

Proactivity and Adaptive Response in Production Planning: An Illustrative Case Study of Workforce Agility in the PPIC Department

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Abstract: PT XYZ, a plastic packaging manufacturer in Indonesia, is highly exposed to seasonal spikes and supply chain disruptions caused by geopolitical factors. As a manufacturing organization, it increasingly operates in a dynamic environment characterized by fluctuations in demand and tight operational constraints. Employee adaptability is a key factor in successfully addressing these challenges, supported by technological systems such as ERP and MRP as enabling tools. This study examines how workforce agility—specifically through the dimensions of proactivity, adaptability, and flexibility—supports on-time order fulfillment amid fluctuating demand conditions. Using a qualitative case study approach, this research investigates the operational dynamics of the Production Planning and Inventory Control (PPIC) department and the Production department. The findings indicate that workforce agility at PT XYZ manifests as a balanced interaction between formal structures and informal mechanisms. To cope with fluctuating demand changes, employees demonstrate proactive cognitive sensing by leveraging historical data trends to predict and prepare for seasonal demand shifts before formal market orders are finalized. Additionally, the organization mitigates the rigidity of the formal ERP system and scheduling workflows by utilizing informal communication channels, such as WhatsApp groups, which significantly accelerates information velocity. This study contributes to the literature on operations management and human resources by empirically demonstrating that workforce agility is not merely an innate individual trait, but rather a socio-structural capability supported by proactive data literacy, two-way communication networks, and experience-driven relational values.

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INTRODUCTION

PT XYZ is a plastic packaging manufacturer that produces plastic packaging PT XYZ is a plastic packaging manufacturing company located in Tigaraksa, Tangerang, Banten, Indonesia. The company produces various plastic packaging products primarily for the Food and Beverage (F&B) sector. In its production process, PT XYZ utilizes several polymer-based raw materials, including Polypropylene (PP), Polyethylene Terephthalate (PET), and High Impact Polystyrene (HIPS). To meet its production requirements, the company sources these materials from both local and international suppliers. The reliance on globally traded polymer materials means that the company's operational performance is influenced not only by internal production factors but also by external markets.

The operational environment examined in this study involves a hierarchical production planning structure. The production process begins with the receipt of Purchase Orders (PO) by the Marketing department, followed by the creation of Sales Orders within the Accurate system and the company's internal Enterprise Resource Planning (ERP) system. These orders form the basis for macro-level monthly production scheduling developed by the Production Planning and Inventory Control (PPIC)

department. The plastic packaging manufacturing industry operates in a highly dynamic business environment, characterized by fluctuating customer demand and constantly changing delivery schedules. In this case, companies are expected to have an efficient production system, but also to ensure effective coordination between the departments involved in the operational process.

Demand volatility is an unpredictable shift in customer demand. Several factors, such as changes in consumer behavior, holidays, pandemics, geopolitical changes, war, market trends, and promotions for goods or services, drive this shift in customer demand.

The company frequently encounters demand volatility, which manifests in unpredictable changes in order quantities and adjustments to delivery deadlines. According to Abolghasemi et al. (2020), demand volatility can create production inefficiencies, leading to increased operational costs, capacity imbalances, and potential stockouts. Such conditions often require sudden adjustments to existing production schedules, which may disrupt operational stability and reduce overall efficiency.

In this situation, the Production Planning and Inventory Control (PPIC) department plays a crucial role in translating information about fluctuations in customer demand into feasible production plans. PPIC (Production Planning and Inventory Control) is a set of activities designed to improve the accuracy of production processes in planning and controlling raw material inventory (Novianti et al., 2020). In addition, according to Brahmantyo et al. (2025), Production Planning and Inventory Control (PPIC) is a critical element in the manufacturing process that coordinates various activities related to production planning, scheduling, and inventory management in order to ensure smooth production operations.

The PPIC department serves as a coordinator between the marketing, production, and warehousing departments to ensure that customer orders can be fulfilled in accordance with production capacity and delivery schedules. However, managing production planning under fluctuating demand presents significant challenges, as sudden changes in order volumes or delivery deadlines require rapid adjustments to production schedules and operational decisions.

