Employer Perspectives on Project Management Effectiveness: An Engineering Management Analysis of BSME 2019 Graduates' Contributions to Engineering Projects

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Abstract— This study investigates employer perspectives on the project management effectiveness of BSME 2019 graduates in the context of engineering management. As the demand for effective project management skills in engineering projects grows, it is essential to understand how well recent graduates are prepared to meet these demands. While the Bachelor of Science in Mechanical Engineering (BSME) program provides a strong technical foundation, the application of project management principles in real-world settings is crucial for career success. This research examines the contributions of BSME 2019 graduates in managing engineering projects, focusing on key aspects such as project planning, communication, risk management, and resource allocation. A survey of employers was conducted to assess the graduates' performance and identify correlations between project management skills and successful project outcomes. The findings highlight strengths and areas for improvement in the graduates' project management capabilities, offering recommendations for enhancing engineering curricula and training to better equip future engineers. This study contributes to the understanding of the role of engineering management in developing highly effective project managers and provides insights into how academic programs can better address industry needs.

***Index Terms*— Engineering Management, Project Management, BSME Graduates, Employer Perspectives, Project Planning, Risk Management, Communication Skills, Resource Allocation, Engineering Projects, Graduate Effectiveness, Engineering Education.**

1. Introduction

In fast paced evolving engineering industry, effective project management is needed for the successful execution of engineering projects. Engineering management, which combines engineering expertise with management skills, plays a crucial role in ensuring that projects are completed on time, within budget, and to the required quality standards. Project management, as a key component of engineering management, involves the planning, coordination, and execution of projects from initiation to completion, requiring a diverse set of skills ranging from technical proficiency to leadership and communication.

The Bachelor of Science in Mechanical Engineering (BSME) program equips graduates with the technical foundation necessary for engineering roles, but it is the application of management principles that often determines their effectiveness in real-world project environments. For BSME 2019 graduates, the transition from academic learning to professional roles in project management presents both opportunities and challenges. Employers expect graduates to not only possess technical knowledge but also to demonstrate strong project management capabilities, including the ability to manage resources, timelines, risks, and stakeholder expectations.

This study aims to explore employer perspectives on the project management effectiveness of BSME 2019 graduates in real-world engineering projects. By analyzing the contributions of these graduates, this research seeks to determine how well their academic training has prepared them for the complexities of engineering project management. Additionally, the study will examine how various project management skills, such as planning, communication, and risk management, correlate with successful project outcomes as perceived by their employers.

The findings of this study will provide valuable insights into the strengths and areas for improvement in the project management skills of BSME graduates. It will also offer recommendations for enhancing project management education within the engineering curriculum to better equip future graduates for success in the competitive and demanding field of engineering management.

The goal of this study is focus on project management contributions of BSME 2019 graduates, this research will add to the growing body of knowledge on the role of engineering management in shaping the career success of engineering

graduates, as well as provide practical implications for employers seeking to improve the performance of their engineering teams.

A. Statement of the Problem

This study aims to evaluate the project management effectiveness of BSME 2019 graduates as perceived by their employers, focusing on five key areas of project management. Specifically, the study aims to answer the following questions:

1. Do employers perceive graduates as capable of creating detailed project plans and meeting deadlines consistently?
2. Do employers believe graduates are proactive in recognizing potential risks and developing mitigation strategies?
3. How do graduates' communication skills impact project outcomes, such as collaboration and decision-making?
4. How do employers evaluate graduates' ability to manage budgets, materials, and human resources for optimal project execution?
5. How graduates effectively track project milestones and make adjustments as needed to keep projects on track?

2. Review of Related Literature

Project Planning and Scheduling are the basics to ensure that projects are completed on time and within budget. According to Kerzner (2017), effective project planning involves defining clear project goals, identifying resources, and scheduling tasks to ensure the successful delivery of projects. This process is essential for engineers, particularly for BSME graduates, who must apply their theoretical knowledge to create practical project plans. Similarly, Gido and Clements (2014) emphasize the importance of project scheduling. They argue that using tools such as Gantt charts, breaking down tasks into manageable segments, and creating achievable timelines are crucial for meeting project deadlines. For BSME graduates, mastering project scheduling is critical to avoid delays, allocate resources efficiently, and ensure timely project completion.

