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Best Practices for Implementing the Case Method and Team-Based Project Models: Efforts to Fulfill Higher Education Key Performance Indicators

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Abstract

This study describes the best practices of implementing case methods and team-based projects in Consulting Project lectures related to achieving Higher Education Key Performance Indicators (KPI-HE). The study used a qualitative descriptive method to describe and depict the best practices of implementing case method and team-based project models in Consulting Project lectures. The research participants were 82 students taking consulting project lectures in the Mathematics Study Program. The case method and team-based project models were carried out simultaneously in lectures, directly confronting students with real problems, challenging students to develop creativity and critical thinking in determining various alternative solutions. The creation of various alternative solutions to partner issues and the formal signing of the Cooperation Agreement between the study program and partners prove that the consulting project lecture supports the achievement of the study program's KPI, especially KPI 6 related to partnerships and KPI 7 related to collaborative participatory classes. The best practices reported in this study will contribute to the study program in improving the quality of learning and, in general, in revising the curriculum, especially for courses aimed at training students to become part of the world of work and industry.

Keywords Case Method; Key Performance Indicators; Team-Based Project

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1. INTRODUCTION

The Freedom of Learning Independent Campus (MBKM) program, launched by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia in 2020, offers flexibility for students to study. The MBKM program aims to offer opportunities for students to study outside their regular program, off-campus, or to directly enter the workforce to hone their skills according to their talents and interests, laying a foundation for their future careers (Dwijayanti et al., 2020; Sukma Yulianto & Juwono, 2024; Dwi Karya Susilawati et al., 2021; Putri Nourma Budiarti et al., 2022; Khoiri & Yulianto, 2025; Nursi, 2023; Yuniar Mujiwati et al., 2023; Herman, 2023). Additionally, MBKM is intended to increase the relevance of higher education to the needs and demands of the world of work and industry. In general, MBKM was launched in response to the rapid changes in various aspects of

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life (Muhammad et al., 2023).

The Consulting Project course is compulsory for students of non-teaching study programs at the Universitas Pendidikan Indonesia (UPI). This course carries four credits to train students to become part of the solution to the world of work, industry, government agencies, or specific communities. The course emerged due to concerns about the loss of experience and knowledge related to the world of work, particularly general societal problems attributed to the achievements of the Field Experience Program (FEP) course. The FEP course previously had a mandatory status, but has changed to non-mandatory. This change in status was due to the MBKM policy from the Ministry of Education and Culture, which requires study programs at various universities to revise their curricula. The curriculum is the primary and crucial thing for running a study program. In educational management, curriculum development is a complex and crucial problem, requiring a multidimensional approach and cross-institutional cooperation (Maryati et al., 2024). MBKM encourages students to carry out activities outside the study program or the campus. Activities outside the study program are recognized as course conversion; this recognition will reduce the study load that must be completed. The FEP course is one of the conversion courses from MBKM activities followed by students.

The difference between the consulting project course and other courses lies in four elements: (1) the independence aspect, students are required to understand the problem based on data provided by partners; students will propose solutions or create a product that can help partners advance and improve; (2) the leadership aspect, students play a greater role as "candidate" consultants so that their role is closer to being an assistant leader in a particular unit than as a subordinate; (3) the competency achievement target aspect, students are required to have more holistic abilities, namely conducting field observations, interviews and in-depth problem analysis, problem analysis, formulating solutions and creating products, and presentations in front of partners in a report; and (4) the activity steps aspect, the consulting project course follows the case method (CM) and team-based project (TPB) learning models.

In the first year of implementing the Consulting Project lecture in the UPI Mathematics Study Program, various problems were found. The problems can be categorized into four groups, namely (1) the lack of memoranda of understanding between UPI and various partners outside the educational institution, (2) the complexity of partner problems, (3) student competence, and (4) the effectiveness of group formation (Puspita et al., 2024).

The learning used in the Consulting Project course fully uses the CM and TBP models. Approximately 70% of lecture activities are conducted on campus. Therefore, the Consulting Project course is not an internship, work practice, or industrial visit activity. Visits to specific industries, agencies, institutions, or community groups in the economic, social, cultural, legal, or political fields (hereafter referred to as third parties or partners) aim to collect data and understand the problems faced by these partners, as well as design the solutions or products needed.

