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Case Article

Locating Fulfillment Centers for AmazingDeal.com

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Abstract. A fast-growing e-commerce firm that has revolutionized the shopping behavior of the masses in India has recently crossed \$1 billion in sales by gross merchandise value. It is now eyeing at the \$10 billion mark and therefore needs to expand its expedited delivery services to more cities across the country, which will require setting up new fulfillment centers. The case seeks answers related to locating the optimal number of new fulfillment centers to be set up based on different coverage requirements for different tier cities, as specified by the management. It provides an opportunity for the instructors to demonstrate the need and art of mathematical modeling for optimization and its nuances using a practical application to facility location problems. The case enables students to appreciate the complexity of real-world combinatorial optimization problems and the power of mathematical modeling (through integer programming) in solving them using Microsoft Excel Solver, as well as commercial large-scale solvers accessed through state-of-the-art optimization suites such as A Mathematical Programming Language (AMPL). Over the past several years, the case has been used as a pedagogical tool across multiple programs in multiple institutes and has received appreciation from a diverse range of participants.

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Supplemental Material: The Case Data Excel file is available at <https://doi.org/10.1287/ited.2024.0082ca>. The Instructor Materials package and Teaching Note are available at <https://www.informs.org/Publications/Subscribe/Access-Restricted-Materials>.

Keywords: facility location • e-commerce • fulfillment centers • mathematical modeling • optimization • supply chain management

1. Introduction

In management science, mathematical programs are among the most popular models that are routinely used as a decision-making tool in a wide variety of business contexts. However, as highlighted by Powell (2001), Williams (2013), and, more recently, Hürlimann (2024), despite the ubiquitousness of mathematical models, there has traditionally been relatively less focus on teaching the *need* or *art* of mathematical model building. As far as academic publications are concerned, although most of the studies formulate interesting problems from specific industries and solve them using either an off-the-shelf solver or some novel solution approaches, there is often very limited discussion on the *art of mathematical modeling* itself. However, this trend has been shifting in recent years, with an increasing number of pedagogical studies emphasizing the

importance of teaching mathematical model building to business students. According to Beliën et al. (2013), motivating students who do not come from a management science background to recognize the utility of mathematical modeling in decision making poses a major challenge. As a result, the use of specialized or not so intuitive applications requires the instructor to invest considerable time just to explain the context to such students (Trick 2004), thereby making it even more difficult for them to work on solutions. Thus, the best way to hook business students right from the start is to use a practical context they can effortlessly relate to, allowing them to immediately see the real-world utility of what they are learning in the class as they tackle the problem at hand (Beliën et al. 2011). Interestingly, as highlighted by Klingenberg (2012), and also observed by the authors, facility location problems are

easily relatable and thus serve as effective tools for introducing mathematical modeling and large-scale problem solving to students from diverse backgrounds. Although a few teaching cases and pedagogical tools (as highlighted in the next section) incorporate facility location contexts, this case is intended to complement them by presenting a *practical* yet easily relatable business scenario that learners with varied academic backgrounds find accessible and relevant.

Our case seeks to introduce the need and art of mathematical modeling using integer programs for a set of closely related, but conceptually different, facility location problems that concern a real-world expansion project undertaken by a growing Indian e-commerce firm. The case aims to provide hands-on exposure to the necessity and nuances of building mathematical models and large-scale problem solving using a state-of-the-art optimization suite. Starting from deliberating on the need of a mathematical model and then identifying the right set of decision variables and constraints, the case takes students through the entire spectrum of model building while reflecting on the “why this” and “why not that” aspects at each step of the process. Students can appreciate not only the utility of mathematical programming for combinatorial optimization but also the formulation intricacies, such as the correct choice of variables, introducing additional sets of variables for the ease of modeling, implications of different inequality signs for the constraints, use of “Big-M” in enforcing logical constraints, strengthening a certain set of constraints, aggregation and disaggregation of constraints, and so on. The set of questions to be asked, possible student responses, and the follow-up counter-questions or discussions at different stages of the process are detailed in the Teaching Note, based on authors’ experience of using the case across various programs. Through this case, students work their way up by first finding heuristic solutions to miniature versions of the problems, then deliberating on the formulations for these problems and then solving them using the MS Excel solver. The initial heuristic exercise helps them grasp the problem definition clearly and, at the same time, realize the complexity of these problems and the limitations of heuristic approaches in solving them optimally. It finally provides students with an opportunity to use AMPL (Fourer et al. 1990) as a mathematical modeling language for the large-scale real-world 486-city instance discussed in the case and solve it using a state-of-the-art commercial solver. Moreover, the importance of data visualization as a pedagogical tool in enabling simple and effective interpretation of optimization results is highlighted by Evans (2015). Accordingly, Tableau Desktop (Tableau 2024) has been used to generate visual depictions of the solutions to all the case problems. The relevant files for all these exercises are included in the Instructor Materials package provided with the case.