Risk Management is another key area of project management that significantly impacts project success. Hillson (2016) discusses the importance of identifying, assessing, and mitigating risks early in the project lifecycle. Proactive risk management is crucial for engineering projects, where unexpected issues can derail progress. Boehm (1989) further emphasizes that by identifying potential risks early, project managers can devise contingency plans that reduce the likelihood of project failure. In the context of BSME graduates, employers expect them to be capable of not only recognizing risks but also developing effective strategies to mitigate them, ensuring projects remain on track despite unforeseen challenges.

Communication plays a central role in the success of engineering projects, as it ensures that all stakeholders are aligned in their understanding of the project's objectives and progress. The Project Management Institute (PMI, 2017) highlights that effective communication is fundamental to project success. It ensures that all team members, clients, and external stakeholders are kept informed and that expectations are clearly defined. Gido and Clements (2014) also stress the importance of communication, particularly in resolving conflicts and ensuring that project goals are understood by both technical and non-technical stakeholders. For BSME graduates, the ability to effectively communicate complex technical information to a variety of audiences is essential for ensuring smooth project execution and fostering collaboration among team members.

Resource Management is critical for ensuring that engineering projects are completed efficiently. Kerzner (2017) emphasizes that managing resources—including human resources, materials, and finances—is essential for staying within budget and meeting deadlines. Effective resource management involves planning the allocation of resources and monitoring their usage throughout the project to avoid overages or shortages. Schwalbe (2015) underscores that project managers must also anticipate potential resource constraints and be flexible in reallocating resources as needed. For BSME graduates, the challenge lies in balancing competing demands for materials, personnel, and machinery to optimize resource utilization and avoid project delays.

Project Monitoring and Control are essential for tracking project progress and ensuring corrective actions are taken when needed. PMI (2017) states that continuous monitoring of project performance against initial plans allows project managers to identify any deviations and implement corrective actions in a timely manner. This process of tracking milestones, costs, and resources is critical to maintaining the project's course. Heldman (2018) reinforces this by highlighting that effective project control ensures that any discrepancies between planned and actual performance are addressed promptly. For BSME graduates, the ability to monitor progress, identify issues early, and make necessary adjustments is crucial to ensuring the project stays within scope, budget, and timeframe.

A. Leadership Styles and Their Influence on Project Management

Leadership is important in engineering management, particularly in project management settings where effective decision-making and team coordination are essential. Florencondia et al. (2022) examined the leadership styles of administrators at the School of Engineering and Architecture (SEA) of Holy Angel University, focusing on transformational and servant leadership. The study highlights that administrative ability and ethical behavior are key characteristics of effective leaders, showcasing their ability to inspire trust, foster collaboration, and guide teams toward shared goals. These qualities align with the competencies required in project

management, such as resource management, risk mitigation, and team communication.

The study also identified creativity and creating value for the community as areas where leadership characteristics were relatively lower but still maintained moderate to high effectiveness. This indicates the importance of fostering innovation and aligning organizational goals with broader societal impacts. Similarly, in project management, creativity is vital for problem-solving, while ensuring value creation supports project sustainability and stakeholder satisfaction.

In the context of engineering management, the findings of Florencondia et al. (2022) emphasize the relevance of ethical behavior and administrative ability. These traits directly influence project outcomes by ensuring transparent communication, fair resource allocation, and adherence to professional standards. The researchers' conclusion that transformational and servant leadership behaviors collectively enhance organizational performance can be applied to engineering projects, where such leadership styles encourage accountability and adaptability among team members.

