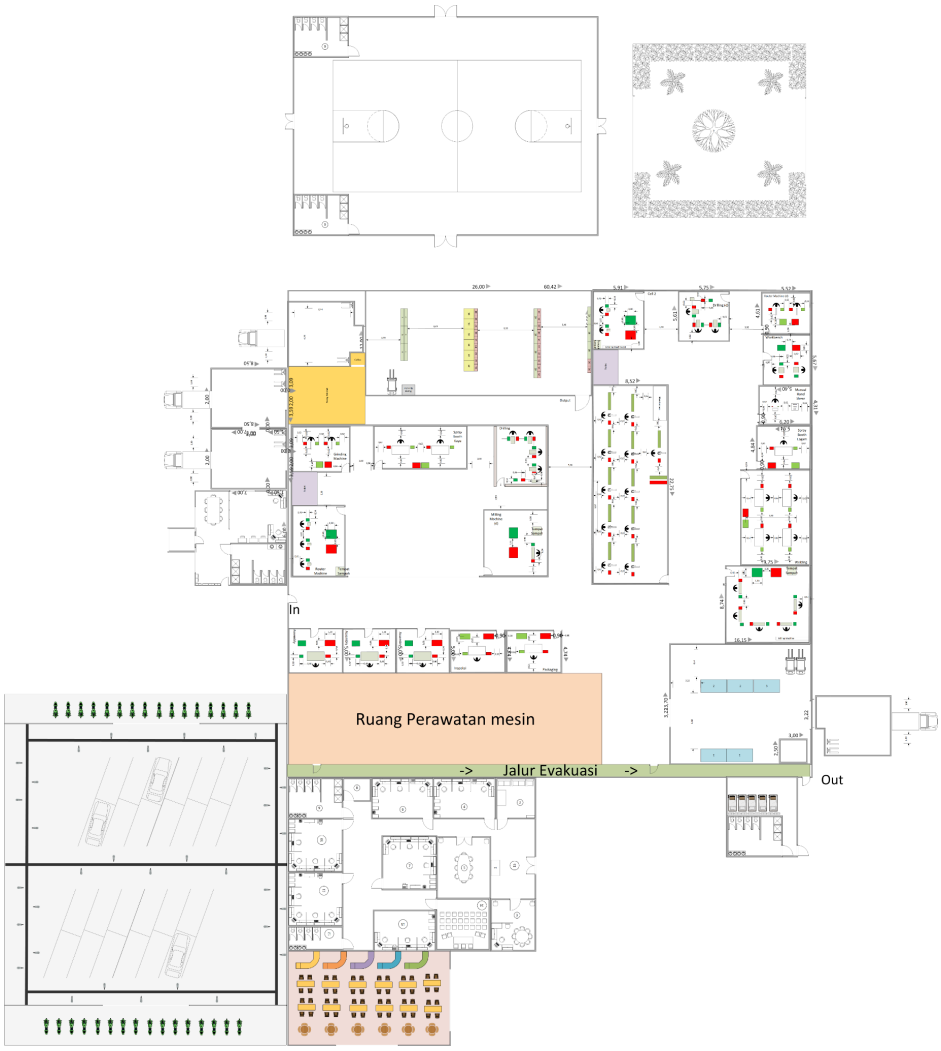
Driving Operational Excellence: My Expertise in Facilities Layout and Financial Planning for PT. PST

In the fiercely competitive landscape of modern business, strategic planning is paramount. Companies, regardless of their scale, constantly face the challenge of optimizing resources to maximize efficiency and productivity. A well-designed facility layout and robust financial planning are not just theoretical concepts; they are critical determinants of operational flow, inter-departmental communication, material handling efficiency, and ultimately, a company's financial health. Recognizing this urgency, I led a comprehensive project aimed at delivering a strategic blueprint for **PT. PST**, a company poised to innovate the market with its flexible and ergonomic folding tables. It is important to note that PT. PST served as a dummy company, functioning as a case study provided by my university for this learning experience. My role was to ensure that every investment decision, particularly in factory and office infrastructure, would yield maximum value and sustainable growth by meticulously **designing capacity**, optimizing **facilities layout**, conducting thorough **cost analysis**, and performing rigorous **investment analysis**.

