

Operations Management Practices of Printing Press in Region IV-A: A Framework for Sustainable Strategic Operations

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ABSTRACT

The study aimed to develop a framework for sustainable strategic operations through addressing the problems identified during the conduct of the study and providing appropriate solutions that will greatly contribute to the success on the operations management aspect of the printing press in Region IV-A. Using the analysis of variance, the study investigated if operations management practices have significant difference with the business profile of the printing press. The research design of this study was descriptive method that involves survey and interview in the data gathering process. The respondents of the study were 67 Bureau of Internal Revenue (BIR)-accredited printers and used non-probability sampling technique. A modified structured questionnaire was adapted from a similar study. As to the business profile, it was revealed that most of the printing press businesses were classified as microenterprise with minimal capitalization. It was realized that the major contributor to the success was the design of goods and services particularly in customizing products that made appeal to customers. Moreover, it was found that there is no significant difference between operations management practices when it is grouped according to the business profile. Problems were also identified as primary and secondary, primary factors arise from the operations itself while secondary factors involve marketing, human resource, and financial matters.

1. Introduction

Businesses differ by what they do, what they can offer and sell to the market. It is also an economic activity conducted primarily for profit (Valencia & Roxas, 2016). Every business requires a form of investments (capital or human) and enough customers to sustain in the competition. Business can be privately owned by an individual, group of persons or organization. In engaging a business there are classifications of business industry sectors: the primary sector involves extracting and harvesting natural products from earth (agriculture, fishing, and mining). The secondary sector consists of processing such as manufacturing and construction. And the tertiary sector provides services like retail, entertainment or financial services (Marcelino, Viray, Bato & Bautista, 2015).

According to the Philippine Statistics Authority, the Philippine economy grew in 2017, wherein its main drivers are manufacturing, trade, real estate, renting and business activities. Among the major economic sector, the industry of manufacturing recorded the fastest growth followed by service. As a matter of fact, printing and services activities related to the printing industry ranked third in the manufacturing sector this is based on the 2012 census of Philippine Business and Industry. Though to some extent, printing is ultimate in the service industry and its products are almost always modified to one client and cannot be sold to a different customer.

The printing business comprises the creation of goods for its customers. Production or operation is the key aspect of this type of business. It is a process that combines and transforms various resources to make a finished product. Thus, it is an integral part of an organization concerned with the conversion of array inputs into the required products having the necessary quality level. It also entails a great understanding of people, processes, and technology, and how they are combined within the business system to create value. Hence, a greater understanding of operations management is necessary for every business.

Operations management is concerned with planning, organizing and supervising the context of production, manufacturing or even on the provision of services. As such it ensures the successful turns of input (materials, equipment, technology, and human resources) to output in an efficient manner. Effective operations management is essential to provide high-quality goods and services to customers, motivating and developing skills of the people who actually do the work, maintaining efficient operations to ensure adequate return on investment (ROI), and protecting the environment.

More likely operations management practices include product and process design; supply network design; planning of inventory, capacity, supply-chain, and project; enterprise resource planning (ERP), lean synchronization, layout, quality management, operations improvement, and risk management (Slack, Brandon-Jones, Johnston, 2013). In smaller companies, OM is simple and straightforward, but in complex companies, there must be standardized procedures and practices to ensure that everything is as efficient as possible. If done right, OM leads to better output with lower defect rates and cost. The business will have a competitive advantage such as providing better products and services for its customers by allowing the business to stand out in the competition and gaining more and new customers in return gaining higher profits awaits for the business.

The printing industry is into production of services to its customers. This industry is one that could have a great advantage and opportunity in terms of growth. In an article released earlier of 2018, recognizing the Philippine printing and publishing industries greatly contribute to the country's economic growth and to be more globally competitive. With this scenario, the entry of production or operation plays vital role in the success of printing business in the Philippines.