While working on the case problems, students are expected to develop skills in mathematical modeling for large-scale optimization problems, which are relevant to corporate careers, particularly in the prescriptive analytics domain. The case is intended to provide guidelines for developing mathematical programming models when addressing similar decision-making problems. An important takeaway for students is the sense of delight that comes from successfully solving the case problems, which involve strategic-level decision making commonly encountered in many industries.

To summarize, this case can be used to achieve the following learning objectives:

- Appreciate the need and art of mathematical modeling: Understand the importance of building mathematical models to tackle combinatorial optimization challenges through deliberations on the necessity of mathematical modeling, selecting appropriate decision variables and constraints, and exploring formulation rationale (“why this” versus “why not that”) across a set of related yet distinct problem variants.
- Understand formulation intricacies: Gain proficiency in advanced modeling concepts, such as introducing auxiliary variables for modeling simplicity, choosing appropriate inequality directions, applying “Big-M” for logical constraints, strengthening constraints, and aggregating versus disaggregating constraints.
- Engage with relatable and real-world contexts: Apply integer programming to formulate a set of facility location problem variants in an easily relatable and practical Indian e-commerce expansion scenario, enabling diverse business students to quickly recognize the practical utility of mathematical programming in strategic decision making.
- Progress from heuristics to formal optimization: Develop intuitive heuristic solutions for miniature (10-city) problems to grasp complexity and heuristic limitations and then transition to exact formulations solvable via MS Excel Solver, fostering eagerness for efficient approaches.
- Scale to large and practical instances with advanced tools: Utilize AMPL as a modeling language and state-of-the-art commercial solvers to optimize a real-world 486-city data set while incorporating Tableau for visualizing and interpreting results to enhance pedagogical understanding.

Our article is organized as follows. The next section reviews relevant literature on different pedagogical resources followed by a description of the case. We then discuss its classroom uses and pedagogical coverage including possible extensions. Finally, we share our classroom experiences and conclude with a summary of the key features.

2. Literature Review

Facility location problems have received considerable attention in operations research literature (Daskin 2013,

Laporte et al. 2019). These problems have also found extensive applications to many real-world problems arising in diverse industries (Cornuejols et al. 1977, Sankaran and Raghavan 1997, Gavirneni et al. 2004, Aktaş et al. 2013, Van den Berg et al. 2017). In this section, we review pedagogical resources on mathematical programming, which are organized according to the case’s learning objectives. In the following four sections, we map representative studies to these objectives and conclude with a summary of our contribution.

2.1. On Teaching Mathematical Modeling Basics

Powell (2001) argues that business students, who are often occasional practitioners, benefit most from basic modeling skills rather than sophisticated toolkits. Consistent with this emphasis, pedagogical approaches in the literature include a two-stage translation from words to algebra (Stevens and Palocsay 2004), compact “formulettes” that students translate and verify (Brown and Dell 2007), and overviews that situate model types in industrial decisions (Stecke 2005). Stevens and Palocsay (2017) discuss how binary variables encode yes/no decisions and logical relations using sequences of elementary implications. Greivel et al. (2024) underscore the value of consistent notation in large-scale linear programs, as illustrated by their reformulation of the Regional Energy Deployment System (ReEDS) energy deployment model. For comprehensive treatments on the basics of mathematical modeling, interested readers may refer to the books by Williams (2013) and Hürlimann (2024).

2.2. On Using Relatable Contexts (Including Facility Location Problems)

Beliën et al. (2011) argue that an effective way to engage business students from the outset is to ground the discussion in a practical context they can easily relate to. Along these lines, Winch and Yurkiewicz (2014) discuss a class scheduling problem that students can quickly relate to and apply a simple integer linear program to solve. Similarly, sports scheduling has been a popular choice. Trick (2004) presents examples from sports scheduling to explain several key concepts in integer programming including symmetry-breaking, cut generation, and alternative formulations. Goossens and Beliën (2023) use a case on the Belgian soccer league scheduling, illustrating the transition from a manual approach to an integer programming approach. More recently, Beliën et al. (2025) present an interesting game embedded in an Excel spreadsheet that requires students to formulate and solve a series of problems framed around the widely popular fictional TV show *Game of Thrones*.

