


COMMENTARY

Further linking Lean management and I-O psychology: A focus on capacity buffers

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This commentary presents a different perspective of Lean to suggest promising areas of collaborations between industrial and organizational (I-O) psychology and Lean researchers unexamined by the focal article. We agree with Balzer, Brodke, Kluse, and Zickar (2019) that (a) the global benchmark study by Womack, Jones, and Roos (1990) led to a consensus that Lean production is a different system than traditional manufacturing and (b) I-O psychology can make a very important contribution to understanding how workers are affected by changes to the design of work generated by Lean implementation in organizations. Indeed, when Lean is viewed solely as bundles of practices or a set of dimensions derived from extant practices (Shah & Ward, 2007), the researcher's perspective may be on the practices themselves and may fail to consider the environment within which the practice was adopted. To date, many Lean researchers have not recognized this global evolution of Lean from cost reduction to the more ambitious goal of *increasing customer value* (Hines, Holweg, & Rich, 2004).

Lean increasingly seeks “to find ways to manage variability and to create capacity by utilizing assets more effectively than in traditional systems,” which incorporates more considerations of the human aspects of Lean (Hines et al., 2004, p. 1000). By focusing on the role of the capacity buffer, or the capacity in excess of average demand (Hopp & Spearman, 2004), we provide a novel, interdisciplinary approach to understanding human interaction in a Lean implementation. Our aim is to highlight capacity buffers as a construct with significant potential for overlap between management and I-O research and practice that may facilitate Balzer et al.'s (2019) call for I-O psychologists to become more engaged in the study of Lean management.

Creating value through capacity management

Hopp and Spearman (2004) developed an axiomatic model that made an important contribution to our understanding of Lean by allowing researchers to examine the context within which Lean practices were adopted and evaluate the extent to which Lean practices add value to customers. They defined Lean as production “accomplished with minimal buffering costs” (Hopp & Spearman, 2004, p. 144) and argue that all systems have three buffers (i.e., inventory, capacity, and time buffers) that protect the system from waste-generating variability (whether internal or external). From this perspective, many Lean implementations have not done more than eliminate obvious wastes (such as unreliable machines); many practitioners have not created Lean systems that seek to add value for the customer (Hopp & Spearman, 2004).

In their model, Hopp and Spearman (2004) guide firms to become increasingly leaner (i.e., less need for variability buffers) by first decreasing the inventory buffer while simultaneously increasing the capacity buffer. Reducing the inventory buffer reveals hidden problems, which managers can address using Lean practices. This allows further reduction in the inventory buffer. As

problems are revealed and solved, the firm can reduce its time buffer. Next, as lead time and inventory buffer decrease, the firm can increase its capacity utilization (reducing the capacity buffer) of front-line workers. It is important to clarify that capacity buffer does not refer solely to the capacity of the line worker nor to the machine; it also refers to capacity of the managers at all levels of the organization. There must be enough supervisory capacity for line workers to receive help and coaching (Mann, 2015; Spear & Bowen, 1999).

Multiple Lean tools affect whether a capacity buffer is created, but the existence of a capacity buffer requires a conscious decision by management that Lean is about more than cost cutting. Traditionally, Lean is constantly reducing the amount of capacity buffer that is actually on the front line through improvement and problem-solving processes (Hopp & Spearman, 2004). This is because multiple Lean practices involve workers in creating the standard operating procedure for each task they perform (de Treville & Antonakis, 2006). Although this provides the workers a sense of ownership and allows the use of quality control techniques, it increases the workers' utilization (thus reducing capacity buffers). The degree of existing capacity buffers provides a measurement of management's view of Lean as being value adding or cost reduction focused. As capacity buffers provide the capability of managers and workers to engage in additional problem solving, there are many areas of research overlap between Lean and I-O to examine the human aspects of Lean.

Capacity buffers in Lean: A door to I-O contributions

In practice, a capacity buffer takes many forms. One obvious form is that there is available time not scheduled for production; and as stated earlier, a second capacity buffer is to have enough supervisory capacity that the supervisor can respond to employee requests for help within a production cycle (see, for example, Hopp & Spearman, 2004; Spear & Bowen, 1999). Other Lean practices that reduce variability and allow faster problem solving, such as 5S, total productive maintenance, and total quality management, also allocate tasks (i.e., cleaning and maintenance) to the workers to organize and perform, giving the employee teams problem-solving responsibility. De Treville and Antonakis (2006) propose that this capacity buffer—decreased cycle times and the increased responsibilities and training provided to workers—introduces a creative tension that can be both extrinsically and intrinsically motivating to workers.