According to Sumadireja et al. (2025), Agility is the ability to respond to change quickly (responsiveness), achieve goals optimally (effectiveness), and adapt to new conditions flexibly with minimal effort (flexibility). Agility is a set of behaviors that reflect the ability to actively face change (proactivity), adjust to new situations (adaptability), and be resilient when facing challenges (resilience).

In such dynamic situations, PPIC staff are expected to respond proactively by anticipating potential disruptions and adaptively by adjusting production plans to accommodate changing demand conditions. Therefore, it is important to understand how the proactive and adaptive capabilities of human resources within the PPIC department support the company's ability to maintain operational agility and ensure on-time order fulfillment.

Despite the growing body of literature on workforce agility, two gaps remain. First, existing empirical studies on workforce agility have predominantly relied on quantitative, survey-based methods conducted within large enterprises (e.g., Breu et al., 2002; Qin & Nembhard, 2015; Sherehiy & Karwowski, 2014), leaving the lived, contextual experience of agility within small-to-medium manufacturing firms in emerging economies such as Indonesia comparatively underexplored. Second, prior workforce agility research has largely centered on formal organizational mechanisms—training programs, performance systems, and standard operating procedures—while paying limited attention to the role of informal communication channels as a complement to, rather than a substitute for, formal planning systems such as ERP and MRP. This study addresses these gaps by adopting a qualitative, illustrative case study design within an Indonesian plastic packaging small-to-medium enterprise, and by explicitly examining how informal coordination mechanisms interact with formal systems to sustain proactivity and adaptive response in the PPIC department. In doing so, this study contributes a context-specific, mechanism-level understanding of workforce agility that complements the predominantly quantitative, large-firm-oriented literature.

RESEARCH METHOD

Research Design

This study uses a qualitative approach with an illustrative case study design. This design was chosen because the research aims to describe a real phenomenon in depth within a specific operational context. In addition, the qualitative method allows the study to capture how coordination in the production planning system adapts to demand changes.

Unit analysis

Unit analysis is the primary entity the case study selected for analysis. The participants in this study were selected using purposive sampling, where individuals were chosen based on their direct involvement in the production planning and execution system. The selected participants include the head of the PPIC Department, the production supervisor for the extruder, and the production supervisor for forming and printing. These informants were selected based on their direct involvement in production planning, workforce coordination, and operational decision making. The research was conducted at PT XYZ, selected purposively due to its high exposure to demand volatility and its multi-departmental production planning structure. Data were collected through semi-structured interviews.

Data Collection Procedure

The data collection techniques in this case study include conducting in-depth interviews with participants involved in the production planning and execution system. In addition, direct observation was carried out to understand the flow of discussions, information sharing, coordination processes, and operational execution when demand changes occur.

Data Analysis

Interview recordings were transcribed verbatim and analyzed using manual thematic analysis, following the approach outlined by Wahyuni (2012). The analysis proceeded in three stages: first, transcripts were read repeatedly to gain familiarity with the data; second, meaningful statements relating to proactivity, adaptability, and workforce coordination were manually categorized into preliminary codes; and third, related codes were grouped into broader themes, which were then cross-checked against the direct observation notes collected during fieldwork. No qualitative data analysis software was used; categorization and theme development were performed manually by the research team to preserve close, interpretive engagement with the informants' own language and framing.

Validity

To ensure the internal validity of this case study, according to Wahyuni (2012) several strategies were applied, including triangulation, member checking, and thick description. Triangulation was conducted by collecting data from multiple sources, such as in-depth interviews, direct observations, and document review. Member checking was used to confirm the accuracy of the interview results with the participants: after transcription and initial theme development, summarized interpretations were shared back with each informant to verify that their statements had been accurately represented and that the identified themes reflected their intended meaning, with adjustments made where informants offered corrections or clarifications. In addition, thick description was applied by providing a detailed explanation of the production planning process, the coordination between PPIC and production departments, and the operational situations when demand changes occur.

