Process Selection Decisions

Marc S. Galli

Walden University

Professor Dr. John Richard Horne

BUSI 3010: Operations Management

November 1, 2020

Process Selection Decisions

Whether an operations manager is head of a manufacturing facility or a production facility, there are many considerations which he or she has to pour over and keep in perfect balance. This dissertation focuses primarily on the teachings of Pinto and Venkataraman, co-authors of *Operations management: Managing global supply chains*, a textbook placed into publication by Sage Publications 2018. This treatise will cover the heart of all production: process flow. Process selection decisions involve many factors, to wit: planning layouts, layout recommendations, outsourcing decisions, service process design matrices, various process types, warehouse design and operation, process flow charts, and making capacity decisions. Each of which will be summarized and critically evaluated in the forthcoming sections of this dissertation.

Element 1: Planning Layouts

Within product manufacturing, operations managers need to be attentive to the particulars of a facility's layout. Deciding on the physical arrangement of work areas and equipment, colloquially referred to as *layout*, is a strategic decision that requires careful attention. These decisions bear greatly on both cost and efficiency within the facility. There are several basic types of layouts chosen specifically because it tailors to manufacturing for specific products. I argue for the cruciality of three basic layout types, to wit, process, product, and fixed-position layouts. I will present my case using Venkataraman (2018) to thoroughly define and provide three examples where each would be preferred. The first of three basic layout types is the process layout. A process layout is considered by most to be a functional layout and is best suited to be employed by a firm which produces a low volume of products. Because of its high flexibility, manufacturing facilities using this basic layout are capable of meeting a wide variety of needs

and unique specifications for its products. Pieces of equipment are laid out positionally according to their functionality, and the process flow employed within the facility is not circuitous but instead varies depending on the particular product being manufactured. Albeit inefficient, the process layout enables a facility to diversify and produce products in a multitude of variations. Examples of products that would be manufactured in a facility employing a process layout include a cell phone case manufacturer, a computer electronics manufacturer, and a small plumbing parts manufacturer.

The second of three basic layout types is product layout. The product layout is basically the complete opposite of the process layout. Eschewing flexibility within the manufacturing process and trading the capability of customization for efficiency and speed, this process is exceptional at producing a highly standardized product (Venkataraman, 2018). Examples of products that are manufactured in a product-layout manufacturing facility include refined sugar, writing paper, and these days you can include computer processors. Once upon a time, computer processors were made fundamentally different and the process to produce a dual-core processor differed from that of a quad-core processor. These days, a batch of processors is created, and firmware is used to cripple and disable a would-be top-tier processor to reduce its capabilities to the specification defined for lower-tiers.

Thirdly, and most recognized of the basic layout types employed in manufacturing facilities is the fixed-position layout. In the aforementioned layout types, the equipment and manufacturing workers were stationary while the product moved through the plant, however, in a plant that uses the fixed position layout, the product is what remains stationary. As specialized workers, materials, tools, and machines are needed, they are brought to the product. Common

examples of items manufactured within this layout include barges, jet airplanes, and residential homes

Element 2: Layout Recommendations

I contend that there are objective methods that can be used to affect prioritization within a remodeling project when limiting factors such as available financials conflict with the desires of management for a far more extensive remodeling project than is possible given currently available resources and finances. I will present my case using Hixson (2015) to express recommendations in two proposed scenarios while providing support for my reasoning. The first such situation which has been proposed is a restaurant that serves high-end food, downtown, to professionals and 20 to 30-year-olds. Hixson (2015) stresses prioritization and analyzing specific aspects that will bring about the greatest return on investment. Since the majority of patrons are not coming for drinks between 11 a.m. and 2 p.m., I would forfeit improvements to the bar area to better focus and concentrate efforts on more important areas of improvement. The description of the high-end restaurant gives rise to the comprehension that patrons come to expect a level of class and a high standard. To accomplish this best, all funds should be directed at the kitchen and dining area. Any executive chef would testify, presentation holds every bit as much value as the actual quality of the food does. Since the restaurant is only open during lunch hour, expense can be spared on the waiting area. For this reason, and because the restaurant is so exclusive, the entrance/exterior appearance still fails to command as much attention as the kitchen and dining area should.