Hopp and Spearman (2004) argue that Lean management should extract waste from current processes and feed it back into capacity buffers. However, this buffer is not used as slack time; it is used as stated above to do problem solving and housekeeping, all of which require employee engagement and all of which help to eliminate workplace problems. One common Lean practice is morning huddle board start-up meetings. These can be used to provide recognition to teams and individual workers, for bottom-up reporting of successes and problems in production, and in solving problems and improving the system. Netland, Schloetzer, and Ferdows (2015) found that daily Lean reporting on the shop floor (i.e., bottom up) and using nonfinancial rewards, such as recognition, assisted the Lean implementation. This concept addresses potential concerns I-O scholars may have that Lean does not put enough emphasis on employee well-being and engagement: Capacity buffers can be used to inject task-focused work with additional meaning, enjoyment, and quality.

Despite the theoretical importance of the capacity buffer in the human side of Lean, research on Lean has largely ignored management's treatment of the capacity buffer. De Treville and Antonakis (2006) proposed that employee motivational response to Lean interventions or Lean tools could be measured using an extended job characteristics model, but capacity buffers have not been considered in this framework. Similarly, prior research about the behavior of employees and teams operating in lower versus higher inventory systems (Schultz, Juran, & Boudreau, 1999) did not consider the capacity buffer. From an I-O psychology perspective,

capacity buffers may constitute task, knowledge, and/or social resources that help employees better manage the demands of their work (Cullinane, Bosak, Flood, & Demerouti, 2014). Even in recent research examining the effects of Lean demands and resources on worker engagement (Cullinane et al., 2014), capacity buffers have not been considered, let alone measured explicitly.

Capacity buffers mapped to I-O topics

Capacity buffers can (a) simultaneously encompass the main areas of I-O psychology that Balzer et al. (2019) argue may add to Lean and (b) conversely contribute to I-O theory and practice. We identify aspects of Lean management related to capacity buffers with parallel concepts in I-O psychology to provide a path for both fields to move forward together. As capacity buffers have the potential to improve employee satisfaction and customer experience, organizations at minimum should consider how these processes evolve. To be even more effective, organizations should consider how leadership can leverage capacity buffers to build staff resilience, create results-oriented reward structures, and develop better teams and systems.

Engagement, well-being, and burnout

High-pressure service industries such as healthcare are constantly being called on to do more and be more productive with fewer staff and resources (Roemeling, Land, Ahaus, Slomp, & van den Bijllaardt, 2017). Better integration of the capacity buffer concept into management practice may therefore address some of the most complex, significant, and intertwined issues facing these industries: customer experience and staff burnout. Recovery research would suggest that capacity buffers may allow employees to take momentary breaks from production or routine tasks to engage in problem-solving and developmental activities that allow them to maintain higher levels of engagement (Trogakos & Hideg, 2009). These opportunities for recuperation of depleted resources would be especially beneficial for resilience against the demands of emotional labor (Lilius, 2012), thereby enhancing interpersonal interactions with customers and clients. De Treville and Antonakis (2006) propose that Lean allows recovery through job rotation, which is facilitated by job training and by the employee's engagement in problem solving due to cleaning, maintenance, and quality management tasks. Cullinane et al. (2014) call for Lean managers to consider ways to provide employees with resources to reduce the potential burnout of a fast-paced, dynamic work environment; we posit that effective management of capacity buffers by Lean leaders is a promising approach. By better understanding how capacity buffers influence interpersonal interactions as well as rest and recovery from job demands, I-O and management scholars may be able to make meaningful contributions to engagement and well-being within organizations.

Teams and leadership

To solve problems and make improvements, teams and front-line workers need managers to be available; it is important that the frontline have a management capacity buffer. This capacity buffer can help improve the team process and/or eliminate production waste (Mann, 2002, 2015). A team-based organization means that if one team member finishes essential tasks, he or she may engage in backup behaviors to assist other team members who have not yet completed their work. As discussed above, this is especially critical for leadership roles within teams: Leaders cannot assist employees who are struggling or need additional guidance and support without a capacity buffer. I-O teams and leadership research may benefit from incorporating the capacity buffer concept, as it constitutes a team-level resource that may predict important emergent states such as cohesion, efficacy, potency, and resilience. Further, as Mann (2015) argues that effective Lean implementation requires leadership to reduce conflict between various teams within a Lean system, scholars in the multiteam systems (MTS) area of I-O psychology may be interested in

understanding the way capacity buffers develop across MTS boundaries and the extent to which MTS processes such as boundary spanning may more effectively integrate excess capacity into system improvement and effectiveness.

