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Vikas Singla's chapter on layout planning aims to educate students about the importance of designing proper layouts, various characteristics of process and product layouts, basic techniques for designing them, and other types of layouts. Layout planning involves making decisions about the physical arrangement of economic activity centers within a production or service facility. This includes determining the type of centers needed based on the jobs involved in producing a good or service. For example, a motorcycle service station should have specific service centers for each motorcycle, tool stations, and common tool centers used by all units. Other important aspects of layout planning include determining the space and capacity for each center to ensure uninterrupted movement of people and materials. The placement of different service centers is also crucial, taking into account relative location (space occupied relative to other centers) and absolute location (particular space within a facility). In educational institutions, for instance, departments related to social sciences might be grouped in one center while those relating to sciences are in another. The canteen should be placed near teaching departments but away from areas that could disturb the teaching function. A proper layout has a direct effect on production efficiency and ensures smooth and rapid movement of materials from raw materials to end products. A retail store is a complex system with various departments that cater to different customer needs. One such arrangement is shown in Fig. 16.1.1, where the grocery department dominates space due to its high demand. The layout planning is crucial in this context as it affects the overall functionality of the store. For instance, the placement of the vegetable and meat product stores was found to be objectionable by some vegetarian customers, highlighting the importance of considering customer preferences in the design. A well-designed plant layout can facilitate the flow of materials and information, as seen in service stations and universities where specific departments are located close together. It also enables efficient utilization of labor and equipment, such as reducing the movement of workers at a service station or optimizing the allocation of space for stores with varying customer traffic. Moreover, an effective layout can help companies communicate their strategies effectively, ultimately contributing to achieving competitive priorities. By strategically planning the layout, businesses can maximize efficiency and optimize resources, leading to improved customer satisfaction and increased competitiveness in the market. Stopping utilization of all machines to nothing, the car wash operation setup is different from store operations because in stores, if one economic area breaks down, it can be replaced by another process or function. However, in a car wash layout, such replacements are not possible, so the process affects the use of labor and equipment significantly, increasing customer convenience at service centers: banks provide various services, and many customers access a branch, increasing demand. To reduce waiting times and improve customer flow, banks must select an optimal layout, ensuring worker safety: in manufacturing facilities, heavy materials are moved around, and workers operate hazardous machines. Proper layouts provide enough space for material movement and allow workers to move freely, reducing the risk of accidents. Improving employee morale and communication: proper layout selection plays a crucial role in enhancing employee morale and productivity in organizations that require free flow of communication and teamwork. Companies like IT, banks, and teaching departments use layout design to improve employee productivity. Types of layouts: layout planning has significant implications for both manufacturing and service firms. A company's objective determines the type of layout to select. Mass production systems are chosen when the goal is to produce low-cost products, while batch production systems are preferred when producing customized and high-quality products. The characteristics of each operation system influence layout design, with strategic objectives guiding the selection process. In systems requiring customized production, the layout design diverges from traditional batch production models. Companies often implement hybrid layouts that combine elements of both operating systems, catering to their unique needs. For instance, a car assembly plant utilizes mass production for assembling similar vehicles and batch operations for painting, necessitating a hybrid approach. 16.3.1 Process Layout Companies manufacturing low-volume, high-variety products opt for process layouts, grouping workstations or departments based on function. This layout is prevalent in service industries like banking, retail stores, and apparel shops, which provide diverse services with limited demand for each type. The characteristics of a process layout include: * Low product or service volume * High product or service variety * Utilization of general-purpose equipment capable of performing multiple operations * Flexibility in adapting to changes in product mix * Shared resources used to produce different products or services Process layouts, however, come with drawbacks such as lost productive time due to resource changes and jumbled resource flow, resulting in costly and time-consuming material handling. In retail environments, for example, a customer's path might resemble a maze, navigating through the layout to reach their desired service. This complexity can hinder efficiency and