In the Region, printing press status is inevitably growing and competition is stiff but despite these, alliances are also formed between owners. As it grows, restrictions are tightening due to imposed government regulations. Like a normal business procedure, each business seeks permit, however, some printing press failed to comply with government requirements (BIR compliance) and that is why there is still an uncounted printing press that operates illegally in the region.

2. Literature Review

Operations Management

Operations management (OM) is a stretch of activities that makes value in the formation of goods and services by converting input into output. Waters (2002) says that an operations manager makes decisions that keep organization working effectively. Their decisions affect inputs, operations, and outputs and they use feedback on performance and other relevant information to continually update their decisions. At the operational level, hundreds of decisions are made to achieve local outcomes that contribute to the achievement of the company's overall strategic goal (Russell, 2007). Many decision-making situations occur under conditions of uncertainty hence decision-analysis. Decision-analysis is a set of quantitative decision-making techniques to aid the decision-maker in dealing with a decision situation in which there is uncertainty. These critical decisions are the design of goods and services, managing quality, process and capacity design, location strategy, layout strategy, supply-chain management, human resources and job design, inventory management, scheduling, and maintenance.

Based on Operations Management written by Heizer and Render (2011), Operations managers apply the management process to the decisions they make in the Operations Management (OM) function. The ten critical decisions/areas are as follows: 1) design of goods and services; 2) managing quality; 3) process and capacity design; 4) location strategy; 5) layout design and strategy; 6) human resource and job design; 7) supply-chain management; 8) inventory; 9) scheduling; and 10) maintenance. The study was anchored to these ten critical areas of OM and each is discussed accordingly based on its relevance to the printing industry as the setting of the study.

Design of Goods and Services

Serrano (2016) stated that organizations that well-designed products or services are more likely to realize their goals than those with poorly designed products or services. It is a major factor in cost, quality, time-to-market, customer satisfaction,

and competitive advantage. Mortoya (2017) added that good product design satisfies customers, communicate the purpose of the product or service to its market and brings financial rewards to the business, the objective of good design whether for products or services is to satisfy customers by meeting their actual and anticipated needs and expectations. This, in turn, enhances the competitiveness of the organization. Thus, the design activity has one overriding objective this is to provide products and services and processes which will satisfy the customers.

Managing Quality

A business organization produces goods and services to meet customers' needs. Quality is rapidly becoming a major factor in a customer's choice of products and services (Meredith & Shafer, 2012). There are quality perceptions coming from two different perspectives, customer and producer: From customer's point of view they perceive quality that certain companies produce better-quality products than others, and they buy accordingly.

Product quality is product or service price (Somma, 2012). The producer perceives quality to be how effectively the production process is able to conform to the specifications required by the design and this is referred to as quality of conformance. This means that quality during production should meet the required design and making sure that the output is in the same quality during and after the process. Achieving quality of conformance should be at an acceptable cost (Lombardo, n.d.). An example of this quality conformance in printing is when the output is different from what the client and company agree from the start of the process then the specifications of the design didn't meet and achieve it may result in the dissatisfaction of the client to the business.

Process and Capacity Design

The process is the essence of operations management. They transform inputs into outputs. Process strategy is an organization's overall approach for physically producing goods and services. Process decisions should reflect how the firm has chosen to compete in the marketplace, reinforce product decisions, and facilitate the achievement of corporate goals (Stevenson, 2011). A firm's process strategy defines through 1) Capacity intensity it is the mix of capital (equipment, automation) and labor resources used in the productive process, and 2) Process flexibility it is the ease with which resources can be adjusted in response to changes in technology, demand, resource availability, and products or services (Russell, 2000).

Location Strategy

According to Irwin (2010), there are two location decisions that are highly important and part of the production system design. One is it requires a long-term commitment. And the other one must have an impact on the operating expenses (fixed or variable) and as well as revenue. Garg (2011) stated, if a firm opts for poor location, it will have to face many problems like non-availability of required raw materials, problems such as power supply, local people, waste disposal and many more.