Culture, justice, and rewards

The reward system in the firm must facilitate capacity buffer sharing. If not, less experienced employees who may need more time and support may have fewer opportunities to learn and so may continually struggle more at work. This affects firm profits (Emery & Fredendall, 2002) and may give some employees a sense of organizational injustice. These employees may feel like it is unfair that coworkers have more time to interact with customers or patients simply due to having more experience instead of sharing their superior knowledge. I-O psychologists can contribute to Lean by helping to better understand the aspects of organizational culture and climate that influence the development of capacity buffers (and the way capacity buffers influence organizational culture and climate) and how management can influence these factors. This may involve exploring the ways that organizations leverage capacity buffers as reward structures or the ways that capacity buffers influence justice-related performance constructs of counterproductive work behaviors and organizational citizenship behavior.

Decision making

Fundamental to the concept of capacity buffers—and constituting an area ripe for additional exploration and research—is the need to balance the production tasks with the aspects of work that are most meaningful and enjoyable to employees. How does management make decisions about capacity buffers in their day-to-day work, and how do they effectively engage workers to do this? Why does Lean obtain the cooperation of the employee in creating a capacity buffer that is not owned by the worker? I-O psychologists with expertise in measurement and evaluation may be best suited to answer questions regarding the right amount of capacity buffer needed to maintain the optimal ratio of time spent on essential production tasks and time that may be spent in a buffer category. Individual differences in self-regulation and work motivation are likely to contribute to not only the ways that employees bypass standardization to enhance their capacity but also the decisions managers make with what to do with such capacity buffers.

Conclusion

We agree with the premise that scholars and practitioners in I-O psychology and Lean management have significant potential to work together to address many important issues in both fields. To elucidate an area of common ground, we have highlighted a critical component of Lean (i.e., the creation and use of the capacity buffer) that requires understanding the human side of Lean to understand how this buffer is effective—an area that I-O psychologists may find most appealing for an initial foray into this line of work. As a concept, capacity buffers are integrative, because their creation and use requires the implementation of multiple Lean practices and a decision by management to do more than cut costs. I-O researchers are well-suited to measure the joint effects of multiple Lean practices and their resulting capacity buffers on worker motivation and performance. Balzer et al. (2019) rightfully call upon I-O psychologists to see past the unfamiliar terminology and marketing of Lean to facilitate the improvement of these methods. By presenting capacity buffers as a construct that can span the boundary between both fields, we help to further open the door to cross-disciplinary collaborations that Balzer et al. built in their focal article.

References

- Balzer, W. K., Brodke, M. H., Kluse, C., & Zickar, M. J. (2019). Revolution or 30-year fad? A role for I-O psychology in Lean management. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *12*(3), 215–233.
- Cullinane, S. J., Bosak, J., Flood, P. C., & Demerouti, E. (2014). Job design under lean manufacturing and the quality of working life: A job demands and resources perspective. *International Journal of Human Resource Management*, *25*(21), 2996–3015.
- de Treville, S., & Antonakis, J. (2006). Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues. *Journal of Operations Management*, *24*(2), 99–123.
- Emery, C. R., & Fredendall, L. D. (2002). The effect of teams on firm profitability and customer satisfaction. *Journal of Service Research*, *4*(3), 217–229.
- Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: A review of contemporary lean thinking. *International Journal of Operations & Production Management*, *24*(10), 994–1011.
- Hopp, W. J., & Spearman, M. L. (2004). To pull or not to pull: What is the question? *Manufacturing & Service Operations Management*, *6*(2), 133–148.
- Lilius, J. M. (2012). Recovery at work: Understanding the restorative side of “depleting” client interactions. *Academy of Management Review*, *37*(4), 569–588.
- Mann, D. W. (2002). Steelcase learns how teamwork evolves effectively under lean production. *Journal of Organizational Excellence*, *21*(3), 43–48.
- Mann, D. W. (2015). *Creating a lean culture: Tools to sustain lean conversions* (3rd ed.). Boca Raton, FL: Taylor & Francis Group.
- 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.
- Roemeling, O. P., Land, M. J., Ahaus, K., Slomp, J., & van den Bijllaardt, W. (2017). Impact of lean interventions on time buffer reduction in a hospital setting. *International Journal of Production Research*, *55*(16), 4802–4815.
- Schultz, K. L., Juran, D. C., & Boudreau, J. W. (1999). The effects of low inventory on the development of productivity norms. *Management Science*, *45*(12), 1664–1678.
- Shah, R., & Ward, P. T. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, *25*(4), 785–805.
- Spear, S., & Bowen, H. K. (1999). Decoding the DNA of the Toyota production system. *Harvard Business Review*, *77*(5), 96–106.
- Trougakos, J. P., & Hideg, I. (2009). Momentary work recovery: The role of within-day work breaks. In S. Sonnentag, P. L. Perrewé, & D. C. Ganster (Eds.), *Current perspectives on job-stress recovery* (pp. 37–84). Bingley, UK: Emerald Group.
- Womack, J. P., Jones, D. T., & Roos, D. (1990). *The machine that changed the world*. New York, NY: MacMillan Press.

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