Location decisions are easily relatable (Klingenberg 2012) and thus serve as excellent tools for introducing mathematical modeling to students from diverse

backgrounds. One such pedagogical tool is the burrito optimization game (Snyder 2022), which provides an interactive web-based interface for an experiential introduction to optimization. It challenges players to place burrito trucks on a city map to maximize profit, balancing fixed costs, variable costs, and revenue. Sinha and Sainy (2024) present a facility location problem in the context of electric vehicle (EV) charging stations. Croella and Gregori (2025) present a case exercise on food donation supply chain that integrates location decisions with vehicle routing, fleet sizing, and workforce management to obtain environmentally sustainable solutions, whereas Chatterjee and Dhaigude (2017), Chau and Benson (2025), Gupta et al. (2017), and John et al. (2018) present cases on multicriteria facility location.

2.3. On Transitioning from Intuitive Heuristics to Exact Models and Scaling Up

A common and effective classroom practice is to start with intuition and small instances before formalizing mathematical models and solving larger instances. Brusco (2022) presents an Excel workbook for five classic discrete location models, where students progress from trial-and-error to complete enumeration via VBA, and finally solve integer programming formulations using the Excel Solver. The exercise helps students understand facility location problems, while appreciating the efficiency of mathematical programming over complete enumeration. Similarly, the burrito optimization game (Snyder 2022) allows the players to compare their heuristic solutions with Gurobi’s optimal solution and thus appreciate the challenge of optimizing by hand. In terms of scale, Milburn et al. (2017) demonstrate how real-sized instances force a move from simple heuristics to implementable models in a large-scale vehicle-routing setting. In a small business setting, Li et al. (2025) use vehicle routing problem variants within a prescriptive-analytics framework to highlight iterative model refinement as routing decisions evolve.

2.4. On the Use of Tools and Effective Communication of Results

Spreadsheets remain useful for transparency and early experimentation (Pachamanova 2006, Leong and Cheong 2008); however, to scale up, algebraic modeling languages and modern mixed-integer linear programming (MILP) solvers are appropriate. AMPL has been used effectively in teaching several classical operations research problems (Fourer et al. 1990, Lee and Raffensperger 2006, Alpers and Trotter 2009), and courses increasingly incorporate solver-level exposure (Dunning et al. 2015). Evans (2015) highlights visualization as part of prescriptive analytics. A practical precursor in solving most business problems is constructing reliable distance data. Huggins (2019) shows how to

convert ZIP code data into distance matrices (including via Google Maps), a step that often determines whether classroom models feel real.

Our case presents a contemporary context that is accessible to students across different programs and backgrounds. It is based on a real business scenario involving large-scale data from 486 Indian cities and incorporates the full arc of the modeling process—from problem framing and formulation choices to heuristic and exact solution approaches, the use of a standard optimization suite, and visualization of results.

The case discussion begins with exercises based on a small (10-city) instance. The simplicity and practicality of the exercise problems help students engage quickly and gain firsthand exposure to the challenges of complete enumeration. This naturally leads to a discussion of more structured modeling approaches. The case helps the instructor bring the individual components of the modeling process together within a structured, iterative discussion format that encourages compare-and-contrast reasoning throughout.

The accompanying Teaching Note outlines suggested discussion questions, possible student responses, and follow-up prompts, drawing on several years of classroom use in various programs. To support instructors, the materials package includes detailed solution analyses for the miniature problems, a presentation on set covering, AMPL code files for all case problems, detailed case solutions, and Tableau visualizations of the results on the Indian map, along with input data and workbooks.

3. Case Description

Ratnesh, a first-year MBA student at the Indian Institute of Management Ahmedabad in India, has joined AmazingDeal.com’s Bangalore office for his two-month summer internship in 2014. AmazingDeal, which started in 2007 as an online portal to sell books with an initial investment of just 500,000 Indian Rupees (INR), revolutionized the shopping behavior of Indians and successfully shifted millions of users from a brick-and-mortar store to online shopping, thereby heralding the beginning of a whole new industry. The company soon expanded its presence in a wide range of categories and grew at an unprecedented rate, which not only helped it attract funds from leading venture capitalists but also helped it make several significant acquisitions.

