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Short Communication

The Initial Basic, Feasible, or Optimal Solution for the Transportation Problem is to Solve it at the Same Time Using Varios Method

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Operations research (OR) is a scientific research technique or mathematical technique used to aid decision-making in large organizations or organized systems management. Transportation is the movement of people, livestock, and goods from one location to another in the real world, and it is a massively coordinated process. The transportation problem (TP) is extremely complex due to its breadth. Modes of transportation include air, land (rail and road), water, cable, pipeline, and space travel. Infrastructure, vehicles, and operations are subsets of the transportation industry. As a result, transportation is critical for the development of civilization and has been a hot topic for decades, with OR playing a significant role. This study examines recent transportation developments, challenges, and approaches utilizing OR. As a result, the scope of this study includes original, high-quality research focusing on the application of OR techniques to TPs (mathematical programming models, algorithms, simulation-based approaches, and so on). A diverse community of scholars from around the world has published numerous articles on the study of the utilization of operations research models and algorithms in transportation problems. This series of selected papers covers topics such as automated guided vehicle routing, on-ramp lane arrangement, autonomous vessel scheduling, bus transportation, cross-docking flow shop problems, and airline commodity transportation, among others. Here, offer TP has a new idea and provides some implications for many different types of TPs [1-3].

The TP is also one of the most highly regarded problems in the field of optimization, in which the objective is to minimize the total transportation cost of distributing resources from a number of sources to a number of destinations. The literature witnesses that different techniques have been developed in the past to solve the transportation problem. In some techniques, the focus is on finding an initial basic feasible solution, while the rest focuses on finding the optimal solution to the TP. Northwest, least cost, and Vogel's approximation techniques are developed to find an initial basic feasible solution, whereas the Modified Distribution (MODI) Method and Steppingstone Method are designed to find an optimal solution to the TP. However, these methods, in certain instances, especially for large-scale TPs, fail to reach an optimal or near-optimal solution in a reasonable amount of computational time [4-6].

Development and transportation also play a critical role in balancing the overall supply chain of manufacturing firms. Whenever an industry produces a product, it must reach its end users. Consumers may be located outside of the industry. As a result, transportation is necessary to ensure that end users have access to the various goods and services produced. The TP, as the name implies, is concerned with the logistics of moving various resources and finished goods from one location to another. The most important factor is to decide on the quantity, cost, and transportation routes. Based on demand, sources (factories) supply their goods to different destinations (warehouses). Any source will make every effort to keep transportation costs as minimal as possible. This is how the TP occurs. The transportation model is useful for selecting the routes that will incur the least amount of travel costs, as well as where facilities should be located. This model may be used to determine the best location for a new factory or manufacturing plant in order to minimize production costs. In 1781, French mathematician G. Monge formalized the problem. A Russian mathematician, L. V. Kantorovich, made significant progress in this area during and after World War II to solve postwar problems. This is why the problem is also known as the Monge-Kantorovich problem. Hitchcock (1941) defined TP mathematically, and Koopman proposed the principle of optimum

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solution in 1950 [7]. However, in 1951, after the introduction of the Simplex Algorithm by George B. Dantzig, complex TPs that were arousing in business were solved and optimal solutions were found. Many researchers have paid attention to solving the problem using different approaches and finding alternative methods to solve cost-minimizing TPs considering their special structure. Products must be transported to the correct location, at the correct time, in the right condition, and for the right price. To face these challenges, businesses, such as shippers and logistics service providers, must develop efficient distribution systems that make optimum use of transportation and distribution centers [8].

The results of this work enable us to estimate the superior performance of various types of TPs. Our heuristic produces the lowest-cost TP solutions in the majority of the benchmark scenarios tested. In many cases, our proposed method yields a direct optimal solution or requires fewer iterations to achieve an optimal solution, and it is easily applicable to large-scale TPs [9]. The proposed method is extremely easy to implement, and each step yields a new efficient solution.

Real-life problems are typically modeled with multiple objectives that are measured and optimized in various ways. Multi-objective problems include commodity average delivery time, transportation reliability, product deterioration, and other factors [10]. The goal in this case is to find a shipping schedule that minimizes total shipping costs and time while meeting supply and demand constraints. The TP treats multiple objective functions concurrently to accommodate the criteria. As a result, the following research article introduces and provides novel algorithms for solving classical and multi-objective TP in the most efficient and effective manner.

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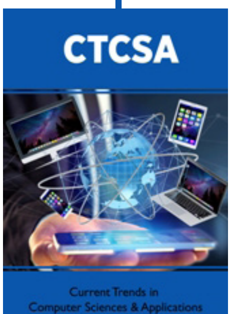

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