seized within the company. While a top-down communication is effective to give an indication to employees of what their tasks are, a bottom-up communication channel allows for the shopfloor employees to communicate the operational challenges directly affected by the production system.

While both Successful Practices and Followers agree that establishing effective communication and a common language are important for a successful Production System, there is a difference in how the Production System is systematically communicated throughout the company. Compared to followers, Successful Practices encourage more bottom-up communication and allow employees to recommend changes.

Frequent and structured communication between the Production System team and the global corporate team is considered essential for an effective production system, especially by Successful Practices.

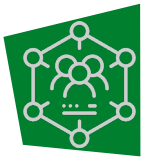
Ambassadors for the Production System do not seem to be necessary for an effective program. Clear communication and goals have a better effect than leading by example.



Guidelines for practitioners to successfully manage their Production Systems



Have a committed and encouraging Top Management but do not let it drive the Production System on its own



Establish Production System teams at corporate and site level with defined roles and responsibilities



Have clear, well aligned roadmaps in place



Assess the knowledge and skillset of employees and put high emphasis on training and coaching



Create ownership for improvements at shopfloor level



Make the implementation of certain Production System elements mandatory



Conduct regular, ideally internal and external maturity assessments



Regularly follow-up on the implementation of Production Systems and related improvements



Do not underestimate a systematic communication approach to create understanding and buy-in





Prof. Dr. Thomas Friedli

Director
Institute of Technology Management
(ITEM-HSG)
Dufourstrasse 40a
CH - 9000 St.Gallen



Mark Grothkopp

Group Coordinator

✉ mark.grothkopp@unisg.ch
☎ +41 (0)71 224 72 72



Jens Kaiser

Group Coordinator

✉ jens.kaiser@unisg.ch
☎ + 41 (0)71 224 72 62



Lorenzo Pirrone

Research Associate

✉ lorenzo.pirrone@unisg.ch
☎ +41 (0)71 224 72 74



Thomas de Liefde

Research Assistant

✉ thomas.deliefde@student.unisg.ch

EQUIS ACCREDITED AACSB ACCREDITED ASSOCIATION OF MBAS ACCREDITED