Ratnesh has been asked to report to Pallavi Palkar, an associate director (AD) at AmazingDeal. In his first meeting with Pallavi, he has been briefed about AmazingDeal’s plan to expand its next day delivery (NDD) and same day delivery (SDD) services as a part of their roadmap to become a \$1 billion company by 2020. The company’s marketing team has identified the top 486 potential cities, based on factors including internet

penetration, mobile usage, credit card, population, literacy, and so on, for the expansion of its services. These cities have been further classified as Metros, Tier 1, Tier 2, and Tier 3 based on their demand potential and population.

Currently, AmazingDeal has four big fulfillment centers in Delhi, Mumbai, Kolkata, and Bangalore. All orders are processed by the fulfillment center that is nearest to that order location and sent to customers by road or air based on the type of delivery needed, namely, standard delivery, NDD, and SDD. NDD and SDD options command good premiums over the standard delivery, but at the same time, they often require fulfillment by air mode, which is very expensive and often costs more than the premiums earned. Therefore, with the vision to achieve \$10 billion in sales by 2020, AmazingDeal aims to expand its NDD and SDD services to cities beyond Metros and Tier 1 cities by road, as opposed to the more expensive air mode. This requires opening of new forward fulfillment centers (FFCs) closer to these cities, which will also enable them to add perishable items like fruits and vegetable to their offerings. Ratnesh has been entrusted with the responsibility to assist Pallavi in planning this expansion project, which needs to be completed and presented to the vice president within the next two months. The case essentially seeks answers related to the optimal number and locations of the new FFCs to be set up based on the diverse coverage requirements specified by the management for different tier cities.

4. Suggested Classroom Use

The case is written with the objective of providing students with hands-on exposure to mathematical modeling and large-scale problem solving using a real-life application of facility location models. Essentially, the case problems demonstrate the application of set covering, maximal covering, and p-median location models. The case questions have been designed and sequenced to challenge students using counterintuitive scenarios at every step of the mathematical modeling exercise. Based on our experience, we suggest using a *Socratic* approach to teaching the case, in which the instructor asks a series of questions and counter-questions to guide students toward discovering answers or recognizing errors, thereby supporting a richer learning experience.

The class discussion begins with miniature versions of the original case problems, involving only 10 cities, which can be solved using complete enumeration. This allows the class to segue to problems of progressively increasing difficulty, dispelling common misconceptions in the process, before reaching a point where students realize the practical limitations of complete enumeration even for a problem with only 10 cities. For

example, students often conclude that the FFC location that is optimal for locating one FFC is also part of the optimal solution for locating two FFCs in the maximal coverage problem. The discussions outlined in the Teaching Note are designed to generate counterexamples that help students recognize such errors. The exercise also fosters a sense of competition among students, who actively seek improved solutions. In the process, they not only gain a clear conceptual understanding of the problem but also recognize the computational complexity involved in obtaining the optimal solution. At this stage, the instructor introduces mathematical modeling as a practical approach to solving such combinatorial problems. Drawing on the authors' experience of using the case across multiple programs and institutions, the Teaching Note provides detailed guidance for instructors on facilitating class discussions that address "why this" and "why not that" questions at each step of model development. By the end of the exercise, students are expected to have a thorough understanding of how to approach such decision-making problems using mathematical programming.

The instructor can organize the discussions on the case and the case questions as outlined below:

(a) **Importance of Mathematical Modeling:** We suggest that the instructor initially encourage students to attempt the case problems on their own. Because the case context with more than 450 cities is too large for a comprehensive classroom discussion, a 10-city miniature problem (provided in the Teaching Note) can be used by the instructor, which should be relatively easier, yet still not trivial for students to deal with. In line with the first case question, the Teaching Note details a set of subquestions and the discussions that typically follow. The interactions following these questions are often intensive and usually set the tone for the rest of the case discussions. This stage culminates in the instructor using a small Excel exercise to demonstrate the exponential growth in computational complexity as problem size increases. By this time, the class is expected to recognize not only the limitations of heuristic and complete-enumeration approaches, but also the need for more effective solution approaches for such problems.