customer satisfaction. Manufacturing facilities often struggle with the efficient movement of people and materials due to varied customer paths, hindering employee productivity and increasing costs. This issue can lead to slower production rates, higher storage needs, and wasted time in changing between tasks. To address these challenges, designing work centers based on process layout is crucial. Key considerations include keeping departments close together to minimize material movement, arranging them in the sequence of operations, and ensuring convenient inspection and supervision. An example of this can be seen in an illustration where three departments are assigned to specific locations, taking into account distances between locations and workflow between departments. By analyzing these factors, the most efficient arrangement is determined, resulting in optimal productivity and minimal waste. In a similar vein, firms adopting mass production systems often utilize product layouts for their operations. This approach caters to high-volume, low-variety product manufacturing, where operations are continuous and repetitive. Examples include car assembly lines or car washing facilities, where employees perform repetitive tasks with precision. By tailoring process layout designs to meet specific industry needs, companies can optimize their production processes, reducing waste and increasing overall efficiency. Manufacturing operations mainly rely on the product layout, whereas services typically use batch production systems and process layouts for their operations. The key characteristics of product layout include high-volume and low-variety production, specialized equipment that performs one operation at a fast rate, and dedicated resources for each task. In contrast to process layout, product layout minimizes downtime due to machine changes and optimizes material flow through streamlined processes. For example, in car washing, different machines are designed to perform specific tasks, such as washing, rinsing, or drying, allowing for efficient production without the need for frequent equipment changes. The workflow is also linear, with raw materials flowing according to a set sequence, reducing waste and inventory storage needs. Employee skills in product layout tend to be low-cost and focused on repetitive tasks, enabling workers to become proficient in their assigned roles quickly. Material handling costs are also lower due to the streamlined process. However, product layout has some limitations: it can be inflexible to changes in production processes, equipment utilization may be lower compared to process layout, and specialized machines can limit adaptability. Additionally, a fixed layout is often required, which can make it challenging to accommodate changes or new products. The production line is limited to producing a specific type of product. If demand for these products decreases, the resources cannot be utilized to manufacture other products. Additionally, if one machine breaks down, it can affect the entire assembly line. For instance, if a rinsing machine fails, the drying machine cannot operate until the car reaches its workstation. The equipment used is capital-intensive, making it costly to produce small batches. In a product layout, machines are arranged in sequence, and each product moves through the process flow from start to finish. Little inventory builds up between workstations, and no workstation should be idle. However, different operations may require varying times. For example, washing and drying might take 2 minutes, while rinsing takes 4 minutes. In this scenario, if a car enters the assembly line, gets washed in 2 minutes, then machine 2 will receive the product for processing after 2 minutes, and machine 3 will get it for drying after 6 minutes. Meanwhile, another two cars can be washed during that time, resulting in inventory accumulation before machine 1. This type of layout is considered unbalanced. To address these bottlenecks and optimize resource usage, line balancing techniques are applied to remove inefficiencies and ensure proper design. The hybrid layout combines elements of product and process layouts, where some activities follow the characteristics of product layout while others follow those of process layout. Examples include car assembly lines and food preparation in dine-in restaurants versus fast food restaurants. The restaurant industry offers various options to cater to diverse customer preferences, resulting in restaurants providing high volumes of goods at low variety, while fast-food establishments prioritize serving similar products in large quantities. Some restaurants now offer hybrid services, combining both types, and adapt their layouts accordingly. Process layout is often used for high-variety, low-demand products, whereas product layout focuses on producing high-demand, low-variety goods. A typical retail store like Easyday differs significantly from the layout found in an apparel store. Observing the layout of online retailers such as flipkart.com can provide valuable insights into the differences between various types of stores.

What is office planning and layout. What is project layout planning. What is systematic layout planning. What is layout planning in operations management. What is layout planning in dental technology. What is the importance of layout planning. What is the primary goal of facility layout planning. What is layout planning in production management. What is store layout planning. What is site layout planning. What is facility layout planning. What is the primary objective of facility layout planning. What is the primary objective of layout planning in manufacturing.