Key Performance Indicators for Higher Education (KPI-HE), stipulated through the Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754/P/2020. Achieving Key Performance Indicators (KPIs) is a key component in the university ranking system in Indonesia. KPIs serve as an instrument to measure and evaluate the performance of a university, encompassing elements of the tridharma of higher education and management of both finance and human resources (Mujanniyati et al., 2024). All academics in higher education institutions must support this policy (Kemendikbud, 2021). Two of these KPIs are KPI 6, related to partnerships, and KPI 7, about collaborative and participatory classes.

Amin et al. (2021) and Herianto et al. (2024) concluded that, in implementing MBKM, achieving KPI 7, related to implementing collaborative participatory classes, was not optimal and required continuous adjustment. In contrast, Arifien et al. (2022) It was found that all parameters related to KPI 7 increased during the MBKM era. The achievement of KPI 6 has not experienced a significant increase (Dwijayanti et al., 2020). Overall, the development of KPI from 2020 to 2021 has not shown a substantial

increase (Sukma Yulianto & Juwono, 2024). Based on these studies, it can be inferred that implementing MBKM regarding KPI achievements still yields mixed results and requires further research. Although, in general, MBKM effectively supports KPI achievement through direct experience-based activities (Herianto et al., 2024).

The Consulting Project course has great potential to support KPI 6 and KPI 7. A contribution to KPI 6 is possible because one of the course's outputs is the establishment of cooperation with various partners, as evidenced by the issuance of a Cooperation Agreement. Meanwhile, KPI 7 is likely to be supported by the Consulting Project course, as it has been outlined from the beginning that this course is not an internship but a lecture with a CM and TBP model. Using the CM and TBP model indicates that learning is carried out collaboratively, involving each group member.

Learning is a complex process because it involves students, teachers, and content. This problem is also found in universities such as UPI. UPI is a university that has two types of graduates: 1) producing prospective teacher graduates who are oriented to be able to help students solve problems at school, and 2) Producing graduates who are problem solvers in the field of work or society, meaning that graduates not only know, but also the ability to identify and solve problems that are relevant to their field or society.

Various learning models can be selected to achieve the best results and meet the set goals. One such learning model is the case-based learning model. Case-based teaching helps develop an understanding of the complexity of teaching and allows teacher-students to connect theory-based ideas with practical difficulties(Gravett et al., 2017). The advantages of the CM and TBP models in higher education are that they can increase students' participation, motivation, soft and hard skills, critical thinking skills, responsibility, and cognitive aspects (Batubara & Irayani, 2024). Through cases, learning can be designed in such a way that students are trained to be able to overcome various complex problems. This is in line with the research results, which conclude that the relevance and authenticity of cases can effectively facilitate the understanding and construction of knowledge in real-world contexts for prospective teachers (Şen Akbulut & Hill, 2020).

In case-based learning, each group member's various experiences, personal backgrounds, and interests can influence the discussion when solving different cases. Chen (2024) It was concluded that effective discussion facilitation and group dynamics were identified as factors that influenced learning success. Meanwhile, Zhao et al. (2020) Case-based and problem-based learning effectively improve communication, independent learning, and teamwork skills.

Routinely assigning case-based questions can help students solve case-based mathematics problems (Asfar & Asfar, 2020). Research results by Ralph (2015) concluded that there is a positive relationship between learning content knowledge and project-based learning in a collaborative atmosphere. Similarly, Telegina et al. (2019) found that project-based learning effectively teaches mathematics and increases motivation to study mathematical topics. These studies suggest that exposure to cases in a collaborative atmosphere is adequate for learning mathematics. More generally, Raza et al. (2020) Concluded that case-based learning increases student engagement and that there is a positive and significant relationship between case-based learning and the four aspects of engagement: behavioral, emotional, cognitive, and agentic engagement. Likewise, Wijnia et al. (2024) Found that problem-based learning has a positive impact on motivation, while Dewi et al. (2024) Discovered that implementing the collaborative project-based case method affects students' collaborative abilities.