(b) **Eliciting the Mathematical Model:** At this point, the instructor introduces the mathematical programming approach to the class, explaining its three stages, namely formulation, solution, and interpretation, and outlining the key elements of a linear program, including parameters, decision variables, the objective function, and constraints. The most crucial part then follows in which the instructor, instead of providing the complete model upfront, attempts to elicit it from students. From our experience, this process of eliciting mathematical models is enriching for both the instructor and the class. The idea here is to motivate students

to define the required decision variables, the objective function, and the constraints of the model. In most instances, students propose several alternative ways of modeling the same problem. Although these models often have shortcomings, addressing them through structured and constructive discussion helps deepen understanding, and in some cases, leads to improvements beyond the formulation(s) initially considered by the instructor.

(c) **Discussions on the Mathematical Model:** The formulation stage is followed by a discussion stage in which students are required to explain the reason(s) behind their modeling choices, including decision variables, objective function, and constraints. For example, the maximal covering problem helps students recognize the difficulty in formulating the objective function using only the set of location decision variables, which is often their initial modeling choice. It also highlights the challenges involved in expressing relationships among different sets of decision variables, allowing the instructor to emphasize the importance of linear relationships in mathematical modeling. The questions posed and the discussions that follow each model are detailed in the Teaching Note.

(d) **Solving the Problems:** The final step is to solve the formulated problem using appropriate tools. MS Excel with the Solver add-in is used to set up and solve the miniature (10-city) version of the problems, and the optimization suite AMPL together with CPLEX is used to solve the full-scale (486-city) case problems. The Excel files and the AMPL code files are included in the supplementary Instructor Materials package. Although MS Excel provides an accessible way to introduce linear programming setup and solution for small-scale problems, AMPL supports generic modeling and, together with its range of commercial solvers, is more suitable for large-scale practical problems. AMPL facilitates this by allowing a clear separation between the model and the data, enabling compact model representations that are automatically expanded using the data. The Instructor Materials package also includes a PowerPoint presentation depicting the solutions to the case problems on the Indian map, generated using Tableau Desktop. The package also includes the input data and Tableau workbooks used to generate these visualizations.

(e) **Importance of Location Decisions:** At this stage, the instructor may provide an overview of location modeling and decisions and their importance for both manufacturing and service firms (Daskin 2013, Laporte et al. 2019). Specific examples can be discussed to explain the key parameters and variables involved in such decisions. In an operations and supply chain management course, the instructor may also refer to supply chain management literature (for example, textbooks such as Chopra et al. (2023) and Simchi-Levi et al.

(2022)) to explain the relevance of the case in the context of supply chain network design. Students can be asked to brainstorm and identify similar problems from other industries and business contexts where the same questions apply and have implications for business goals.

The Teaching Note elaborates on the above steps for each case problem and is divided into three parts: Part A covers case Questions 1(a) and 1(b), Part B covers Questions 2, 3(a), and 3(b), and Part C covers Question 4. It is designed to support discussions across a range of programs and courses, as highlighted in the next section. At the same time, certain sections are identified as optional in the Teaching Note and may be omitted at the instructor's discretion, depending on the nature of the program and the level of student engagement.

5. Pedagogical Coverage

The coverage of the case is designed to suit programs ranging from undergraduate and graduate to executive education. Set in the context of a practical and strategic-level decision-making scenario, the case discussion includes understanding the need for mathematical programming, formulating the case problems from scratch with step-by-step reasoning, and finally, coding and solving the models using AMPL to obtain optimal solutions. In an MBA program, the case can be used in courses such as Logistics and Supply Chain Management, Warehouse Management, Facility Location Modeling, Mathematical Modeling (or Programming) for Managerial Decisions, and Business or Prescriptive Analytics. The case may also be used to introduce optimization platforms such as AMPL and commercial solvers such as CPLEX or Gurobi to students. In this context, the instructor can highlight the role of such software suites in handling complex decision-making problems encountered in practice. With respect to facility location modeling, the case covers set covering, maximal covering, p -median models, and a few extensions.

In an undergraduate- or graduate-level foundational course, the instructor can use two sessions to discuss case Questions 1, 2, and 3 with Question 3(b) (and possibly Question 3(a)) assigned as follow-up work. In the Teaching Note, this coverage corresponds to Part A and Part B. A third session can be used to discuss Question 4, corresponding to Part C of the Teaching Note. In addition to discussions on the core mathematical models, alternative formulations (as outlined in Part C) and their implications in the context of the p -median model can also be discussed. As remarked in the Teaching Note, the instructor may further discuss the branch-and-bound approach for solving integer programs, which can help students gain deeper insights into the working of commercial MILP solvers. Portions identified as optional in the Teaching Note may be omitted,

and the pace of discussion can be adjusted based on the number of assigned sessions. For instance, setting up and solving the miniature problems in Excel may be skipped if students already have prior exposure. Similarly, selected discussion questions at the end of the modeling exercises may be omitted depending on the level of student engagement.