Our second example is a restaurant in a mid-size town serving home-style meals. Given seven areas within which funds may be apportioned and upon which improvement may be rendered, to wit: the exterior, entrance, waiting area, dining area, kitchen, restrooms, and bar, I

propose to apply portfolio risk management assessments as introduced by Hixson (2015) wherein he postulates that due consideration must be given for a circumstance where growth exceeds the capacity planned for service. In context, the lesson on portfolio risk management can be appropriately applied to this second scenario where inexpensive home-style meals draw a crowd in this mid-sized town that it cannot adequately and simultaneously handle. To keep waiting patrons desirous to stay, I assert that renovations should be conducted on the waiting area and entrance to the establishment. Additionally, I recommend that surplus capital would be wisely invested in the dining area to cultivate and maximize the homely atmosphere that patrons have come to appreciate. My thoughts are diverted to places such as Buca Di Beppo and Cracker Barrel, which prioritize its interior décor and thus cultivate a warm and welcoming environment.

Element 3: Outsourcing Decisions

Using Webb's (2017) article published in Forbes magazine as my guide to outsourcing, I assert that there are distinct factors within the decision-framework that an organization can use to determine if a product should be produced in-house or if it should instead be outsourced. To outsource is to rely on a third-party for internal operations. In principle, choosing to outsource permits a company to shift its focus while "experts" handle the minutia. Suppose an information technology company billed itself as a full-service I.T. solutions provider but noticed that customers wanting website design by their firm also wanted provisions for website hosting. If the I.T. company chose to outsource the website hosting, they would be freed to put more effort into their mainstay service, designing websites to customer specifications. Most outsourcing providers offer a "white-label" service where they will re-brand the product or services to give the impression that the contracting firm is a division or extension of the primary company. This builds their brand and customer recognition. A principle factor in deciding to outsource is the

profitability of the product or service. Some products and services are loss leaders; they serve the function of bringing in new business but don't actually earn profits for the company. Outsourcing makes sense in this scenario to maximize profitability by diverting the maximum focus to more lucrative products and services. Other factors include consideration for the opportunity cost lost by focusing efforts on a product or service which could otherwise be outsourced (Venkataraman, 2018). Producing some products and offering some services require great financial capital to launch, great liability insurance coverage, or certain licensure to offer. In these cases, outsourcing makes the most sense!

Element 4: Service Process Design Matrix

According to Inman (2019), the service process matrix is a valuable tool to evaluate strategic changes within a service-oriented corporation. The service process matrix is divided into four quadrants and charts a company's position on the chart when evaluated by its position on a continuum of two separate metrics. The first of which compares the relative degree of interaction and customization while the latter measures the degree of labor intensity. The matrix was first presented in 1986 by Roger Schmenner. The theory is a simple one: service organizations often start with a high degree of labor intensity combined with a high degree of client/customer interaction and a business strategy that is conducive to compliance with custom requests. Over time, due in part to the concept of economies of scale, the company will move diagonally upwards on the Cartesian plane which the matrix is plotted on, representing repetitive service decreases in the labor and customer interaction required to provide the services.

An organization can use the service process design matrix for self-examination and to audit its service processes to gain insight into areas where improvement can be found. By way of example, if, when evaluated, a company is found to be struggling with labor intensity, they could

improve their service offerings either through increasing automation, a revised hiring process, better direction and control of employees, an enhanced training program, or through better scheduling practices. An additional example of utilizing the service process matrix to aid in operations management can be seen in corporations that have minimal interaction with customers. Additional effort should be expended to seek refinements in productivity, which will lead to a benefit from the economic principle of economies of scale, which translates to cost advantages as production becomes efficient (Inman, 2019).