B. Leadership in Engineering Management and Project Success

Leadership in engineering management can be help for influencing the execution and success of projects. Florencondia et al. (2022) explored the leadership styles of members of the Philippine Institute of Civil Engineers (PICE) - Aurora Chapter, focusing on Transformational and Transactional Leadership theories. Transformational leadership emphasizes inspiring and motivating team members to achieve extraordinary outcomes, fostering innovation and individual growth (Robbins & Coulter, 2007). In contrast, transactional leadership is centered on organization, supervision, and group performance, using rewards and punishments to drive compliance.

The study highlights that both leadership styles are essential for effective project management. Transformational leadership is linked to fostering creativity and problem-solving, critical for addressing the complex challenges inherent in civil engineering projects. This aligns with the need for innovative thinking and adaptability in managing engineering projects, where leaders must inspire teams to overcome unforeseen obstacles. Transactional leadership, on the other hand, ensures structure and efficiency, dynamic for meeting deadlines, adhering to budgets, and maintaining quality standards in project execution.

3. Scope and Limitation of the Study

The research will be conducted within a defined geographic region or industry sector, where BSME 2019 graduates have been employed post-graduation, ensuring that the findings are relevant to real-world project management in engineering environments. The study will consider multiple organizations employing these graduates, focusing on different types of engineering projects, including both large-scale industrial projects and smaller, more localized engineering assignments. The study will be limited to a specific cohort of BSME 2019 graduates employed by companies that are willing to participate. As a result, the findings may not be representative of all BSME graduates or employers in different geographic locations or industries. The sample size may also limit the generalizability of the results. While the study will assess the graduates' overall effectiveness in engineering projects, it will primarily focus on project management aspects, excluding other important competencies such as technical skills, innovation, or the graduates' general adaptability to the workplace environment. As a result, the findings will not provide a complete picture of the graduates' overall professional performance.

4. Methodology

This section outlines the research methodology that will be used to evaluate the project management effectiveness of BSME 2019 graduates as perceived by their employers. The methodology encompasses the research design, data collection methods, sampling techniques, data analysis procedures, and ethical considerations to ensure that the study is systematic, valid, and reliable.

A. Research Design

This study will employ a descriptive research design with a quantitative approach. The purpose of this design is to gather and analyze data on the perceptions of employers regarding the project management skills of BSME 2019 graduates. The research will focus on five key areas of project management: Project Planning and Scheduling, Risk Management, Communication, Resource Management, and Project Monitoring and Control. By using a quantitative approach, the study will facilitate the objective analysis of employer feedback regarding the graduates' performance in these areas.

B. Data Collection Methods

The primary method of data collection for this study will be a questionnaire. The questionnaire will be designed to assess the perceptions of employers about the project management effectiveness of their BSME graduate employees. It will be structured using a Likert scale format, where respondents will be asked to rate their agreement with statements related to the project management skills of the graduates. The Likert scale will range from Strongly Disagree to Strongly Agree, with five points to capture varying levels of perception.

The questionnaire will include questions related to:

1. Project planning and scheduling.
2. Risk management and mitigation.
3. Communication and collaboration.
4. Resource management (human, material, financial).
5. Project monitoring and control.

In addition to the Likert scale questions, the questionnaire may also include **open-ended questions** to provide employers an

opportunity to elaborate on their perceptions and give specific examples of how the graduates contributed to projects.

C. Sampling Technique

The study will utilize non-probability sampling, specifically convenience sampling, to select a sample of employers. The participants will be employers of BSME 2019 graduates who have been employed for a sufficient period to assess their project management skills in real-world settings. The sample will include employers from various industries, such as manufacturing, construction, energy, and design, where BSME graduates are likely to be involved in engineering projects. The sample size will be determined based on the availability and willingness of employers to participate in the study.

D. Data Analysis Procedures

The data collected from the questionnaires will be analyzed using descriptive statistics to summarize the responses and provide an overview of employers' perceptions. Frequency distributions and mean scores will be computed for each item on the Likert scale to assess the overall perception of graduates' project management effectiveness.