RESULTS AND DISCUSSION

Workforce Agility in Dynamic Operational Environments

Manufacturing companies frequently operate in an environment characterized by fluctuations in demand, rapid technological changes, and constantly evolving customer requirements. In such environments, organizational performance depends not only on technological systems and operational

processes but also on the ability of employees to respond effectively to changing conditions. This capability is commonly described as workforce agility, which refers to employees' capacity to adapt, respond, and act effectively under conditions of uncertainty and change (Breu et al., 2002). Employees in the PPIC and Production departments implement the essence of workforce agility through their adaptive capacity and mental flexibility in the face of uncertainty. This agility is developed within them through repeated observation and recording of changes in material requirements and related activities when demand changes. Furthermore, employees process existing information into observable information and also understand the changing patterns that occur in material planning and production planning schedules. As an internal capability, workforce agility plays a role in employees' cognitive readiness to align with dynamic serves as the foundation for their agility capabilities before being transformed into operational actions.

Workforce agility has been widely discussed in operations management and human resource management literature as an essential capability for organizations facing turbulent environments. According to Breu et al. (2002), workforce agility represents a strategic approach to managing employees in knowledge-based and dynamic economies, enabling organizations to respond rapidly to evolving market conditions and customer needs. During fluctuations in demand caused by seasonal events or geopolitical shifts, the organization's workforce demonstrates agility through a two-channel coordination mechanism: formal and informal. Formally, information flows systematically from the Marketing department through material requisition forms to the PPIC department for schedule adjustments and material planning, before being finalized on the Production floor. This formal structure serves as the company's standard operating procedure to minimize misunderstandings and information gaps while ensuring a measurable and efficient system.

In parallel, to address the inherent rigidity of the formal channel, employees actively utilize informal coordination through *WhatsApp* groups. This informal channel accelerates the flow of information, giving the team sufficient time to process and decide based on critical data in real time. The integration of formal and informal coordination effectively combines information accuracy with operational speed, representing the core workforce flexibility strategy implemented by PT XYZ to achieve on-time delivery despite high demand volatility. Similarly, Qin and Nembhard (2015) describe workforce agility as the capability of employees to sense changes in the work environment and respond appropriately through flexible and adaptive actions. In manufacturing contexts, such agility enables employees to adjust production activities, coordinate across departments, and maintain operational performance despite fluctuations in demand or supply conditions.

The concept of workforce agility has been further elaborated in the literature as consisting of several behavioural dimensions, including proactivity, adaptability, flexibility, resilience, and competence (Sherehiy & Karwowski, 2014). These dimensions represent behavioural and cognitive capabilities that allow employees to cope with uncertainty, solve emerging problems, and adjust their work practices when organizational conditions change.

Proactivity and Solution of Change-Related Problems

Proactive behavior refers to self-initiated actions in which employees anticipate problems, identify opportunities for improvement, and initiate changes that enhance organizational performance (Crant, 2000). Furthermore, Tessarini Junior & Saltorato (2020) state that proactivity relates to the level of engagement in activities that benefit the organization and the employee. This attribute relies heavily on self-motivation, self-efficacy, and autonomy to make important decisions and anticipate and solve problems. Unlike reactive behavior, which occurs only after a problem arises, proactive behavior involves anticipating potential disruptions and taking early action to mitigate their impact. This aligns with what PT XYZ employees do while preparing to encounter changes in demand. PPIC and Production employees who observe the pattern of changes in demand that exist within a certain period of time, with the presence of recurring patterns that are visible from previous historical data,

the Team can present data on demand for goods into trends, then matched with the actual patterns that are currently occurring, from this information, the team can predict the number of future requests and maneuvering issues before it hinder process; so that when there is an official change in demand from the marketing team, the PPIC and Production teams are ready to support the production process without long delays and minimize losses due to inefficiencies in the production process. In addition, an individual attitude that is not resistant to existing changes also supports the team's success in responding to changes in demand.

In the context of workforce agility, a proactive attitude encompasses the ability to address issues related to changes arising from environmental uncertainty. Sherehiy and Karwowski (2014) argue that proactive employees make a significant contribution to organizational agility because they are able to identify emerging operational issues and take the initiative to find solutions before disruptions escalate. In practical field settings, when issues arise due to changes in demand and production adjustments, employees resolve existing problems by coordinating with relevant teams to ensure issues are resolved promptly, preventing delays or significant production issues. However, when it comes to decision-making—whether in Production or the PPIC department—every action or decision made by employees must still be approved or at least acknowledged by the supervisors and managers of each department. This ensures that employee initiatives remain measured and focused, thereby enhancing their effectiveness. In a dynamic manufacturing environment, proactive employees can identify scheduling conflicts, anticipate raw material shortages, or propose adjustments to operational processes to maintain smooth production.