In addition to solving problems or cases related to the content, the CM and TBP learning can help solve practical problems that occur outside the classroom; this is in line with the research of Prawira et al. (2022), which concluded that CM and TBP learning strategies could overcome packaging design problems, allowing products to be mass-produced downstream in the business community. The results of this study provide information that the CM and TBP models are efforts to improve the quality of learning and strengthen the competencies of study programs, in addition to developing partnership

networks with the community and local government.

During the case completion process, each group member actively interacts with one another, discussing various aspects, analyzing them, and reaching a consensus on the best solution. This process aligns with de Leng et al. (2024). In my opinion, discussion is a crucial variable in case-based learning. Like Levin's opinion, Vygotsky (in Amahorseya & Mardliyah, 2023; Tohari & Rahman, 2024) States that the complex thinking process highly depends on students' social interactions. When students discuss events, objects, and problems with adults or other more knowledgeable people, the discussion results will gradually become part of the students' thinking structure. During the project completion process, each student interacts, develops critical thinking, and develops their potential (Telegina et al., 2019). From these three opinions, it can be concluded that the quality of the discussion will affect the quality of case method learning, which will shape the students' thinking structure.

Several studies have been conducted to address the problems related to the implementation of CM and TBP. In general, these studies were conducted in a classroom context linked to a real-world context, and the results showed a relationship between the CM and TPB models and motivation, communication skills, teamwork, and knowledge construction. However, no research has been found related to the best practices of these models in courses where students go directly to the field to explore problems. Then, each team tries to determine various alternative solutions. The solutions provided are intended to help partners optimize performance, work efficiency, expand market share, or income. In addition, this study is also linked to the achievement of KPI-PT in the Non-Education Study Program at UPI.

This research is necessary, considering the Consulting Project course is a substitute course designed to accommodate the MBKM policy. Therefore, various learning strategies and the course's output must be studied. The study's results will benefit non-educational study programs within the Indonesian Education University, enabling quality improvements and enhancements in lecture implementation. In turn, the optimization of consulting project lecture implementation as one of the supporting courses for achieving KPI-PT, especially KPI 6 and KPI 7, can be achieved.

The purpose of this study is to describe the best practices of implementing the CM and TBP models in Consulting Project lectures related to achieving Higher Education Key Performance Indicators (KPI-HE) in the Mathematics Study Program at the Indonesian Education University, specifically KPI 6 regarding partnerships and KPI 7 related to the implementation of collaborative participatory classes.

2. METHODS

The research uses a qualitative descriptive method to describe and depict the phenomena arising from implementing the CM and TBP models in Consulting Project lectures. The researcher used a qualitative descriptive research design because the researcher explored various best practices in implementing the lecture. The good practices in question include the activities of each student group at each stage of the CM and TBP models in solving partner problems, as the main cases to be solved by the student group. Various cases owned by partners are studied, and the best alternative solutions are sought, emphasizing the meaning of the conclusions obtained. Additionally, this study revealed various responses from research participants regarding the advantages and disadvantages, the benefits that participants obtain, and the number of effective group members implementing the CM and TBP models.

The research participants comprised 82 fifth-semester students enrolled in the Consulting Project course at the Mathematics Study Program UPI. Several partners, where students conducted lecture activities outside the campus, also became research participants. Data were collected from lecture observations, questionnaires on implementing the CM and TBP learning models, and document studies in the form of project reports from each group. The data analysis techniques included the following stages: identification, clarification, reduction, and verification, which were presented in a descriptive narrative manner.

3. FINDINGS AND DISCUSSIONS

The stages and descriptions of activities in the Consultation Project lecture are derived from the CM and TBP model, as shown in Tables 1 and 2, to strengthen the achievement of the UPI Mathematics Study Program KPI.

Table 1. Case Method (CM) Model

Stages	Activity	Activity Description
1	Group students into consultant teams	Lecturers coordinate the formation of student consultant teams.
2	Each consulting team explores collaboration and identifies partner issues	The lecturer allows the student consultant team to meet face-to-face and listen to the partners' problems. The lecturer also provides direction regarding exploring partner cooperation with the study program.
3	Each team discusses and collects various alternative solutions to solve partner problems.	The lecturer directs the discussion, asks questions, and observes the student consultant team discussing alternative solutions to partner problems.