Element 5: Various Process Types

According to Venkataraman (2018), five basic process types exist, to wit: project, job-shop, batch, repetitive, and continuous flow. Each process or collection of interrelated tasks converts certain inputs into specific outputs. The first, a project process, describes a process that is used to produce just one product. Project processes are typically used when few products are needed to be produced, and unique production characteristics or specifics are necessitated. Even though there is often a high cost associated with these unique productions, project process is perfect for when a product needs to be designed particularly to customer specifications. This process is actually quite common and employed in the production of a movie and also in construction projects. Project process is most used when demand is relatively low for the product outputted and when constraints are placed on the budget as well as the projected date by which the project must be completed.

A second process type is called the job-shop process. Similar to the project process type, the job-shop process excels when the requested production volume is low, and when there is a requisite need for enhanced customization. The job-shop process, however, unlike the first process type, permits further personalization and multiple variants of the base template

(Venkataraman, 2018). A clear example of this process can be seen in the manufacturing facilities of exclusive, high-end, and exotic cars and motorcycles: the engine, frame, and design may be provisioned by the base template, but paint, colors, decorum, and other design elements are infinitely customizable and careful attention is paid to these details. A second example of a job-shop process is employed by Etsy shop owners producing home-crafts. Hallmarks of this process include high production costs, the requirement of highly skilled labor, and enhanced attention to detail.

In my review of basic process types, I assert that the batch process is the most compromising of the five. The batch process is used to produce partially-standardized products. By moderating product variety and trading some flexibility within the process, increased production efficiency and potential for increased production volume is gained. Examples of products that are produced using batch processing include paint manufacturing and wallcovering products. With the support of Venkataraman (2018), I argue that the benefits of batch processing are great in terms of the increases in efficiency and volume. It just should be noted that there will be an upfront cost realized in the more arduous and costly production planning process.

A repetitive process type comes about with the standardization of the product being manufactured. The production cost per unit will go down, albeit at the cost of product variety and the capacity for customization (Venkataraman, 2018). At this stage, the need for laborers skilled in a craft is low since machines can automate a lot of standardized processes. Production planning is diminished as variables in manufacturing are eschewed in favor of constants. This type of manufacturing processing system is employed in the production of automobiles and household electronics such as televisions and computers.

Lastly, in review of the five basic process types, I present the continuous flow process. This process is exemplified by the production of sugar, chemicals, and oil (Venkataraman, 2018). The process type is only employed for the production of highly standardized products in facilities that are often operating 24-hours per day and in facilities that are entirely devoted to producing this one single product. As may not be obvious, this process type offers no flexibility or customization in the design of products that are outputted and relies heavily on automation. Should the production process require any modifications, the cost to redesign the process would be extremely high.

Element 6: Design and Operation of a Warehouse

There are many considerations that go into the effective design of a warehouse. Venkataraman (2018) outlines a few aspects of an organization's needs, the first of which is the minimization of warehouse costs. It's no secret that warehousing products or raw materials is expensive. The organization may have a need for climate-controlled storage, which can be quite a bit more costly. Even more expensive is if the company needs refrigerated or freezer storage. Often times a company can store things vertically and use pallet trucks and a forklift to move their warehoused goods around. This method will conserve floor space and permit leasing a warehouse with reduced square footage, which will greatly reduce costs.

A second consideration involves the operations of a warehouse and the company's needs to move products or raw materials around the warehouse. Depending upon the size of the products or materials being moved, the company may require larger and wider walkways and paths throughout the warehouse to accommodate forklifts or other equipment. Thought should be given to the company's needs for accessibility and timeliness with consideration that walkways and aisles may even need to be widened to permit two forklifts to pass by each other while

simultaneously carrying a load. A third consideration involves the design of a warehouse layout, which permits the installation and use of equipment to handle bulk material, e.g.: conveyor belts, elevators, or silos. Amazon and Wal-Mart are industry leaders in warehousing, materials storage, and shipping. They have deployed automated storage and retrieval systems, termed ASRS. This technology is capable of transmitting information directly from stores to the corporate warehouses where products can be staged for shipping and transportation to customers when an order is processed or to replenish store stock levels where appropriate.

