Project Portfolio

Integrated Decision System Consultancy Pte. Ltd.

- **Supply Chain Transformation Project** - Aerospace & Defense Company

  Contributed to a major consulting engagement aimed at redesigning the client's supply chain into a unified, data-driven capability. The work began with a diagnostic phase that revealed structural gaps and silo dynamics. To address these issues, the second phase explored advanced technologies and integrated data analytics. These insights will shape the third phase, where they will be consolidated into a strategic roadmap that sets priorities, defines governance requirements, and charts pathways to achieve long-term competitiveness.

- **Production Scheduling Optimization** – Manufacturing Company

  Contributed to the development of a production optimization model for a manufacturing company to coordinate the flow of raw materials, work-in-progress, and final products. The model incorporates bill of materials (BOM), production rates, manpower constraints, and procurement planning to support daily operations. It also enables strategic scenario analysis, such as evaluating the feasibility of large orders, assessing the impact of adding equipment, and modeling risks from delayed or uncertain supply.

- **Fleet Routing Optimization** – International Freight Forwarder

  Contributed to the implementation of a routing optimization system for a B2B logistics provider to address inefficiencies in fleet utilization and the separation of pickup and delivery operations. The project aimed to move away from a zone-based manual approach toward a more integrated and optimized routing strategy. The system comprises three core components: the Anticipatory Job Engine (forecasting individual pickup and delivery jobs with detailed attributes such as location, weight, and volume), the Static Routing Engine (initial route planning), and the Dynamic Routing Engine (real-time adjustment based on actual jobs).

- **Spare Parts Demand Forecasting & Inventory Optimization** – Engineering Services Company

  Conducted demand forecasting and data analysis for a project with an engineering services company responsible for maintaining a large urban taxi fleet. The project aimed to reduce high inventory costs associated with spare parts procurement, which was historically based on simple three-month consumption rules. As inventory planning is closely tied to maintenance strategy, the analysis accounted for both preventive and corrective maintenance demand patterns to support more effective procurement planning. These insights were further used to inform inventory optimization decisions, enabling more efficient stock levels while maintaining required service levels and fleet uptime.

- **Workforce Planning for Airport Security** – Security Services Company

  Worked on a decision support project for a security services company operating in an airport, aimed at improving operational planning for lane allocation and workforce scheduling. The existing approach suffered from inefficiencies in lane planning, suboptimal shift generation, and high absenteeism in rostering. The objective was to develop a more robust and integrated modeling framework to reduce operational costs and strengthen the company's position in future airport tenders.

- **Train Loading Optimization** - Third-Party Logistics (3PL) provider

  Worked on a decision support and optimization project for a third-party logistics provider, aimed at improving the efficiency of loading containers onto trains. The existing planning process lacked an integrated approach to account for key operational constraints such as wagon capacity, destination pairing, commodity types, and load balance. The objective was to develop an optimization framework that ensures feasible and efficient loading plans while supporting better capacity planning through short-term demand forecasting.

- **Project Scheduling Optimization** – Internal Development Project
  Contributed to the development of a project scheduling optimization model and a project crashing optimization model prepared for the construction industry in Singapore, in collaboration with Singapore Polytechnic. The scheduling model produces an initial plan under multiple general resource constraints, while the crashing model dynamically adjusts schedules when deadlines change by allocating additional resources. Together, these tools enable project managers to assess cost–duration trade-offs and select the most effective strategies to meet delivery targets.

- **Inventory Planning Optimization** – Internal Development Project

  Worked as part of a team developing two optimization models to support inventory planning across product categories and retail locations. The first model focused on determining the optimal allocation of budget and space to each product category at a given location, balancing profitability, business priorities, and physical constraints. The second model operated at the category level to jointly recommend replenishment and removal quantities for products—where removal decisions also account for perishability and the need to prevent excess aging or spoilage. This category-level approach ensures consistent planning across SKUs and avoids conflicts that could arise from treating products in isolation.

