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**JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA**

**PGDM / PGDM (M) / PGDM (SM)**

**FOURTH TRIMESTER (Batch 2022-24)**

**END TERM EXAMINATION, OCTOBER 2023**

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| --- | --- | --- | --- |
| Course Name | Operations Analytics | Course Code | 20525 |
| Max. Time | **2 Hours** | Max. Marks | **40 MM** |

INSTRUCTIONS:

1. This is a closed-book examination.
2. Examinations will be conducted in the computer lab on Moodle using MS Excel.
3. All interpretations and calculations should be written in an Excel file only.
4. Students are supposed to submit one Excel file with all the questions on a different sheet.

Q. No. 1. The company is seeking to identify the most suitable supplier for a critical component used in its products. Supplier selection is a crucial decision as it directly impacts product quality and production costs. To make an informed choice, the company has collected data on several potential suppliers and various criteria. The manufacturing company is evaluating five potential suppliers for a critical electronic component. Each supplier has been assessed based on several criteria that are considered essential for making the selection decision.

Supplier Criteria:

1. Quality (Q): Represents the supplier's track record in delivering high-quality components with minimal defects. Scores range from 1 to 10, with higher scores indicating better quality.

2. Price (P): Reflects the cost of the component supplied by each supplier. Lower scores are better in terms of cost competitiveness.

3. Delivery Time (D): Measures the supplier's ability to consistently meet delivery deadlines. Higher scores indicate more reliable delivery.

4. Environmental Sustainability (ES): Evaluates the supplier's commitment to sustainable and eco-friendly manufacturing practices. Higher scores reflect a stronger focus on sustainability.

5. Financial Stability (FS): Assesses the financial health and stability of the supplier. Higher scores indicate greater financial stability.

Data table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Supplier** | **Quantity (Q)** | **Price (P)** | **Delivery Time D** | **Environmental Sustainability (ES)** | **Financial Stability (FS)** |
| Supplier A | 8 | $1,000  | 95% | 8 | 80% |
| Supplier B | 9 | $1,100  | 97% | 7 | 90% |
| Supplier C | 7 | $950  | 92% | 9 | 85% |
| Supplier D | 8 | $1,050  | 94% | 8 | 88% |
| Supplier E | 9 | $980  | 96% | 7 | 92% |

Calculate criteria’s weights using most suitable objective methods. **10 Marks**

**Q. No.2.** Third-Party Logistics (3PL), a dynamic industry that plays a crucial role in the supply chain. 3PL providers are under increasing pressure to optimize their operations to meet the growing demands of clients. In this scenario, a prominent 3PL company operates in multiple regions and is looking to assess the interdependencies among various factors that impact its operational efficiency. The 3PL company manages transportation, warehousing, and distribution services for clients across different industries. They are keen on evaluating the factors influencing their operational efficiency and understanding the complex relationships among these factors.

Operational Factors:

1. Transportation Efficiency (TE): Measures the timeliness and cost-effectiveness of transportation services provided by the 3PL.

2. Warehousing Efficiency (WE): Evaluates the efficiency of warehousing operations, including inventory management and storage.

3. Information Technology (IT) Integration (ITI): Reflects the extent to which IT systems are integrated across the supply chain, enabling real-time tracking and data sharing.

External Factors:

1. Market Demand (MD): Represents the fluctuating demand patterns in the market for logistics services.

2. Regulatory Changes (RC): Measures the impact of changes in government regulations and compliance requirements on the logistics industry.

3. Technological Advancements (TA): Reflects the adoption of new technologies in logistics, such as automation and IoT devices.

Assume yourself to be a subject matter expert, offering ratings and crucial data essential to this context.

Analyse and visualise interrelationships among factors using the appropriate method. 10 Marks

**Q. No. 3 Case Study: Efficiency Evaluation of Hotel Chains**

This case study focuses on a group of hotel chains operating in various locations. The hotel management group aims to evaluate the efficiency of each hotel chain to optimize resource allocation, improve service quality, and enhance profitability. To achieve these objectives, they have collected data on various inputs and outputs for each hotel chain. The hotel management group oversees five hotel chains, each offering a range of accommodation and hospitality services. These hotel chains differ in terms of the number of properties, the number of employees, total revenue, operating costs, and guest satisfaction ratings.

In the context of efficiency evaluation and Data Envelopment Analysis (DEA) for hotel chains, inputs and outputs represent the key factors used to assess the performance and efficiency of each hotel chain. These inputs and outputs are chosen based on their relevance to the specific industry and the objectives of the evaluation. Here's a breakdown of typical inputs and outputs in the hotel industry:

Inputs:

1. Number of Properties: This input reflects the scale and extent of the hotel chain's operations. It represents the physical infrastructure and real estate assets owned or managed by the chain.

2. Number of Employees: The number of employees indicates the workforce allocated to operate and manage the hotels. This includes staff responsible for guest services, administration, maintenance, and management.

3. Total Revenue (in $): Total revenue is a financial input that represents the income generated by the hotel chain from its operations. It includes revenue from room bookings, dining, events, and other services.

4. Operating Costs (in $): Operating costs represent the financial resources consumed by the hotel chain to run its operations. This includes expenses related to salaries, utilities, maintenance, marketing, and other operational expenditures.

Outputs:

1. Guest Satisfaction Score (out of 100): The guest satisfaction score is an output that measures the quality of service and guest experience provided by the hotel chain. Higher scores indicate better customer satisfaction and service quality.

These inputs and outputs collectively provide a comprehensive view of each hotel chain's performance. Inputs represent the resources used to deliver services, while outputs measure the outcomes and quality of those services.

Data:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hotel Chain** | **Number of Properties** | **Number of Employees** | **Total Revenue (in Million)** | **Operating Costs (in Million)** | **Guest Satisfaction Score (out of 100)** |
| A | 20 | 1,200 | 50 | 30 | 85 |
| B | 15 | 900 | 45 | 27 | 88 |
| C | 25 | 1,500 | 60 | 35 | 83 |
| D | 10 | 600 | 30 | 18 | 90 |
| E | 30 | 1,800 | 70 | 40 | 86 |

1. What is the primary objective of the group of hotel chains in collecting and analyzing data for its individual hotel chain? **4 Marks**
2. Assume the group of hotel chains wants to assess the efficiency of Hotel Chain A. Using the provided data, calculate the efficiency score for Hotel Chain A and interpret the result.

**8 Marks**

1. Identify factors or areas should the group of hotel chains evaluate for improvement in hotel’s performance? **8 Marks**