Location and layout are interdependent. If location of a new establishment is good, it will not be difficult to arrange internal facilities, but it will provide space to satisfy the current and future needs. Consequently, most organization do not set out with the intention of identifying the one best location; rather, they hope to find a number of acceptable locations from which chooses and avoid choosing a location which will create future problems.

Layout Design and Strategy

Facility layout is the procedure of shaping best arrangement of facilities and equipment capable of satisfying anticipated demand with respect to quantity, quality, and timing at the lowest cost (Meller, Narayanan & Vance, 1998). It requires meaningful integration of all the elements of the conversion process—men, machines, and materials (Kochhar & Heragu, 2010). In addition, it requires the knowledge of constraint imposed by legal, technical or other factors for new facilities or for existing system the proposed layout must satisfy constraints from the existing building and other physical structures that form part of the production process and the transport system (Saraswata, Venkatadri & Castillo, 2015).

In order to have a good layout here are the following guidelines according to Garg (2015): 1) Accumulate basic information like volume, rate of production, specifications, and bill of materials. 2) After the accumulation of pertinent data next is to coordinate the basic data like workforce size and type, the number of work stations, type of equipment required and storage and space requirement. 3) Decide the equipment and machinery required a number of components to be produced, capacity or each and time to complete the work. 4) Select and prepare materials handling system based on its length and speed of movement. 5) The orientation of plan should utilize maximum natural heat, light and other weather conditions. 6) There

should be minimum of backtracking and bottlenecks. 7) Design individual work stations for the optimum performance, safety, and comfort of employees. 8) Calculate storage space required. 9) Plan and locate service areas like offices, toilets, washrooms, tool rooms, cafeteria, power generation areas, parking areas, etc. 10) lastly, get the official approval of layout from the concerned authorities.

Human Resource and Job Design

Employees are the people who work in an organization, they are the so-called “resources”. In fact, it is a resource that all companies have available to them (Hendry, 2012). In the service industry, it tends to be more people-intensive than capital intensive and human resources are becoming a more important competitive factor for service companies. Moreover, the advances in information technologies have also changed the working environment, especially in service companies (Korczyński, 2002). Since they rely heavily on information technology, services need employees who are skilled with computers, software, and network (Bohlander, Snell & Sherman, 2007). The employees are required to be better educated, have greater skill levels, and have greater technical expertise, and are expected to take on greater responsibility (Lewin & Mitchell, 1995).

Supply Chain Management

Supply chain management is the integration of the activities that procure materials and services, transform them to intermediate goods and final products, and deliver them to customers (Hugos, 2018). Activities include purchasing and outsourcing activities, plus many other functions that are important to relationship with suppliers and distributors (Coyle, Langley, Novack, & Gibson 2013).

Likewise, Heizer and Render (2011) discussed that the supply chain management includes determining transportation vendors, credit and cash transfers, suppliers, distributors, accounts payable, warehousing and inventory, order fulfillment, and sharing customer, forecasting, and production information. Effective supply-chain management makes suppliers “partners” in firm’s strategy to satisfy an ever-changing marketplace (Chauhan & Proth, 2005).

Inventory

All organization has some type of inventory planning and control system. The objective of inventory management is to strike a balance between inventory investment and customer service. According to Heizer & Render (2011), there are functions of inventory and these are: to separate various parts of production process. If a firm’s supplies fluctuate, extra inventory may be necessary to decouple the production process from suppliers to cope with firm’s fluctuations in demand and provide a stock of goods that will provide a selection for customers. Such inventories are typical in retail establishments; to take advantage of the quantity discounts, because in larger quantities it may reduce the cost of goods or their delivery; to hedge against inflation and upward price changes. Hence to accommodate the functions of inventory, firms maintain four types of inventories: raw material inventory, work-in-process inventory, maintenance/repair/operating supply (MRO) inventory, and finished-goods inventory.

Scheduling

Aggregate scheduling is also recognized as aggregate planning. It is focused on identifying the right quantity and timing of creation of goods for the intermediate future which usually counts from three to eighteen months in advance. In trying to regulate the forecasted demand, the best way that an operations manager do is to adjust the overtime work, outsourcing rate, labor levels and production rates, and controllable variable (Kerzner & Kerzner, 2017).