Table 2. Team-Based Project (TBP) Model

Stages	Activity	Activity Description
1	Project Determination	Lecturers guide students in determining the appropriate project completion theme/idea for the partner's problems in each student consulting team.
2	Designing project steps	The lecturer facilitates the student consultant team in designing steps for project completion activities and their management.
3	Drafting a Cooperation Agreement Letter	The lecturer guides the student consultant team and drafts the Cooperation Agreement Letter.
4	Project scheduling	The lecturer assists the student consultant team in scheduling all activities that have been designed.
5	Project completion with lecturer facilitation and monitoring	Lecturers accompany the student consultant team in implementing the concepts/designs created.
6	Signing of the Cooperation Agreement	The head of the study program and the partner party signed the Cooperation Agreement Letter.
7	Preparation of reports and presentation of project results	Lecturers facilitate student consultant teams in compiling reports and presenting project results.
8	Evaluation of project results	At the end of the learning, the lecturer, the student consultant team, and partners reflect on the results of the consultant team's project.

In implementing the Consulting Project lecture, two learning models, namely the CM and TBP, are implemented simultaneously, as presented in Tables 1 and 2. The purpose of implementing these models simultaneously is to utilize the cases identified by partners as course projects, which are analyzed and discussed, and to seek various alternative solutions, ultimately testing the best solution.

At each stage, each team member contributes maximally. The stages of the two models, which are implemented simultaneously, are presented in Figure 1.