A fourth consideration involves the firm's needs for loading bays and how frequently they will be accessed. The company should design a warehouse layout which places the largest and heaviest products and raw materials nearest the loading bays for ease of loading and unloading. This decision will certainly impact other considerations previously addressed and if applied successfully, will result in decreased loading and unloading times as well as other improvements in efficiency and a decrease in the chances for a workplace injury. After the warehouse layout has been implemented for a couple of months, the company should reevaluate its choices to see if the layout needs to be revised.

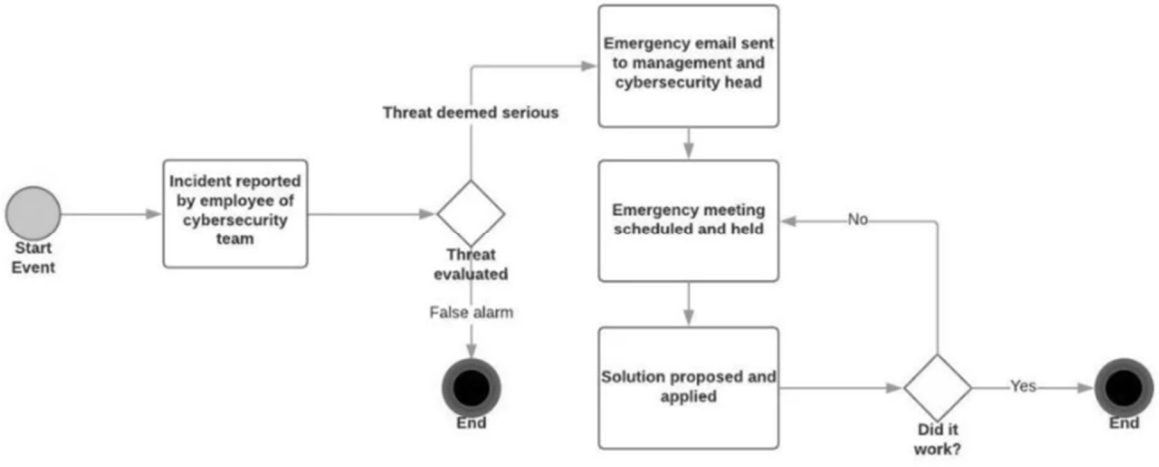
Element 7: Process Flow Chart

Through an analysis of Johnson (2020), I have synthesized a listing of the components of a process flow chart. A process flow chart is used to provide a visual representation of steps in a simple business process or task. To effectively communicate the steps and order in which they are followed, some common and accepted symbols have been designated. Rectangles represent a process or action carried out by an employee. Ovals represent the start or endpoint of a process. Diamonds are used when there is a decision or approval which must be made. Lastly, arrows

demonstrate the connection between different steps or processes and articulate the process's flow.

In the figure appended below, incident response has been documented using a process flow chart. At the onset of the incident response, an incident is first reported by an employee. Subsequently, the threat is evaluated as to its severity and need for a response. In the case no action is needed, the process flow ends. This decision is notated with a diamond shape. Should action be necessitated, an arrow emanating from the diamond leads to a rectangle denoting a process or action which is to be carried out by an employee. In this process flow chart, an email is sent to management or the supervising department head. Following the emanating arrow, another process is enacted: a meeting is scheduled and held. Subsequently, a solution is proposed and applied. Later, the solution is evaluated as to its effectiveness. The symbol denoting this decision is again, the diamond. From this decision, the process either ends or another meeting is scheduled. In the process flow chart, this action creates a feedback loop that causes the process flow to continue until a proposed and applied solution resolves the issue.

Figure 1. *Incident Response Process Flow Chart*



Note. This figure demonstrates the implementation and use of a process flow chart using commonly accepted geometric symbols. Reprinted from Johnson, J. (2020, February 26). *What is a process flowchart and how to use it*. Tallyfy. https://tallyfy.com/process-flowchart/. Copyright 2020 by Jamie Johnson.