Strategic Blueprint: Designing Optimal Facilities and Robust Financials

The core objective of this project was to meticulously design optimal office and factory layouts for PT. PST, alongside a thorough financial analysis to ensure the proposed investments were viable and highly beneficial. This involved a multi-faceted approach, encompassing detailed data collection, advanced analytical methodologies, and a deep understanding of operational economics. Our product, the "Meja Lipat PST," is designed to meet the growing demand for flexible workspaces, especially in the era of home offices and co-working spaces. It stands out with varied colors, ergonomic design, and features for Work From Home (WFH) professionals. PT. PST aims to produce up to 95,733 units annually.

My initial phase focused on **meticulous layout planning**:



- **Office Layout Design:** I began by calculating the precise space requirements for PT. PST's office departments. This involved determining the necessary floor area for various administrative and support functions, such as the reception, waiting rooms, director's office, accountant's office, meeting rooms, and specialized departments like HRD, production planning, and marketing and sales. The total office area was meticulously planned (total 560.9239 m²) to accommodate required personnel and facilitate efficient communication and workflow , directly supporting the company's human resource capacity.
  PT. PST Office Layout
- **Factory Layout Design and Capacity Planning:** This phase was critical for establishing the operational backbone of PT. PST, directly influencing its production capacity. I explored two primary layout alternatives: **Process Layout** and **Group Technology (GT) Layout**.

    - **Process Layout:** This approach groups similar machines or processes together. Its design facilitated efficient material flow and offered flexibility for diverse product routes.
    - **Group Technology (GT) Layout:** This method organizes production into "cells," where dissimilar machines are grouped to manufacture a family of parts or products. This enhances efficiency for specific product types.
      I utilized
      Activity Relationship Charts (ARC) to visually represent the desired closeness relationships between various departments, assigning weights (e.g., 'A' for Absolutely Necessary = 243, 'E' for Especially Important = 81). These charts were fundamental inputs for the
      CORELAP (Computerized Relationship Layout Planning) method, which systematically places departments to optimize proximity and minimize material handling costs.
- I calculated **Unit Area Templates (UAT)** to determine the standardized area needed for each department. This metric, derived from the actual area requirements of each department (e.g., Production Area at 3090.825 m² for Process Layout and 3383.52 m² for GT Layout), allowed for a systematic placement of facilities through iterative placement rating. This direct link between area needs and UATs ensured the designed layouts could support the projected annual production capacity of 95,733 units. The placement rating iterations, guided by ARC relationships, facilitated the optimal arrangement of departments within the factory space.
  The factory designs incorporated several additional facilities crucial for supporting capacity and employee well-being, such as ample parking (for 20 cars and 56 motorcycles), a canteen, a multi-purpose hall/field, a garden, a clinic, a security post, and a waste treatment facility. These additions enhance operational efficiency, productivity, and safety within the facility.
  Layout Keseluruhan Terakhir Pabrik dll. *Comprehensive Factory Layout (Process Layout Example)*
  Layout Cell 1 *Example of a Production Cell Layout*
- **Location Determination:** I identified **Demangharjo, Tegal, Central Java**, as the optimal location for PT. PST's facilities. This decision was driven by several strategic considerations directly impacting cost and logistics: the availability of large land areas (18,940 m²) at a favorable price (Rp 1,000/m²), a competitive regional minimum wage (UMP Jawa Tengah: Rp 2,110,000) , direct access to major roads for large vehicle movement without disturbing residential areas, and its strategic proximity to the Velox Consulting Group's base in West Java. This analysis underscores my ability to integrate location strategy with overall cost efficiency and supply chain considerations for optimal **capacity utilization**.

Financial Analysis: Cost Control and Investment Viability

A robust financial analysis was integral to validating our proposed layouts and **capacity plans**. This phase involved meticulous **cost analysis** and comprehensive **investment analysis**.

- **Cost Analysis:** I systematically calculated the **Cost of Goods Sold (HPP)** for PT. PST's folding tables, which formed the basis for pricing strategies and profitability projections. This involved breaking down all cost components:
    - **Direct Material Costs:** Including raw materials (e.g., square hollow iron, stall pipes, MDF wood) and auxiliary materials (e.g., hinges, bolts, paint). The total annual direct material cost was projected at approximately Rp 13.26 billion.
    - **Direct and Indirect Labor Costs:** Covering wages, THR (religious holiday allowance), and insurance for both direct production operators and indirect administrative/support staff.
    - **Overhead Costs:** Encompassing factory purchasing and maintenance, electricity consumption for machinery and facilities, water usage, and depreciation of assets.

      The HPP per product was calculated at approximately Rp 172,834 for the Process Layout and Rp 174,178 for the GT Layout, leading to selling prices of Rp 249,400 and Rp 251,339 respectively. My analysis confirmed that differences in machinery quantity and space utilization between the two layouts contributed to their distinct cost structures.