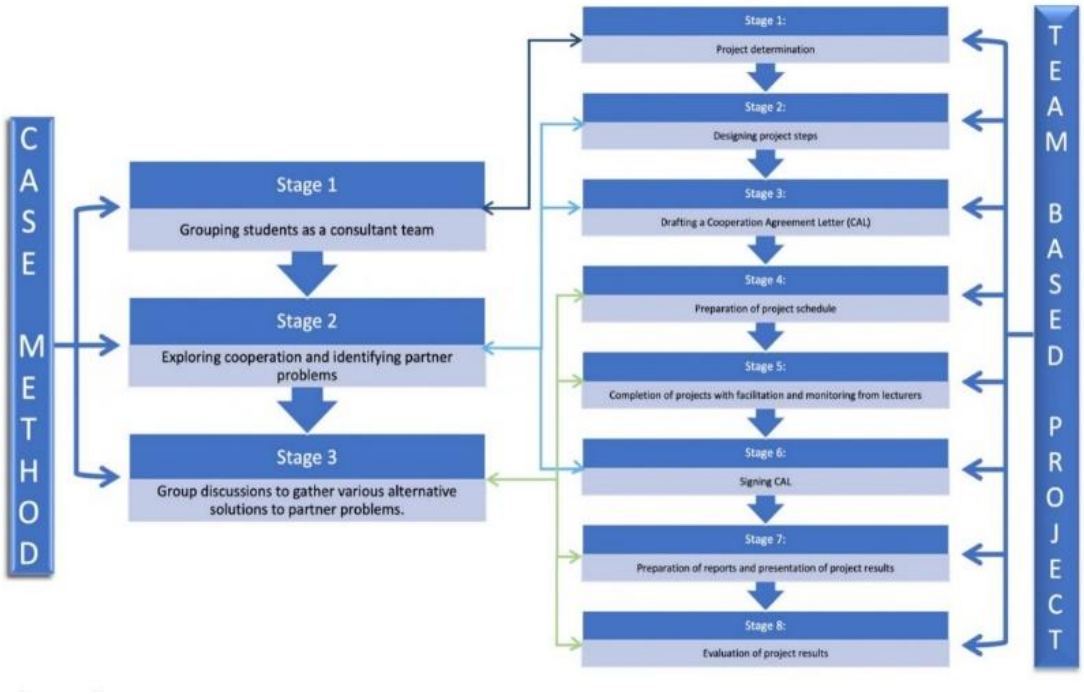

Figure 1. Simultaneous Form of CM and TBP Implementation

Findings

In general, both models are divided into three main stages in their implementation. In the initial stage, the student group acts as the protagonist, making key decisions based on information and data obtained from the partner, which will become the team's main project. In the next stage, the student group digs deep into details from the partner, designs steps to solve the partner's problems, and formally explores cooperation with the partner, ending with signing a cooperation agreement with the aim that each party can know their respective roles. In the third stage, the team, under the direction of the supervising lecturer, conducts an in-depth analysis of the case based on information and data obtained from the partner, discusses critically determining various alternative solutions from the initial design made, prepares a schedule of activities, completes the project, discusses the project results with the partner, prepares reports, presentations, and evaluations. Based on the problem-solving solution, the team can provide recommendations to the partner. The solution recommendations depend on the scope of the partner's business/type of activity. For partners who run a sales business, the solutions provided can be in the form of applications related to the amount of stock, the amount of demand, the amount of income, bookkeeping applications, and others. Meanwhile, for public institutions, the solutions provided are in the form of applications to help with the problems faced, for example, determining practical evacuation route analysis, creating activity inventory applications along with reporting, applications/methods for promotion, and others. To ensure that the solutions provided are reliable enough, group discussions are conducted to test and develop solution designs.

Based on the learning model used in the Consulting Project lecture, namely the CM and TBP model, which are implemented simultaneously, the activity stages of each group are presented in Figure 2 below:

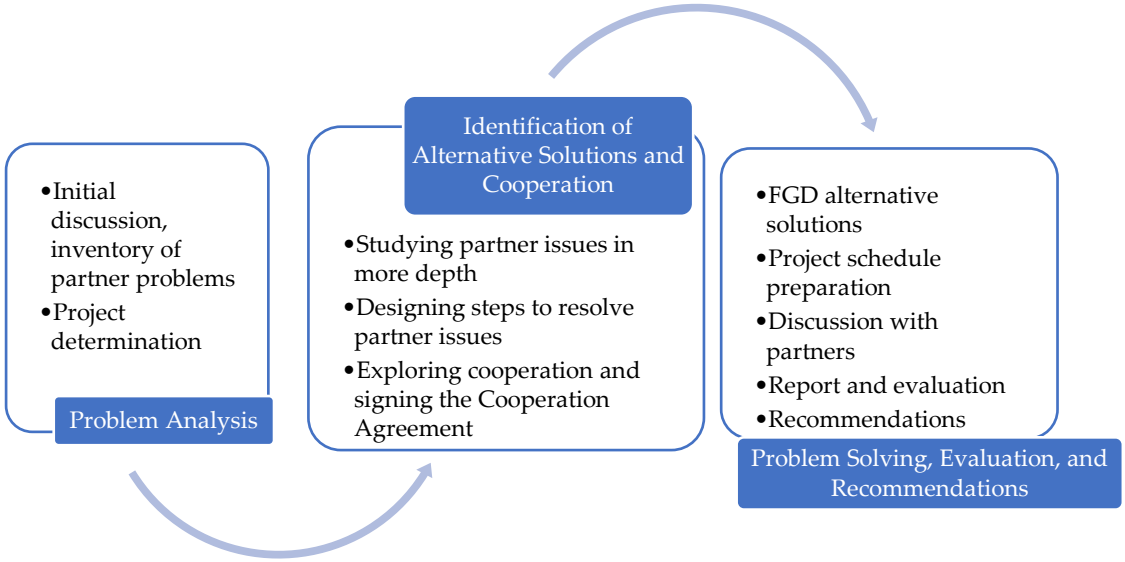

Figure 2. Consulting Project Lecture Activity Stages

Partner Problems and Alternative Solutions

Based on observations of lecture activities, each group follows the stages of the chosen learning model. At the end of the lecture, each group presents a final report containing partner problems along with alternative solutions chosen by each group to assist their partners. Based on reports from each group, the following section presents several categories of partners, partner problems, alternative solutions offered by student groups, and partner responses, as shown in Table 3 below.

Table 3 presents various categories, partner problems, alternative solutions offered by student groups, and partner responses.