- **Time Series Profiling** – Internal Development Project

  Contributed to the development of a set of tools for time series profiling to support better forecasting decisions:

  1. **Time Series Age Classification** – Categorizes each time series as *New*, *Active*, or *Inactive* based on its lifecycle stage, helping to identify maturity and relevance before forecasting.
  2. **Time Series Characteristics Classification** – Classifies each series as *Continuous*, *Fuzzy* (a spectrum between continuous and intermittent), or *Intermittent*, with an additional *Transient* property for any type that shows long gaps of inactivity between active periods.
  3. **Change Point Detection** – Identifies significant shifts in the underlying pattern or behavior of a univariate time series or a correlated multivariate time series, indicating structural changes that may require adjusting the forecasting approach.

- **Time Series Predictability Score Estimation** – Internal Development Project
  Contributed to the development of a predictability score estimation tool to assess the regularity of patterns in a time series before applying forecasting models. This score not only guides model selection and sets realistic forecast expectations, but also unlocks a wide range of business insights across industries. For example, predictable products can support long-term marketing plans and inventory optimization, predictable customers can inform loyalty programs and subscription models, and predictable maintenance patterns can guide compliance monitoring and downtime planning.

- **Lost Sales Estimation for Demand Forecasting** – Internal Development Project

  Developed a model to estimate lost sales for products affected by stockouts, with the goal of improving demand forecast accuracy in environments with frequent inventory shortages. The model used sales data and inventory records to recover unobserved demand.

- **Intermittent Time Series Forecasting** – Internal Development Project

  Developed a model to handle intermittent time series forecasting, enabling us to predict both the timing and quantity of orders with fair accuracy. Unlike the common approach of aggregating the time series into a coarser frequency before forecasting—which often loses detail about individual order occurrences—our method directly models the intermittent nature of the data. As a result, the model offers better support for inventory and resource planning in environments where demand is sporadic and unpredictable.

PT Edu Media Digital

As Tech Lead, I provided technical direction across the following projects, ensuring alignment between analytical solutions and business objectives.

- **Student Performance Prediction**

  Developed a predictive analytics solution to estimate student academic performance and identify early signs of academic risk. The model analyzes both pre-admission data and historical academic records to predict semester GPA and detect students who may struggle in future terms. This enables universities to evaluate admission quality, monitor student progression, and implement early intervention strategies to improve academic outcomes.

- **Class Scheduling Optimization**

  Developed an optimization model to automate university class scheduling, replacing a manual and time-consuming planning process. The model generates feasible schedules while balancing multiple objectives, including efficient room utilization, fair distribution of teaching load, and accommodation of lecturer availability and preferences. It ensures conflict-free schedules across courses, lecturers, and student cohorts.

- **Student Credit Risk Modeling**

  Developed a predictive modeling solution to assess the financial risk of students and support university revenue planning. The project analyzed historical payment behavior to model revenue patterns and identify students at risk of delayed or incomplete payments. These insights enable institutions to anticipate cash flow, manage financial risk, and design targeted intervention strategies.

- **Lecturer–Course Assignment Optimization**

  Developed an optimization model to assign lecturers to courses based on cost efficiency, workload balance, and teaching quality. The model supports decision-making by recommending assignments that minimize teaching costs while ensuring fair distribution of workload and alignment between lecturer expertise and course requirements.

- **Academic Performance Monitoring System**

  Developed an academic monitoring dashboard to support program-level decision-making and early identification of student risks. The system provides a comprehensive view of academic performance, including GPA trends, course-level outcomes, and real-time monitoring of at-risk students. It enables academic leaders to diagnose issues, evaluate course effectiveness, and take timely interventions.

- **Financial Performance Monitoring System**

  Developed a financial monitoring dashboard to provide university leadership with visibility into financial performance and student payment behavior. The system tracks key financial metrics, analyzes tuition collection patterns, and highlights areas of financial risk, including student arrears and revenue gaps. It also supports forward-looking financial planning through projection and scenario analysis.

- **Workforce Analytics & Planning System**

  Developed a human resource analytics dashboard to support workforce planning, recruitment, and career progression within the university. The system provides insights into staff composition, turnover trends, retirement projections, and internal mobility, enabling better planning of recruitment and succession strategies.