The importance of proactive behavior is particularly evident in organizational settings characterized by demand volatility and operational interdependence. Employees who demonstrate proactive behavior are more likely to take initiative in coordinating information, communicating emerging risks, and implementing corrective actions. As a result, proactive behavior contributes to improved organizational responsiveness and operational effectiveness (Crant, 2000). In production planning functions such as the Production Planning and Inventory Control (PPIC) department, proactive problem-solving can play a critical role in addressing operational disruptions resulting from changes in customer orders, material availability, or production capacity constraints.

Flexibility, Adaptability, and Rapid Response to Market Changes

In addition to proactivity, workforce agility also involves the capacity of employees to adapt their actions in response to changing operational conditions. Flexibility from an organizational perspective refers to the flexibility that a company grants its employees in the form of workforce adjustments to adapt to dynamic situations. From an employee's perspective, flexibility is the freedom employees have to manage their work hours and the duration of their work in a professional way (Hill *et al.*, 2008). Furthermore, according to Qin & Nembhard (2015), Flexibility and adaptability refer to employees' ability to adjust their work practices, roles, and decisions when organizational circumstances change. These capabilities are particularly important in environments where customer needs, production schedules, and supply conditions frequently fluctuate. According to Tessarini Junior & Saltorato (2020), flexibility and adaptability indicate behavior, attitudes or skills to accept and engage in changes related to work conditions, tasks, and expectations. At the individual level, flexibility and adaptability refer to:

- 1) When or where the work is performed, and
- 2) Proactivity and resilience when relating with people from different cultural groups or with different backgrounds, and the variety of tasks performed, even simultaneously.

Employees focus on the solutions needed to address changes in schedules or production planning caused by shifts in demand, rather than resisting such changes or focusing on personal feelings. Employees fully understand the importance of their respective roles, so that when there is a change in demand, they automatically contribute according to their job descriptions and support one

another to ensure the planning succeeds. The strong sense of camaraderie among employees is one of the factors supporting the flexibility demonstrated by individuals within the department.

Breu et al. (2002) emphasize that workforce agility requires employees to respond rapidly to changes in customer demands and market conditions. Such responsiveness allows organizations to modify operational processes and maintain service levels despite uncertainty. In manufacturing environments, adaptability may involve adjusting production schedules, reallocating resources, or coordinating with different departments to respond effectively to new operational requirements.

Human Resource Management and Workforce Capability

Human capital consists of the knowledge, skills, and abilities of the people employed in an organization (Armstrong, 2010). Human capital refers to the knowledge, skills, experience, and capabilities possessed by employees that contribute to organizational performance. According to Becker (1993), human capital is considered an important asset that enables organizations to improve productivity and achieve a competitive advantage.

Referring to Sutrisno et al., 2025, human capital agility refers to the strategic ability of human resources to adapt quickly, responsively, and effectively to changes in the work environment, technology, and organizational dynamics without losing sight of core objectives. Which explains that organizational agility stems from individuals' ability to learn, innovate, and adapt their skills to meet the demands of change.

How a company manages its people often says more about its resilience than any formal system ever could. At PT XYZ (CJM), a plastic packaging manufacturer in Tigaraksa, Tangerang, workforce capability is not something that lives inside a policy manual. It shows up on the shop floor, in casual production floor conversations, and in the way senior workers pull juniors aside to walk them through a problem. This section looks at three dimensions of how PT XYZ actually manages its people: how knowledge moves through the organization, how technical skills are built and recognized, and how feedback travels between teams.

Knowledge Sharing and Learning Culture

Within the PPIC department at PT XYZ, knowledge does not flow in one direction. Senior staff do guide and teach junior employees, but the relationship is not strictly top-down. Juniors are encouraged to bring their own field observations back to senior staff, which means the learning goes both ways. Even employees who are not directly involved in a particular issue are welcome to sit in and listen during discussions, which gradually builds a shared understanding across the team without anyone having to formally schedule a training session.