In an advanced graduate level elective, more extensive coverage may be appropriate and can include the full Teaching Note. These students can be encouraged to carry out the experiments in AMPL, as suggested in the Teaching Note, to develop a deeper understanding of not only the modeling process but also the solver solution method. In this setting, the instructor may use the aggregate versus disaggregate formulations of the p -median problem to highlight alternative models for the same problem and to illustrate the differences between them in terms of efficiency (CPU time or sharpness of the LP bounds). This also allows the instructor to segue into the discussion on convex hull of an integer program. Moreover, additional advanced models may be discussed or given as assignments to further extend the discussion of mathematical programming using facility location. Some of these models are as follows: fixed charge facility location problem, p -center problem, p -dispersion problem, obnoxious facility location (Daskin 2013, Laporte et al. 2019), and facility interdiction, as an example of bilevel optimization (Jayaswal and Sinha 2022). The Teaching Note suggests a concluding discussion in which students compare the models and their solutions across different scenarios discussed in the case and reflect on potential extensions.

6. Classroom Experiences

This case has been used for teaching operations research, prescriptive analytics, mathematical modeling, and facility location-related topics in a range of programs including one- and two-year MBA and short-duration executive education programs in areas such as Logistics and Supply chain Management, Warehouse Management, and so on. It has been used across multiple institutes in India, including the Indian Institute of Management Ahmedabad, Indian Institute of Management Nagpur, Indian Institute of Management Indore, and Indian Institute of Management Amritsar, where the authors have taught the case over several offerings. MBA students, having completed core courses in operations management and operations research, generally find the case relevant because of its practical context and the use of commercial optimization tools. Company executives, on the other hand, are often quick to recall decision-making situations from their own professional experience where intuitive judgment was used and where a formal mathematical

modeling approach could add value. They show considerable interest in learning mathematical modeling techniques that can support more structured decision making in such contexts and frequently seek guidance on how to address similar problems drawn from their own work settings.

To provide a representative view of classroom reception across programs and backgrounds, we collected recent feedback from participants across an MBA elective and two different open-enrollment programs. The participants were asked to complete a brief online survey that was anonymous and voluntary and included three items: a 1–5 effectiveness rating, one strength, and one area for improvement. The 82 participants who responded comprised a mix of students (full-time MBA, MS, or PhD), faculty, and industry participants. On effectiveness rating, 96% rated the case 4 or 5 (59% rated it 5) with overall mean of around 4.51. Among the 47 student respondents, 94% rated 4 or 5, whereas 51% rated it 5. On the strengths of the case, the respondents most often cited relatable and practical business context (32%), followed by the model building exercise (28%) and Excel to AMPL/solver workflow with map-based interpretation (11%). Suggestions for improvement included mostly more hands-on tool time and extra examples, and a few requested a brief primer on notation and constraint logic. A sample of comments are as follows:

- “The Case gave an idea of complexity of real-world Network design.”
- “Practical, containing huge data set simulating real life conditions.”
- “The case study was so relevant. The approach to solve the case is engaging as professor tried to get the answers from us and make us think in different directions. It makes it interesting and challenging.”
- “The wrong cases were also discussed, highlighting where one can go wrong during mathematical modeling before arriving at the correct results. Such discussions are important as they enhance the learning experience, helping to build deeper understanding and avoid similar mistakes in future work.”
- “This made the concepts more relatable, easier to understand, and showed me the direct value of applying models to decision making in practice.”
- “I have used MILP earlier, but to implement at this scale, it’s the first time.”

7. Conclusion

The case demonstrates a practical application of mathematical modeling and its nuances in the context of facility location. It seeks answers related to locating the optimal number of new FFCs for a fast-growing e-commerce firm that needs to expand its quick delivery services. The case helps integrate facility location

and operations research concepts with hands-on implementation using MS-Excel and AMPL. The primary objective is to help students understand the utility of mathematical programming in addressing real-world business problems. It serves both as an introduction to mathematical programming and as an exercise that exposes students to the key building blocks and modeling considerations involved in formulating and solving such problems. Experience across different programs suggests that participants find the case relevant and that the discussions help them better understand how mathematical programming approaches can be applied in business decision-making contexts.

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