Maintenance

The operations managers focus on design improvements and backup components to improve reliability. Reliability improvements also can be obtained through the use of preventive maintenance and excellent repair facilities.

Firms give employees “ownership” of their equipment. When workers repair or do preventive maintenance on their own machines, breakdowns are less common. Well-trained and empowered employees ensure reliable systems through preventive maintenance. In turn, reliable, well-maintained equipment not only provides higher utilization but also improves quality and performance to schedule. Top firms build and maintain systems that drive out variability so that customers can rely on products and services to be produced to specifications and on time.

Sustainable Strategic Operational Framework

The broader need for operation management improvement is no longer difficult to see especially in its specific domain in creating the value of the firm's production. Nkomzwayo (2016) proposed a business framework model that can be used by entrepreneurs that serve as a strategic tool for the development process. The main objective of the framework is to have a value proposition for the entrepreneurs for them to survive in the manufacturing industry. Various activities under this framework need to be taken into account and managed.

There are nine major manufacturing decisions with essential sub-factors formulate by Framework for Operations Strategy Problem One: Conflicts (n.d.) and these are as follows: Facilities – size and location; Capacity – timing, amount and type; Vertical Integration and Supplier Management (The technology supply chain) - direction, extent interface and collaboration; Production Technologies and Processes - equipment, automation, interconnectedness, scale, flexibility; Workforce and management – policies (wages, security), skill levels; Information technologies – use and level of investment, parity or differentiation; Supply chain and Materials (fulfillment supply chain) – logistics facilities and methods, inventory policies, vendor relations, production planning; Organization and Incentives – structure, reporting level, degree of centralization, role of staff, control reward systems, and costing systems. Business Process – product generation, interfaces, responsibilities, vendor development, order fulfillment, service and support, quality, flexibility, and other cross-cutting capabilities.

Most studies show disassembly as technical activities that breakdown the components into part without considering the essential factors like employees' skill, tools, equipment, and product knowledge. Likewise, some researches strict assumptions that exploit to positive paradigms in the operations. Records of research focus on remanufacturing operations, especially in production planning and control. The instance includes inventory control and demand forecasting, etc. Bras and McIntosh suggest that the practice of disassembly should cover organization design, product characteristics, and process design, the figure below depicts strategic operations framework for disassembly in remanufacturing (Priyono, Ijomah, & Bititci, 2015).

3. Methodology

The study was a descriptive research which made use of quantitative-qualitative method. It was conducted in major cities in Region IV-A. The respondents are purposively selected based on the list of accredited sole proprietorship printers with offset machinery of the Bureau of Internal Revenue. 73 per cent and the distribution of the respondents were as follows: 18 from Batangas city; ten (10) from Lipa city; 17 from Calamba city; ten (10) from San Pablo; and 12 from Lucena city. Only 73 percent was retrieved due to the following reasons: unable to find and locate the printing press either having a wrong address or transfer of new business location; rejection from the proprietors to participate as respondents; and non-existence of the business. Randomly selected customers and suppliers which were identified by the printing press owners and managers were also asked to evaluate the design of goods and services, managing quality, strategic location of the printing press, and supply chain management. The survey questionnaire was a modified instrument based on Owino (2009) while the interview guide was developed by the researchers. On the other hand, in interpreting and analyzing the results of the study, the following were the statistical tools used - frequency distribution and percentage, and analysis of variance.