The frequency of these exchanges depends on the weight of the issue at hand. Everyday operational matters are handled informally, often at the same time they arise. When something more serious comes up, particularly anything that could hurt the company financially, such as missing inventory or damaged materials, a meeting is called immediately. Problems that fall somewhere in between are typically gathered and addressed in a weekly session. This tiered approach keeps the team from being overwhelmed by constant meetings while still making sure nothing gets ignored.

When plans change abruptly, junior staff are not left to wonder why. Supervisors take the time to explain the reasoning behind a shift and treat those moments as teaching opportunities, with the expectation that juniors will eventually need to handle similar situations on their own. This approach builds not just awareness but genuine readiness, which matters a great deal in an environment where production schedules can change with very little warning.

As for how lessons get recorded, the process is practical rather than elaborate. For routine matters, staff jot things down personally or save notes in *WhatsApp* where they can be searched later. For more serious incidents, someone takes formal minutes and the record eventually gets compiled into a reference document. It is not a sophisticated knowledge management system by any stretch, but it works for the scale and pace of the operation. When the PPIC Head was asked what single

human factor keeps the department running, the answer was immediate: solidarity. The willingness of people to back each other up and the quality of communication across departments were identified as the real engine behind the team's ability to hold things together.

Technical Skill Development and Multi-Skilling

On the production floor at PT XYZ, operational flexibility hinges on a single role: the foreman ("mandor", in Bahasa), and/or the floor supervisor. Unlike regular operators who are trained for specific machines or lines, foreman are expected to be competent across all positions in their area. This means that when someone is absent or when an urgent reallocation of labour is needed, the foreman can step in without the line grinding to a halt. In a factory environment where even a short stoppage has downstream consequences, this kind of coverage is not a bonus, it is a necessity.

The decision about who gets developed into a multi-skilled foreman sits with the foreman themselves, who observe and assess their operators over time. The company recognizes the extra weight that comes with broader responsibility, and foreman who demonstrate mastery across multiple roles receive financial incentives as a result. This is a straightforward acknowledgment that asking someone to carry more capability deserves more than just a pat on the back.

Training an extruder, forming, and printing operators to the point where they can work independently takes between three weeks and a month. The production process is technically demanding, and unlike managerial learning which can be picked up from multiple sources, this kind of knowledge requires close, supervised practice. The hardest part of the training is the technical side, where precision matters and casual learning is simply not enough. To confirm that an operator is ready to be trusted alone, PT XYZ uses an evaluation team that both teaches and assesses throughout the training period. Clearance from this team is required before an operator is considered ready to handle a crisis independently.

Feedback Mechanisms and Continuous Improvement

Production supervisors at PT XYZ are not simply handed a plan and expected to execute it without question. When a supervisor believes that what PPIC has drawn up cannot realistically be done, they say so. The PPIC team retains the final call on planning decisions, but the feedback is taken seriously and leads to a proper discussion rather than being dismissed. This kind of bottom-up communication, where the people closest to the work can push back without fear, is what separates a responsive operation from a rigid one.

Communication between Process 1, which handles extrusion, and Process 2, which covers forming and printing, happens through a mix of channels depending on what the situation calls for. Formal meetings are held when needed, but much of the day-to-day problem-solving takes place informally on the floor, sometimes over coffee when tensions are running high. What stood out in the interview was that operators from both processes do not think of themselves as two separate groups. Despite working in different areas, they identify as a single team, and this shared sense of belonging makes it noticeably easier to sort out cross-process problems quickly.

When the supervisor of the Forming and Printing section was asked what makes them proud of their team during a crisis, the answer was simple: the operators follow through. They comply, they adapt, and they get on with it. That kind of behavioural consistency under pressure is not something that can be manufactured through procedures alone. It comes from the kind of trust and culture that PT XYZ has been building steadily across its teams.

CONCLUSION

This study set out to understand how a mid-sized plastic packaging manufacturer manages to stay operationally stable when demand keeps shifting beneath it. What emerged from the case of PT XYZ was not a story about sophisticated systems or cutting-edge technology. It was, more than

anything else, a story about people, and about the quiet, consistent ways in which they have learned to work with uncertainty rather than against it.