Table 3. Partner Problems and Alternative Solutions

Partner Categories	Partner Issues	Alternative Solutions	Partner Response or Results Achieved
Canteen	• View incoming orders • Amount of expenses • Financial management • Bookkeeping	• Create applications to solve partner problems • Create user-friendly and responsive websites	Interested in using the website in the long term because of its ease of use
Online clothing store	• No complete bookkeeping • No Clothing Hang Tags	• Create a bookkeeping application using Visual Basic for Applications (VBA) in Microsoft Excel, • Create a Hang Tag design	The existence of bookkeeping applications and clothing Hang Tag designs helps partners.
School for Children with Disabilities (owned by the foundation)	• Lack of teaching staff for children with disabilities • Lack of administrative staff • Lack of operational funds	• Opening a volunteer program for students of the Special Education Study Program. • Creating a design for the arrangement of facilities and infrastructure	The management now has access to student groups in the Special Education Study Program as an effort to overcome the shortage of teachers for children with disabilities. The arrangement of facilities and infrastructure is getting better.
Public schools	Determining the most	Creating disaster evacuation	Be a reference for partner

Partner Categories	Partner Issues	Alternative Solutions	Partner Response or Results Achieved
owned by foundations	optimal disaster evacuation route (Construction of multi-story buildings located in disaster-prone areas)	routes using the Maximum Dynamic Flow Model (MDFM).	mitigation in the event of a disaster.
Distributor of raw materials for the culinary industry	The most optimal strategy for procuring and determining catfish distribution channels	Utilization of Linear Programming that models the relationship between decision variables (supply quantity) and objective function (purchase cost) by considering constraints. Utilization of optimization methods to determine the optimal route using the Simulated Annealing approach in the form of a Python program	Partners receive recommendations on the optimal supply quantity from each supplier and guidance on optimizing distribution routes efficiently and economically.
Government-owned elementary school	Lack of workforce who can administer the management of School Operational Assistance (SOA) funds, including recording activity plans, the amount of funds for each activity, activity schedules, and activity reports.	Creating an application with a user-friendly display. The application allows partners to match GCB (General Cash Book) data with the planned budget more quickly.	Partners find it easy to use the application because of its simple features: • Search Keyword, Search by month, nominal, and activity description. • GAP of Budget to find the difference between the BKU and the planned budget.

Table 3 shows that each group employs different mathematical theories, mathematical theory applications, or other theories tailored to the partner's case or problem. In addition to the differences in the chosen theories, the products produced vary; some groups produce websites, optimize route determination, develop bookkeeping, reporting, or volunteer recruitment systems.

Based on the results of field observations, discussions with partners, in-depth group discussions, and an examination of related theories, each group concludes the project task by determining the form of the solution provided and presenting it in a report. The following section presents several alternative solutions to partner problems, briefly outlined in Table 3.

A canteen is located in an area with a jogging track and field facilities that are adequate for various sports, including futsal, basketball, volleyball, and tennis. As a supporting facility, the canteen offers a range of meals, snacks, and drinks. Problems arise when there are many customers requesting service. Partners, in this case, canteen managers, are often overwhelmed serving customers and managing incoming orders. So far, partners have managed finances and bookkeeping manually; this method has the risk of miscalculations that can result in losses and require a relatively longer time.

Based on the analysis of the problems experienced by the canteen manager as a partner, the student group tried to create alternative solutions to make it easier for partners to manage their business. Initially, the student group created a financial accounting application. However, several obstacles arose, including a very long running time, which caused the laptop's temperature to increase drastically and its performance to decrease. The solution was to create a user-friendly and responsive website that

can be accessed comfortably on all electronic devices. Partners found the created website helpful because they could easily review customer orders, track expenses, and view income. The ease of accessing and using this website made partners want to use it in the long term.

The next partner is a fashion store that operates online through the TikTok live platform. Partners face problems such as 1) incomplete bookkeeping regarding financial data and inventory, and 2) the absence of clothing hang tags, even though this component is a unique way to add unique product points and messages that will make consumers remember the product brand. The solution offered by the student group to the partner is to create an accounting application using Visual Basic for Applications (VBA), Microsoft Excel, and create a clothing Hang Tag design according to the partner's request. The student group succeeded in building good cooperation with the partner; the students succeeded in 1) creating an accounting application using Visual Basic for Application (VBA) Microsoft Excel to help manage product sales and 2) creating a Hang Tag design according to the partner's wishes, which in printing was handed over to the partner.