To analyze the strength of the relationship between different variables (e.g., the relationship between project planning and scheduling and project success), the study will employ Pearson's correlation and Spearman's rank correlation. These statistical tools will help determine if there are any significant associations between the project management skills and overall effectiveness as perceived by employers.

Qualitative data from open-ended questions will be analyzed using thematic analysis to identify recurring themes or patterns in employers' feedback. This will help provide deeper insights into the specific contributions of BSME 2019 graduates to engineering projects and their perceived strengths or weaknesses in various project management domains.

E. Ethical Considerations

The study will adhere to ethical guidelines to ensure that the rights and confidentiality of the participants are respected throughout the research process. Key ethical considerations include:

1. Informed Consent: All participants (employers) will be provided with detailed information about the purpose and scope of the study. They will be asked to provide informed consent before participating in the survey using google form.
2. Confidentiality: The confidentiality of employer responses will be maintained, and no identifying information will be shared in any public reports or publications. Data will be stored securely and accessible only to the research team.
3. Voluntary Participation: Participation in the study will be voluntary, and employers will have the option to withdraw from the study at any time without any consequences.
4. No Harm to Participants: The study will ensure that no harm or discomfort is caused to the participants. Questions will be designed to avoid sensitive or intrusive topics.

5. Results and discussion

A. Results and Data Interpretation

The following section presents the results of the study based on the feedback of 52 employer respondents regarding the project management effectiveness of BSME graduates. The data is analyzed and interpreted to reflect the percentage distribution of responses for each statement, providing insights into the graduates' performance in key areas of project management.

B. Project Planning and Scheduling

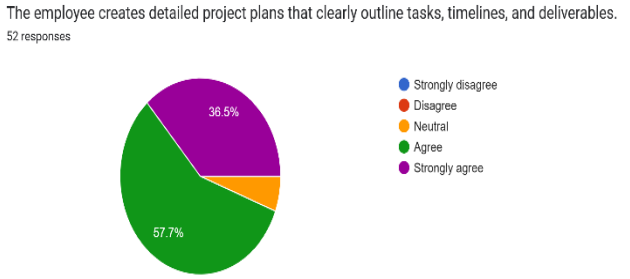

Fig.1.

A total of 19 respondents (36.5%) strongly agreed that the graduates excel in creating detailed project plans, while 30 respondents (57.7%) agreed. Only 3 respondents (5.8%) remained neutral. This indicates that the majority of employers perceive the graduates as proficient in outlining project tasks and timelines, showcasing a solid foundation in planning skills.

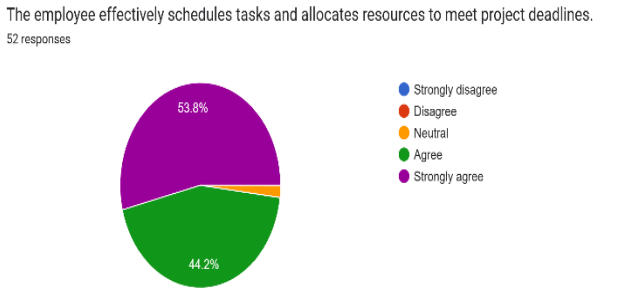

Fig.2.

Among the respondents, 28 (53.8%) strongly agreed, and 23 (44.2%) agreed, with only 1 respondent (1.9%) remaining neutral. These results suggest that the graduates demonstrate strong skills in task scheduling and resource allocation, which are essential for meeting project deadlines effectively.

C. Risk management and mitigation.

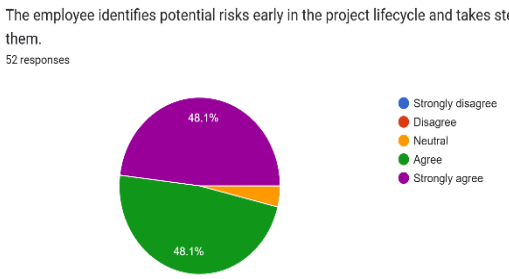

Fig.3.