The findings point to workforce agility as a lived, socially constructed capability rather than a fixed individual trait. At PT XYZ, agility does not reside in any single person or any single department. It accumulates through the daily habits of observation and recording, through the willingness of senior staff to slow down and explain a decision to someone junior, through the foreman who can cover any station on the floor when someone does not show up, and through the supervisor who says out loud that a plan will not work and trusts that the response will be a conversation rather than a reprimand. These behaviours, taken one at a time, seem almost ordinary. Taken together, they form the infrastructure that keeps the operation moving.

Three dimensions of this agility stood out across the evidence. The first is proactivity, which at PT XYZ takes the form of reading historical demand data to get ahead of seasonal spikes before formal orders even arrive. Employees are not waiting to be told that something is coming. They are already preparing. The second is adaptability and flexibility, which show up most visibly in the way teams shift roles, reallocate attention, and absorb schedule changes without treating disruption as a crisis. The third is the relational fabric that makes all of this possible. Solidarity, as the PPIC Head put it, is not a soft concept here. It is the practical reason why departments coordinate well, why the informal coffee session between Process 1 and Process 2 actually resolves problems, and why people comply and adapt when things get difficult.

The role of informal mechanisms deserves particular attention. *WhatsApp* groups, floor conversations, and impromptu meetings held the same day a crisis emerges are not signs of an underdeveloped organization. They are evidence of a workforce that has adapted its communication tools to match the speed at which things actually change. The formal ERP and MRP systems provide structure and accountability, but it is the informal layer that gives the organization its real-time responsiveness. Both are necessary. Neither alone would be sufficient. This reflects the lean thinking principle articulated by Womack & Jones (2003), in which value-adding activity is preserved while rigid, non-responsive procedures are continuously identified and bypassed; at PT XYZ, informal communication functions as precisely this kind of adaptive workaround to the inherent rigidity of the formal ERP and MRP systems.

From a human resource management perspective, PT XYZ demonstrates that capability-building does not require elaborate formal programs to be effective. Multi-skilling built around the foreman role, learning-by-doing supported by available mentors, and performance incentives tied to broader competency all represent low-cost, high-impact investments in workforce depth. The organization earns its flexibility not by spending heavily on training infrastructure but by creating the conditions under which people are willing to grow, share what they know, and step beyond their defined roles when the situation calls for it.

This study contributes to the literature by grounding abstract workforce agility concepts in the concrete operational realities of a small-to-medium manufacturing firm in Indonesia. It reinforces the argument that agility is not a property of technology or process alone, but a socio-structural capability that depends equally on how knowledge circulates, how trust is maintained, and how people relate to one another across departmental boundaries. The case of PT XYZ suggests that for organizations operating in volatile demand environments, investments in relational capital and cross-functional communication culture may yield returns that are just as significant as investments in planning systems.

Practical Implications. The findings carry relevance beyond PT XYZ. Because the mechanisms identified here – proactive use of historical demand data, cross-role flexibility anchored in the foreman position, and informal communication channels that complement formal ERP/MRP systems – are not capital-intensive, they are transferable to other manufacturing organizations facing similar demand volatility, regardless of size or sector. Manufacturing managers, PPIC practitioners, human resource departments, and policymakers concerned with workforce readiness in small-to-medium enterprises

may all draw on these findings when designing low-cost interventions to strengthen operational resilience.

Limitations. This study is subject to at least one important limitation. As a single-case study conducted within one plastic packaging manufacturer, its findings cannot be statistically generalized, and no comparison was made against other organizations operating under different demand conditions, ownership structures, or organizational cultures. The patterns identified should therefore be read as analytically transferable rather than universally representative.

Recommendation

This case study is just a beginning, grounded in direct interviews and direct observation of day-to-day operations. This study interviewed three key informants selected through purposive sampling based on their direct involvement in production planning and execution: the Head of the PPIC Department, the production supervisor for the extruder line, and the production supervisor for forming and printing.

Given that the present study is limited to a single organization, future research is encouraged to extend this line of inquiry by comparing workforce agility practices across more than one company, particularly firms of varying size, sector, or ownership structure operating under similarly volatile demand conditions. Such comparative studies would help establish whether the proactivity and adaptive-response mechanisms observed at PT XYZ hold across different organizational contexts. In addition, further qualitative and/or quantitative studies can be developed to measure top-down evaluation and/or 360-degree evaluation in the PPIC and Production departments. Further interview data can also be correlated and measured to determine which factors increase or decrease the proactivity and adaptability of the workforce.