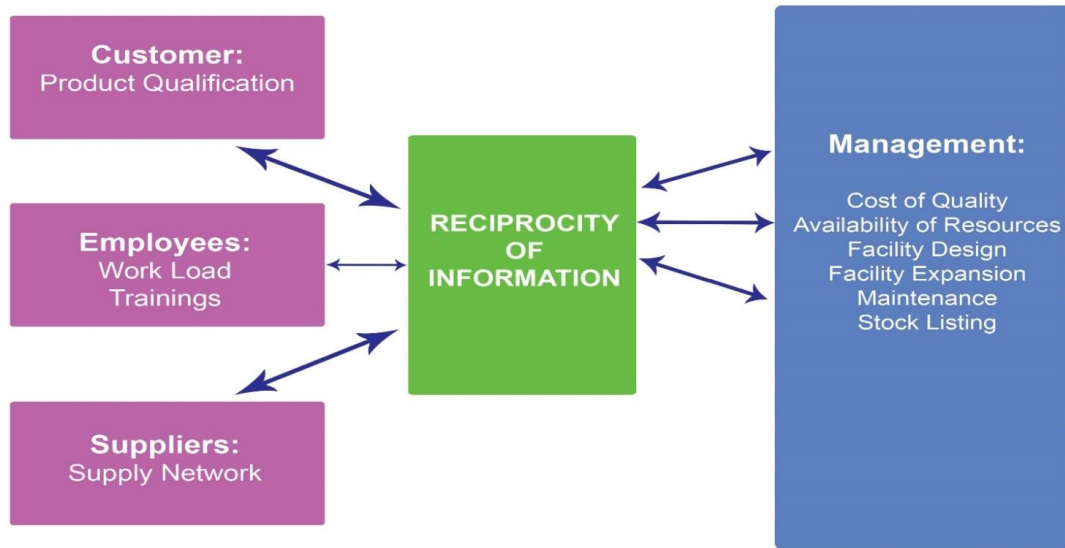
4. Results and Discussion

Based from the objectives of the study, the following are the findings:

1. The business profile of the printing press as to years in business operation resulted to an average of 22 to 25 years of existence. Present capitalization is about less than P250,000 with an average income per year of more than P375,000 and an average asset size of more than P1,300,000. The building and property were acquired by the owners of the printing press. The average number of the machines, workers/operator, and suppliers were 4 to 6 per printing press and having more than 25 customers/clients per month.
2. Operations management practices of printing press resulted to the following: Design of goods and services obtained a general weighted mean (GWM) of 3.57; managing quality with 3.52 GWM; process and capacity design with 3.38 GWM; location strategy with 3.37 GWM; layout design and strategy with 3.40 GWM; human resource and job design with 3.52 GWM; the supply-chain management with 3.37 GWM; inventory with 3.42 GWM; scheduling with 3.43 GWM; and maintenance with 3.49 GWM, all verbally interpreted as "strongly agree". The grand weighted mean for operations management practices is 3.45 with a verbal interpretation of "strongly agree."
3. All of the computed p-values exceed 0.05 denoting no variation in operations management practices when grouped to business profile.

4. The problems or challenges encountered by the printing press in Region IV-A were classified into primary and secondary factors. The primary factors are controlled by the company and these are machine failure, excessive workload, poor quality output, and employees’ time punctuality, attitude, and error while the secondary factors are uncontrolled by the company and these are the unabated price increase of raw materials, suppliers’ term and conditions, and shortage of printing supply.

The framework was developed to see the indicators lacking in the printing press. This is framed in order to address the problems identified in the conduct of the study.



F **SUSTAINABLE STRATEGIC OPERATIONS FRAMEWORK**

The figure shows the framework for the sustainable strategic operations management of the printing press. Sustainability of operations defines that the business operation is running smoothly and meets the current needs without compromising anything that may lead to disruption.

With this being achieved, assurance of profit to the business is evident. Operations sustainability focused on the improvement of product design through product development and monitoring of resources (human and technological). Consequently, sustainability of operations must take into consideration the firms’ competitive advantages which are internal and external elements of enterprise. For consistency, factors on the framework were identified through the findings of the study and pointing out the low keys how to sustain the strategic operations of the enterprise.