Feedback from respondents showed that 25 (48.1%) strongly agreed and an equal number, 25 (48.1%), agreed. Only 2 respondents (3.8%) were neutral. This highlights that most employers believe the graduates are proactive in identifying and mitigating risks.

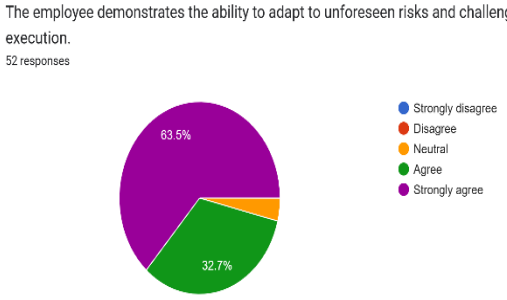

Fig.4.

A significant number of respondents, 33 (63.5%), strongly agreed, while 17 (32.7%) agreed, and only 2 (3.8%) were neutral. These results indicate that graduates are highly adaptable and capable of managing risks during project execution.

D. Communication and collaboration.

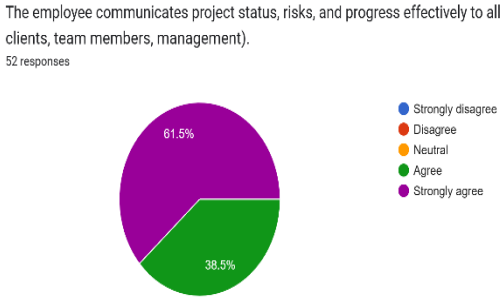

Fig.5.

Responses revealed that 32 (61.5%) strongly agreed and 20 (38.5%) agreed. This demonstrates that graduates are effective communicators, ensuring clarity and transparency throughout the project lifecycle.

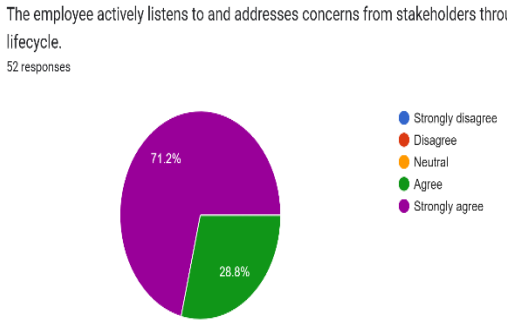

Fig.6.

A notable 37 respondents (71.2%) strongly agreed, and 15 (28.8%) agreed. These results suggest that active listening and responsiveness to stakeholder concerns are strengths of the graduates, contributing to effective collaboration.

E. Resource management (human, material, financial).

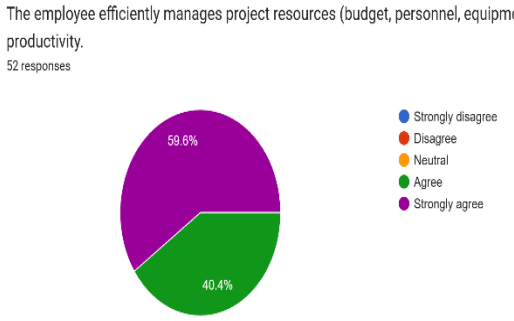

Fig.7.

Among respondents, 31 (59.6%) strongly agreed, and 21 (40.4%) agreed. This indicates that graduates are skilled in optimizing resources to enhance productivity.

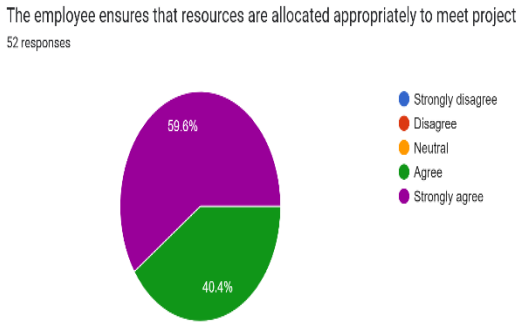

Fig.8.