REFERENCES

- Abolghasemi, M., Beh, E., Tarr, G., & Gerlach, R. (2020). Demand forecasting in supply chain: The impact of demand volatility in the presence of promotion. *Computers & Industrial Engineering*, 142, 106380. <https://doi.org/10.1016/j.cie.2020.106380>
- Armstrong, M. (2010). *Armstrong's essential human resource management practice: A guide to people management*. Kogan Page.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). University of Chicago Press.
- Brahmantyo, F. X. D. A., Kurniawan, I., & Saraswati, T. (2025). Developing production planning and control system by applying dispatching rules: A case study at a packaging manufacturer. *Performa: Media Ilmiah Teknik Industri*, 24(1), 77–91. <https://doi.org/10.20961/performa.24.1.90940>.
- Breu, K., Hemingway, C. J., Strathern, M., & Bridger, D. (2002). Workforce agility: The new employee strategy for the knowledge economy. *Journal of Information Technology*, 17(1), 21–31. <https://doi.org/10.1080/02683960110132070>
- Crant, J. M. (2000). Proactive behavior in organizations. *Journal of Management*, 26(3), 435–462. <https://doi.org/10.1177/014920630002600304>
- Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson Education Limited.
- Grznár, P., Burganová, N., Mozol, Š., & Mozolová, L. (2023). A comprehensive digital model approach for adaptive manufacturing systems. *Applied Sciences*, 13(19), 10706.
- Heizer, J., Render, B., & Munson, C. (2020). *Operations management: Sustainability and supply chain management* (13th ed.). Pearson Education.
- Hill, E.J., Grzywacz, J.G., Allen, S., Blanchard, V.L., Matz-Costa, C., Shulkin, S. and Pitt-Catsoupes, M. (2008) 'Defining and conceptualizing workplace flexibility', *Community, Work & Family*, 11(2), pp. 149–163. <https://doi.org/10.1080/13668800802024678>

- Novianti, D., Maksudi, M., & Inten, S. (2020). *Rancang bangun sistem production planning and inventory control (PPIC) untuk menentukan estimated time departure (ETD)*. INTI TALAFA: Jurnal Teknik Informatika.
- Qin, R., & Nembhard, D. A. (2015). Workforce agility in operations management. *Survey in Operation Research and Management Science*, 20(2), 55-69. <https://doi.org/10.1016/j.sorms.2015.11.001>
- Senge, P. M. (1990). *The fifth discipline: The art and practice of the learning organization*. Doubleday.
- Sherehiy, B., & Karwowski, W. (2014). The relationship between work organization and workforce agility in small manufacturing enterprises. *International Journal of Industrial Ergonomics*, 44(3), 466-473. <https://doi.org/10.1016/j.ergon.2014.01.002>
- Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2008). *Designing and managing the supply chain: Concepts, strategies, and case studies (3rd ed.)*. McGraw-Hill.
- Slack, N., & Brandon-Jones, A. (2019). *Operations management (9th ed.)*. Pearson Education Limited.
- Syamil, A., La Ode, N., Rosariana, B. C., Aristy, L. M., & Liesl, R. (2025). *The roles of agility, supply chain sustainability, and risk management on operations performance in manufacturing industry*. Acset Pondasi Indonusa; MAP Fashion; Persolkelly Indonesia.
- Sumadireja, G. C., Dachyar, M., Farizal, F., Ma'aram, A., & Park, J. J. (2025). Identifying key assessment factors for human capital agility and leadership agility. *Sustainability*, 17(9), 3849. <https://doi.org/10.3390/su17093849>.
- Sutrisno, Ausat, A. M. A., & Junaidi, A. (2025). Analisis peran strategis human capital agility dan digital readiness dalam mengoptimalkan kinerja tim virtual pada dinamika lingkungan kerja hibrida berbasis teknologi adaptif. *Jurnal Minfo Polgan*, Vol.14.
- Ulrich, D., & Brockbank, W. (2005). *The HR value proposition*. Harvard Business School Press.
- Wahyuni, S. (2012). *Qualitative Research Method: Theory and Practice Third Edition*. Jakarta: Salemba Empat.
- Womack, J. P., & Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation (2nd ed.)*. Free Press.