- **Investment Analysis:** This rigorous phase assessed the financial viability and attractiveness of our proposed factory and office layouts. I conducted detailed projections and analyses:
    - **Profit & Loss Projection:** I forecasted PT. PST's revenue, expenses, and net profit over a 10-year period, factoring in an annual inflation rate of 3.52%. Sales growth was projected at 7.5% annually.
    - **Cash Flow Projection:** I developed a comprehensive cash flow statement, detailing cash flows from operating, investing, and financing activities over the same 10-year horizon. This included initial investments in land, buildings, and equipment, recurring investments for asset replacement, external financing (bank loans), and owner's equity contributions.
    - **Investment Feasibility Metrics:** I applied industry-standard metrics to evaluate financial attractiveness:
        - **Discounted Payback Period (DPP):** Calculated to determine the time required for the cumulative discounted cash inflows to equal the initial investment.
        - **Net Present Value (NPV):** Calculated as the sum of the present values of all cash flows, indicating the project's profitability in today's terms.
        - **Internal Rate of Return (IRR):** Determined as the discount rate at which the NPV of a project equals zero, representing the project's expected rate of return.
    - **Minimum Attractive Rate of Return (MARR):** To benchmark the IRR results, I calculated the MARR, which is the minimum acceptable rate of return for the investment. This was derived from the Weighted Average Cost of Capital (WACC), a risk premium of 5%, and the 3.5% inflation rate. Our calculated MARR was 14.32%.
    - **IRR Analysis:** Both Process Layout and GT Layout scenarios (Scenarios 1 and 2 for each) demonstrated an IRR significantly greater than the MARR (e.g., Process Layout Skenario 1 IRR 60.40% > MARR 14.32%), indicating strong financial viability and attractiveness for investment.
    - **Break-Even Point (BEP):** I determined the BEP for each layout, indicating the number of units PT. PST needed to sell to cover all costs. The GT Layout had a slightly better BEP of 5,390 units compared to the Process Layout's 5,581 units, signaling greater efficiency in covering fixed costs.
- **Layout Evaluation and Selection:** The final decision on the optimal layout was made through a comprehensive evaluation that considered both quantitative financial metrics and qualitative operational factors. The GT Layout was selected as the superior alternative. While both layouts were financially viable, the GT Layout demonstrated better overall financial performance (e.g., higher NPV, better BEP) and operational advantages , despite a slightly higher total investment cost (Rp 26,888,697,297 for GT vs. Rp 26,809,039,718 for Process).

Project Conclusion: Tangible Impact and Developed Competencies

From this project, the conclusion is: **the Group Technology (GT) Layout is the optimal choice for PT. PST, offering superior financial returns and operational advantages over the Process Layout. This strategic facilities design, integrated with robust capacity planning, cost analysis, and investment viability assessments, ensures maximized operational efficiency and enhanced profitability for the company.**

From this project, I gained and honed the following skills:

- **Facilities Layout Design & Optimization:** I developed expertise in designing comprehensive office and factory layouts, applying systematic methods like ARC and CORELAP to optimize space utilization, material flow, and inter-departmental relationships.
- **Capacity Planning:** I learned to determine production capacity requirements, translate them into facility space needs (UATs), and design layouts that effectively support target production volumes (95,733 units/year).
- **Cost Accounting & Analysis:** I gained proficiency in meticulously breaking down and projecting various cost components, including direct materials, labor, overhead, shipping, operational expenses, and depreciation, which informed HPP calculations and pricing strategies.
- **Investment Feasibility Analysis:** I mastered financial modeling techniques, including calculating Discounted Payback Period, Net Present Value (NPV), and Internal Rate of Return (IRR), and determining Break-Even Points (BEP) for strategic investment decision-making.
- **Strategic Planning:** This project allowed me to integrate layout design, capacity planning, and financial analysis into a cohesive strategic blueprint, demonstrating my ability to contribute to overall business strategy.
- **Quantitative Data Analysis:** I honed my skills in collecting, processing, and interpreting various data sets to drive design and financial conclusions.
- **Problem Solving & Optimization:** I applied analytical thinking to identify optimal solutions for complex operational and financial challenges.
- **Technical Communication:** I effectively translated complex technical analyses and financial projections into clear, actionable business recommendations for stakeholders.

This project is not merely an academic accomplishment but an invaluable practical experience in applying industrial engineering principles to solve real-world business challenges. It underscores my dedication to operational excellence and my capability to deliver impactful solutions that drive efficiency and profitability.