Element 8: Capacity Decisions

As a manufacturing plant operations manager, it is well within the range of duties to make capacity decisions. To begin, there are several terminologies which must be defined and synthesized, to wit: design capacity, capacity utilization, and process design. They are all three interrelated and applicable to making capacity decisions. Design capacity is the greatest rate of output, which can be achieved by a manufacturing facility under optimal operating conditions, that is to say, all equipment is functioning properly. Capacity utilization is the percentage of the maximum capacity at which the manufacturing facility is actually operating at. Lastly, process design is the result of developing a flow of the processes by which the plant's inputs undergo in a procedural, transformative process turning these raw materials into the final manufactured product (Pinto, 2018). Quite obviously, given the terminological definitions, the three are intertwined. To synthesize this reformative process and succinctly state the correlation between applicable terminology: it is the plant operation manager's responsibility to tweak process design until the capacity utilization of the plant reaches design capacity.

Synthesizing Pinto (2018), I assert that there are many variables to consider when making capacity decisions. In light of this consideration, I would include the following factors in making capacity decisions. First, future capacity requirements must be identified by forecasting demand for products manufactured in the plant. Second, the current available capacity must be figured. Third, capacity alternatives should be developed which account for future expansions while

taking into consideration product life-cycles, components' relations to other components manufactured in the same plant, and accommodations for fluctuations in capacity requirements and input needs for the plant's direct distributors. Additional effort should be made to factor in the optimal level by which each capacity alternative should operate to maximally reduce the production costs per unit of output. Fourth, the best long-term capacity alternative should be selected, and it should be monitored to determine how well this alternative will meet the company's needs. This step-by-step process and these factors for making capacity decisions are all about the plant's reliability and ensuring it is maximizing its capacity utilization and suffers the absolute minimal, if any, amount of down-time.

Conclusion

Pinto and Venkataraman wrote the majority of a textbook on process flow, entitled *Operations management: Managing global supply chains.* This reference has been principle in the development of this dissertation, which should serve as a monograph on operations management. This treatise has analyzed and synthesized many considerations that should be taken into account, including planning layouts, layout recommendations, outsourcing decisions, service process design matrices, various process types, warehouse design and operation, process flow charts, and making capacity decisions.

References

Gilbert, D. (2017, June 20). *Which store layout suits your business best?* DotActiv. https://www.dotactiv.com/blog/best-store-layout-for-retail

Hixson, D., & Guliani, K. (2015, February 1). *Capacity Planning*. USENIX, The Advanced Computing Systems Association. https://www.usenix.org/system/files/login/articles/login_feb15_07_hixson.pdf

Inman, R. A. (2019). *Service process matrix - type, hierarchy, movement within the matrix, managerial challenges*. Reference For Business. https://www.referenceforbusiness.com/management/Sc-Str/Service-Process-Matrix.html

Johnson, J. (2020, February 26). *What is a process flowchart and how to use it*. Tallyfy. https://tallyfy.com/process-flowchart/

Leong, C. (2017, September 26). *Retail layout* [Video]. YouTube. https://www.youtube.com/watch?v=CURY8BvXkkg

Pinto, J. K., & Venkataraman, R. R. (2018). Chapter 7: Capacity planning. In *Operations management: Managing global supply chains*. Sage Publications. https://class.content.laureate.net/128b5d1171ef3a2a4ee26a61c26e5607.pdf

Schindly, B. S. (2017, September 26). *Advantages & disadvantages of a supermarket layout*. Bizfluent. https://bizfluent.com/info-8651141-advantages-disadvantages-supermarket-layout.html

Venkataraman, R. R., & Pinto, J. K. (2018). Chapter 9: Process design and layout planning. In *Operations management: Managing global supply chains*. Sage Publications. https://class.content.laureate.net/796b1d303cb8277b09ff48a54719aa6f.pdf

Webb, J. (2017, July 28). *What Is Offshoring? What Is Outsourcing? Are They Different?* Forbes. https://www.forbes.com/sites/jwebb/2017/07/28/what-is-offshoring-what-is-outsourcing-are-they-different/?sh=1a8584512a2e