The next partner is a catfish distributor with suppliers from various regions, each offering different prices and distances. The collected fish are then distributed to various markets or restaurants, adjusting selling prices to the applicable and agreed-upon prices. One way to maximize profits is to minimize operational costs. The student group helps the entrepreneur determine the distances from the supplier to the collection center and from the collection center to the market or restaurant. These distances have consequences for operational costs, including transportation and logistics costs. The student group created an application utilizing the mathematics studied in college, particularly related to linear programming and optimization techniques. The application is designed to determine the optimal distribution network, reduce distance, delivery time, and logistics costs, aiming for efficiency and minimizing operational costs.

One group of students chose to conduct fieldwork at a Vocational High School in Bandung. After a field survey, the students learned that the building used was a four-story building with three rooms on each floor. The location of the school is in a hilly area and is in the Lembang Fault area. Aurellia (2024) Said that the Lembang Fault is an active fault that can potentially be a source of earthquakes because it penetrates young rocks. This condition is an obstacle for the school, especially regarding disaster mitigation. An optimal evacuation route is needed to ensure all building occupants can evacuate during a disaster. Evacuation routes are needed to transport evacuees from the disaster location to a safe area. Therefore, the student group proposed an evacuation route that could be a reference for the school. The student group modeled the problem by considering two aspects in optimizing the evacuation route: flow (the number of evacuees that can be saved within a specific period) and evacuation time. This problem is known as the maximum dynamic flow problem (MDFP), which aims to maximize the number of evacuees evacuated within a specific period.

From the questionnaire, information was obtained regarding the advantages of the CM and TBP models that confront students with real partner problems. These advantages are: gaining experience and knowledge outside the field of mathematics; exploring more widely about the world of work; learning to solve real problems; learning to become a consultant; improving problem solving, teamwork, critical thinking, and communication skills; applying knowledge in solving real problems; developing existing potential; having work experience outside campus; having a portfolio of projects and applications created; becoming more independent because they are faced with real problems.

Facing students with real-world problems, in addition to having advantages, also revealed weaknesses. Some weaknesses that were captured from the questionnaire include: the level of difficulty faced by each group is different, depending on the complexity of the problems faced by the partners; some partners are less responsive to student activities; problems in the field are often challenging to solve because they are not linear with the competencies obtained during lectures; the workload and responsibilities of each member are not evenly distributed; project completion takes quite a long time;

concerns that the solutions provided are not following partner expectations.

Regarding the research findings, the workload and responsibilities of each member are not evenly distributed, which may be attributed to the uneven distribution of members within each group. Based on Supriatna et al. (2021)The number of group members recommended in the consulting project course is 7-12. This number is considered too large and ineffective, as some individuals are not actively involved in solving partner problems. According to the questionnaire, research participants reported that the effective number of members in one group ranged from 3-5 people (58%), more than five people (37%), and one group consisted of 2 people (5%). The number of 3-5 people is considered the most effective, as with this number, coordination is easier and the workload of each member can be made relatively equal. In contrast, a larger number is needed if the scope of the problem being solved is broader and more complex.

Based on the questionnaire, it was also obtained that students benefit from the project assignments given in the consulting project course. Several benefits were revealed, including: 1) feeling the atmosphere as a worker and contributing to a company's work environment; 2) gaining new insights related to a company's problem-solving process when experiencing obstacles; 3) by learning to analyze problems that occur in partners, it becomes a provision for entering the world of work; 4) training critical thinking skills, communication, creativity, and teamwork; 5) gaining new insights and knowledge that are not obtained in lectures; 6) being able to apply mathematics in everyday life.

Creating various applications, websites, or designs produced by student groups indicates that the CM and TBP approaches are reasonably practical in Consulting Project lectures. Through partner problems, students transform them into projects that challenge student groups to develop creativity and critical thinking in determining alternative solutions. The effectiveness of these two learning approaches, marked by the creation of various alternative solutions to partner problems, is also evident in the responses of partners who feel helped and are willing to use the applications in the long term, as they are generally easy to operate.

As an output, the consultancy project lecture also resulted in collaboration between study programs and various partners. In addition to being demonstrated by the willingness of partners to accept students to carry out lecture activities in the field, formal collaboration is also marked by signing a Cooperation Agreement (SPK) between partners and the Mathematics Study Program, FPMIPA UPI. In 2023, 17 SPKs were produced between study programs and partners in various categories. Several categories of partners are: 1) partners engaged in culinary, fashion, building materials, and goods suppliers; 2) partners engaged in education, both public schools and schools for children with special needs; and 3) partners engaged in services, both household services and other services.