Feedback showed that 31 respondents (59.6%) strongly agreed, while 21 (40.4%) agreed. These results confirm that graduates demonstrate competence in resource allocation, ensuring project objectives are met.

F. Project monitoring and control.

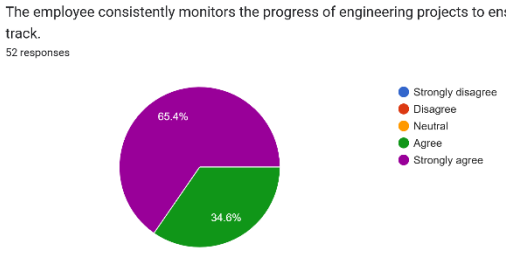

Fig.9.

A total of 34 respondents (65.4%) strongly agreed, and 18 (34.6%) agreed. This reflects a high level of diligence among graduates in tracking project progress.

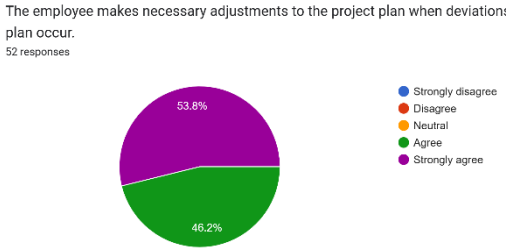

Fig.10.

Among the respondents, 28 (53.8%) strongly agreed, and 24 (46.2%) agreed. These results suggest that graduates exhibit flexibility and problem-solving skills in addressing deviations from project plans.

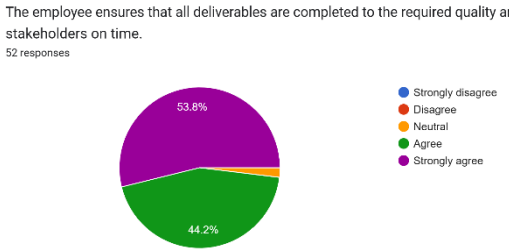

Fig.11.

Responses showed that 28 (53.8%) strongly agreed, 23 (44.2%) agreed, and 1 (1.9%) was neutral. This highlights the graduates' commitment to quality and timely delivery of project outcomes.

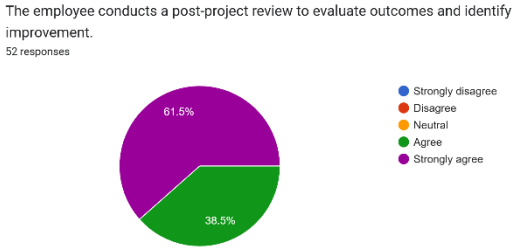

Fig.12.

Among the respondents, 32 (61.5%) strongly agreed, and 20 (38.5%) agreed. These results indicate that graduates value continuous improvement through post-project evaluations.

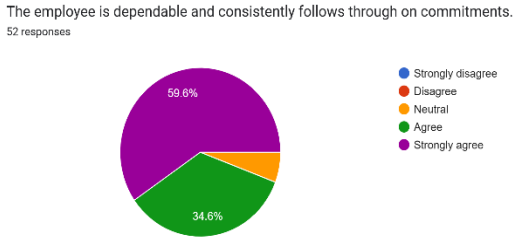

Fig.13.

A total of 31 respondents (59.6%) strongly agreed, 18 (34.6%) agreed, and 3 (5.8%) were neutral. These findings suggest that most graduates are reliable in fulfilling their responsibilities.

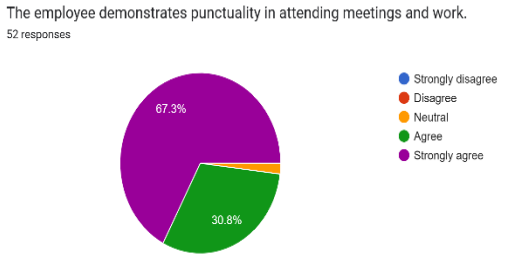

Fig.14.

Feedback revealed that 35 respondents (67.3%) strongly agreed, 16 (30.8%) agreed, and 1 (1.9%) was neutral. This confirms that punctuality is a notable strength among the graduates.

