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A REVIEW: SUSTAINABLE DEVELOPMENT OF MANUFACTURING UNIT THROUGH FACILITY LOCATION PLANNING IN PLANT LAYOUT**Prem Narayan Ahirwar*, Dr. V.K.Khare & Dr. Pankaj Agarwal**

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Keywords: Facility layout planning, sustainability, sustainable facility location, location problem. Mathematically models.**Abstract**

Facility location planning method play a crucial role in specifying the optimum location options for various types of Facilities Location. Facilities design consists of the facility systems design, the layout the environmental systems, the lighting-electrical systems and safety systems. The layout consists of all equipment, machinery and furnishings within the building structure Sustainable development requires implementing suitable policies integrating several competing objectives on economic, environmental, energy and social criteria. This paper serves as a discussion of the current literature concerning the sustainability aspects of the location problem. The main motivation for the current study is to provide a foundation from which issues of sustainable development can be built into facility location models. This paper focused on the modification of the existing layout location planning.

Introduction

Location decision makers have traditionally focused on the economic aspects of locating facilities, but given the growing interest in sustainable development, location decisions frequently also include environmental and social consequences. When compared to past practice, not only industry and government but also the general public are demanding more complex facilities that also meet social and environmental goals. As a result, an increasing number of requirements need to be satisfied in the location decision process. Facility location, also known as location analysis, is a well-known concept in the literature but sustainable facility location is not. This work attempts to define the concept and frame the problem in order to address the issue

Layout determines the way in which materials and other inputs (like people and information) flow through the operation. Relatively small changes in the position of a machine in a factory can affect the flow of materials considerably. This in turn can affect the costs and effectiveness of the overall manufacturing operation. Getting it wrong can lead to inefficiency, inflexibility, large volumes of inventory and work in progress, high costs and unhappy customers. A facility layout is an arrangement of everything needed for production of goods or delivery of services. It may be a machine tool, a work centre, a manufacturing cell, a machine shop, a department, a warehouse, etc. [12]. The layout design generally depends on the products variety and the production volumes. For a manufacturing plant, the facilities layout, also called plant layout, consists of the production areas, production related or support areas and personnel areas within the building. Plant layout affects the output and has significant impact on the cost and efficiency of the operations. Plant layout problems can occur in a large number of ways and can have significant effects on the overall effectiveness of the production system. The facility layout problem deals with the physical array of a given number of departments or Machines within a given pattern. In the context of manufacturing the objective is to minimize the total maintenance time. Organizations of even modest sizes optimize their operations to minimize costs and improve efficiency. One of the many aspects of operations is cost effective and efficient accessing of a set of services or infrastructural facilities by a group of demand points or client.

Litrautre Review

The Facility Layout Problem (FLP) is defined as the physical arrangement of the various departments or machines in a pre-redesign area of location. CRAFT method could be used for solve to multi facility location



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problems [2]. CRAFT method can be solving by combined or Group Technology (GT). The performance evaluation of the current and the re designed layout has been done by using ARENA [1]. A comparative analysis of various approaches to find the best layout for a furniture production firm and has found that using automated search has given the best result [11]. An illustrative case study on the modification of a plant layout model using CRAFT method has been done and the visualization of the effects of changes introduced has been provided using the ARENA software [9] A study on the cellular layout, cellular manufacturing system has been done and a case study has also been done to illustrate the benefits of cellular layouts [4]. The travel diagram technique could be used to minimize wastes of maintenance time, manpower and money and to generate higher profits for the same work from the same resources [6]. Systematic Layout Planning (SLP) procedure has been used to modify the plant location. **According to Owen and Daskin (1998)** and Snyder (2006). It is useful to distinguish two types of uncertainty represented in stochastic location models: i) uncertainty in the operation of the system being modeled; ii) uncertainty in the data collected for use in the model. Plant layout of a compressor manufacturing firm to improve the productivity of the firm [7] An extension of the CRAFT algorithm that aimed to solve complex layout problems has been developed and the results were compared with that obtained from literature [3] Location models can also be classified as deterministic or stochastic. Deterministic models assume demand and other data to be known with certainty. Stochastic models incorporate information on the uncertainty of data and aim to determine solutions that perform well under all possible data realizations, according to an objective derived from the objective of the deterministic version of the model, such as maximizing the expected performance or minimizing the worst-case performance.

Basic Arrangement Of Sustainable Manufacturing Unit

In KSRTC-central works, Bus Body Building unit deals with the construction and assembly of various parts for the construction of bus. They are doing bodybuilding works for different classes of buses like City ordinary, fast passengers, Super fast, Super deluxe etc. Presently, around 516 employees are working under this unit. With the present manpower, they can manufacture a maximum of 40 buses per month. The prime component in construction of a bus is chassis, which KSRTC presently purchases from leading vehicle manufacturers like MARUTI and EYESHER. The chassis is brought to this unit and the body is built through a series of stages. The basic stages of manufacturing unit.

- Mounting of cross bearers and structures
- Flooring of Platform and Construction of Front chanel
- Paneling Works
- Fitting of Seat frames Painting
- Painting of unit
- Fitting of Vertical post, Grab rail and Window rail

Facility Planning For Location Problem

Facility planning determines how an activity's tangible Fixed asset best support achieving the activity's objectives. The optimum allocation of space to the components of the system is the main aim in developing a layout for a system producing goods or services. Basically, facility planning means to determine the best arrangement of facilities and equipment in such way that it is capable of satisfying anticipated demand (quantity, quality, and timing) at lowest cost. The facilities that are planned today must help an organization to achieve Supply Chain Excellence. Supply Chain Excellence is a process with six steps or levels. These steps are Business as Usual, Link Excellence, visibility, collaboration, Synthesis and Velocity. Business as standard works as when a company works hard to maximize its individual functions. The goal of individual departments, such as finance, marketing, sales, purchasing, information technology, research and development, manufacturing, distribution and human resources is to be the best department in the company. Organizational effectiveness is not the emphasis. Each organizational element attempts to function level

Problem Define On Sustainable Manufacturing

The objective of the facility. Whether planning a new facility or the improvement of an existing facility, it is essential that the product to be produced or service to be provided be specified quantitatively. Volumes or levels



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of activity are to be identified whenever possible. The company under study is concentrating on the rubberized coir mattress production with annual Installed capacity problems that hinder the smooth material flow and it has also been observed that there is a lack of scientific layout planning. The building has a dimension of 125m x 80 m and the different departments are located within the building. The building is divided into two sections namely production of 6000 tones, around 4.8 lake units (an ISO 9001:2008 certified company having strict quality standards and also exports products to many countries). The company has to store sufficient amount of raw materials, work in process and finished products. The company has been facing plant and the furnishing department.

Conclusion

The modification of the existing layout of rubberised coir mattress factory using two different approaches has yielded two distinct solutions. The qualitative input method by graph theory and the quantitative input method by CRAFT Theory. Obtained using each method are satisfied for all condition of the existing layout. A final comparison between the results obtained in each method showed that the CRAFT modified alternative yielded the best reduction for the parameters under consideration. The comparative result showed that there is reduction of 4.5% and 2.4% in case of total distance between departments and total distance travelled per day respectively. It is also evident that the CRAFT modified layout has maximum Material handling cost reduction by 2.4%. The layout modified using CRAFT Algorithm is recommended to be implemented in the company. There is a need of some civil work for the implementation and a low initial investment is necessary for it. The layout alternatives developed are evaluated using the three selected parameters such as total distance between department, total distance travelled per day and savings in material handling cost.

References

Needs to be added