Discussion

This study's results align with previous studies, which concluded that students can use the team-based project model to solve problems and develop their competencies (Riyanungrum et al., 2021). The discussion during the third stage in the CM and TBP models in the consulting project lecture effectively produced various alternative solutions to partner problems. These results are in line with the opinion that discussion-based participatory learning will stimulate and improve critical thinking skills to solve problems (Widiastuti et al., 2022).

The CM and TBP models in the Consulting Project lectures have encouraged students to think critically and creatively in designing alternative solutions to partner problems. This finding aligns with the results of Sahertian et al. (2022), Saputra et al. (2022), and Harlanu (2024), which states that the CM and TBP learning aim to enhance students' understanding of learning content and foster high-level thinking. Meanwhile, Prasanna Kumar et al. (2016) Project-based learning can assist in-depth learning, thinking, communication skills, and collaborative projects. In the discussion process during the consulting project lecture, the support provided by the lecturer also motivated students to think about

and choose alternative solutions in solving partner problems; this result is in line with the research of Baroroh & Imania, (2024), which concluded that the higher the social support, the greater the student's learning motivation.

The cases solved by students come from partners, not cases created in class, and have high quality and strength because they are not predetermined, placing students at the center of key decision-making. These results are in line with 1) Stewart (2007), who said that readiness for independent learning, such as having high self-management skills, is a key factor that enables the achievement of learning outcomes in project-based learning; 2) Toogood (2023) conclude that appropriate, relevant, and real case studies effectively support student engagement and learning; 3) Gholami et al. (2023), concluded that developing problem-solving skills in real-world scenarios can bridge the gap between engineering and mathematics; 4) Latif et al. (2024), stated that the project-based learning model can bridge learning challenges.

Lectures on consultancy projects during the research have successfully helped solve partner problems, which were followed by the issuance of a memorandum of understanding, indicating collaboration between the study program and various partners. This output aligns with the research of Belwal et al. (2020), which concluded that industrial collaboration projects build partnerships and provide opportunities to address real-world problems.

The advantages of this research compared to other research are: 1) the form of cases solved by students in the research are not created in class but are sourced from partner problems, 2) the CM and TBP models are carried out simultaneously, 3) the research results are linked to the achievement of the Key Performance Indicators of the study program.

4. CONCLUSION

The Consulting Project lecture's CM and TBP models are carried out simultaneously. In the initial stage, the student group acts as the key decision maker; the next stage is to dig up information in depth, design steps to solve the problem, and explore and sign cooperation documents; in the final stage, the team conducts case analysis, discusses critically in determining various alternative solutions, prepares a schedule of activities, completes the project, discusses project results with partners, prepares reports, presentations, and evaluations. Through partner problems, students make them into projects that challenge student groups to develop creativity and critical thinking in determining various alternative solutions.

The lecture stages that combine CM and TBP, along with the availability of collaborative documents produced, are evidence that this course has the potential to support the achievement of the study program's KPIs, especially KPI 6 related to partnerships and KPI 7 related to collaborative participatory classes. The simultaneous implementation of the CM and TBP models in this Consulting Project lecture has positive implications for developing student competencies relevant to the workforce demands. However, it is necessary to observe various challenges that may arise and require management and facilitation strategies from the lecturer in charge of the lecture.

Some recommendations related to the implementation of the CM and TBP models: 1) lecturers need to carry out thorough and structured planning related to clarity of tasks, selection of partners, realistic time allocation; strategies for managing and facilitating guidance and discussion, assessment, and providing feedback; 2) study programs must be proactive in collaborating with partners, evaluating the effectiveness of the implementation of CM and TBB and if necessary, adjusting the curriculum, facilitating lecturers to attend appropriate training.

Some recommendations for further research that can deepen the understanding and optimization of the implementation of the CM and TBP models carried out simultaneously in Consulting Project

lectures include: the effectiveness of lecturer management and facilitation strategies, the influence of student and partner commitment levels, the impact on student specific competencies, and the need to also study the use of other models.

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