The sustainable strategic operations framework involves four stakeholders and these are the customers, employees, suppliers, and management. Each of the stakeholders contains indicator/s that participates to the success of the operations. Reciprocity of information is at the center of framework to represent exchange of communication and double headed arrows signify the two-way communication between stakeholders. Moreover, the reciprocity of information was not directly mentioned on the problems identified but this serves as an avenue that links the management to its stakeholders and vice versa in giving solutions to problems. As mentioned on the interpretation, open communication is needed to prevent disagreement among parties. For instance, these are the challenges found in the study, as to management and employees - employees’ punctuality and attitude towards work; as to management and customers - product specification that leads to differentiation; and as to management and supplier - unabated price increase as well as terms and conditions. All these problems must be properly discussed by each party through having mutual agreement and sharing of information.

To discuss further, indicators were classified as to each stakeholder and derived from the problems and lowest indicators for each sub-variable. For customers’ involvement **Product qualification**, it was indicated in the result of goods and services that the lowest indicator pertains to similar product offering by the printing press. To address the issue, management and

customers should collaborate on the design of goods and services to make it more distinctive among competitors and fit to the qualification of both parties.

For employees' involvement, excessive **workload** and lack of **trainings** were recognized as difficulties. These were resulting from the lowest indicators and problems under capacity design and human resource variables. To solve this, intervention of the management is necessary. Employee and management should work together to augment these needs by seeking for trainings and seminars which are conducted by the different associations of printers nationwide. By this, it will sprout new ideas, methods, processes, techniques, and skills that can be acquired and used by the workers and owners.

For suppliers' involvement, **Supply network**. Technical assistance found the least factor on the supply-chain management at the same time it was also found on the challenges faced by most printers are unabated price changes and shortage of supply. These lead to a possible distortion of the chain from supplier to customer. For instance, supplier is temporarily unable to provide raw materials (paper) ordered by the printer, as a result this will cause delay from production process up to the delivery of the finished product and unable to meet the specification of the customer. To address this, there must be a concrete supply network that links proper distribution from supplier to business and with this it will delivers value to customer by means of constant communication and exchange of information for proper dissemination among the suppliers, management, and customers.

For management involvement, there were several problems and low keys arises, first, **Cost of quality**. It was determined that poor quality arises due to unable to identify cost of quality by the owners. Cost of quality is a measure that management use to do to quantify the cost related to prevention, appraisal and detection of defects in the production. In order to solve this, management should be proactive in any instances in relation to cost of quality. Second, **Availability of resources**, proximity of the location is necessary, it must be accessible by customers and employees, even so, supplies are also easily transported. Thus, business must consider location in which there is availability of resources for a smooth business operation. Third, **Facility design and Facility expansion**, ease of movement for future expansion, proper utilization of space, and proper ventilation are commonly neglected by most printers. Business owners must be foreseeing, especially on future plans. Designing the space is a long-term move of the management, placement of the machineries in-line with the process should be a must consideration. Fourth, **Maintenance**, common practiced by these printing press, they disregard regular maintenance, maintenance is happened only when machine breakdown occurs, more so, it is called repair and not maintenance at all. To propose as part of the framework, these printing press must impose regular check on machinery to avoid inconvenience and delay during the production. This checking could be done with the help of mechanic who is expert in printing machines and replace machine parts which are in need of replacement. Lastly, **Stock listing**, in terms of inventory aspect, it arises that most printers are not after in selecting suppliers who can prioritize quantity of orders. It means all suppliers are accommodating regardless of the quantity in need by the clients. Aside from this, printers are placing orders depending on the terms and conditions granted to them. To respond, appropriate inventory method and program must be adhered by printer for the purpose of proper listing and monitoring of stocks to avoid any inconvenience upon ordering to suppliers.

5. Conclusion

Based on the findings, the following are concluded:

1. The respondents were classified as microenterprise business with limited present capitalization, income not higher than P400, 000 annually and less than 30 clients per month.
2. The design of goods and services gained the highest general weighted mean while location strategy and supply chain garnered the lowest general weighted mean.
3. No significant differences were found on operations management practices when grouped according to the business profile of the printing press.
4. The problems or challenges arising from the operations management are also connected to other aspects of the business.
5. The framework represents the significant factors that affect the sustainable strategic operations.

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