6. Conclusion

This study evaluated the project management effectiveness of BSME 2019 graduates based on employer perceptions, focusing on key areas: Project Planning and Scheduling, Risk Management, Communication, Resource Management, and Project Monitoring and Control. The findings reveal that employers generally perceive the graduates as competent and effective in their roles, with distinguished strengths in communication, adaptability to risks, and project monitoring.

In the area of Project Planning and Scheduling, 94.2% of employers either strongly agreed or agreed that graduates create detailed project plans and schedule tasks effectively, ensuring alignment with project deadlines. This shows that graduates possess foundational planning skills but highlights a need for further refinement to achieve mastery in managing complex engineering projects.

Regarding Risk Management, 96.2% of employers noted that graduates identify potential risks early and adapt effectively to unforeseen challenges. This indicates strong adaptability but underscores the importance of proactive risk identification and mitigation strategies, suggesting that additional training in risk prediction frameworks could enhance their effectiveness.

In Communication, graduates excelled significantly, with 100% of employers agreeing or strongly agreeing that they

communicate project status effectively and address stakeholder concerns. This strength is for ensuring collaboration and seamless decision-making in engineering projects, affirming the importance of continuous improvement in both written and verbal communication.

In Resource Management, 100% of employers agreed that graduates efficiently manage project resources and allocate them appropriately to meet objectives. However, as engineering projects grow in scale and complexity, exposure to advanced resource management tools and techniques could further enhance their ability to optimize budgets, materials, and personnel.

For Project Monitoring and Control, 100% of employers reported satisfaction with graduates' ability to monitor project progress, adjust plans when deviations occur, and deliver high-quality results. This reflects the graduates' capacity for maintaining project alignment and achieving deliverables, but consistent emphasis on using advanced project tracking tools could strengthen their capability further.

This shows the strong project management competencies, areas such as proactive risk identification, resource optimization, and the application of advanced planning tools offer opportunities for growth. Educational institutions and employers can work together to enhance the graduates' contributions to engineering projects, ensuring long-term success in their professional roles. This study helps the other universities the needed role that targeted skill development plays in bridging the gap between academic preparation and real-world project management demands.

7. Recommendation

Based on the findings of this study, several recommendations are proposed to further enhance the project management effectiveness of BSME 2019 graduates. These recommendations aim to address the specific areas outlined in the study's statement of the problem: Project Planning and Scheduling, Risk Management, Communication, Resource Management, and Project Monitoring and Control.

A. Strengthening Project Planning and Scheduling Competencies

The results indicate that 36.5% of employers strongly agreed and 57.7% agreed that graduates are effective in creating detailed project plans. Additionally, 53.8% strongly agreed and 44.2% agreed that graduates effectively schedule tasks and allocate resources. To further enhance these skills, it is recommended that universities and training institutions incorporate advanced project planning and scheduling tools such as Gantt charts, CPM (Critical Path Method), and PERT (Program Evaluation and Review Technique) into the curriculum. Graduates should also be encouraged to practice these tools in real-world scenarios during internships or capstone projects.

B. Enhancing Risk Management Training

Although 48.1% of employers strongly agreed and another 48.1% agreed that graduates identify and mitigate risks effectively, and 63.5% strongly agreed that graduates adapt to unforeseen risks, there is room for improvement in proactive risk identification. Universities and professional development programs should emphasize risk management frameworks, qualitative and quantitative risk analysis, and mitigation planning. Role-playing exercises and case studies involving real-life project risks can provide graduates with hands-on experience. This will ensure that they are better equipped to anticipate and mitigate risks early in the project lifecycle.

C. Building Advanced Communication Skills

Communication emerged as a significant strength, with 61.5% of employers strongly agreeing and 38.5% agreeing that graduates effectively communicate project status, risks, and progress. Furthermore, 71.2% strongly agreed that graduates actively listen to stakeholders and address concerns. To maintain and enhance this strength, it is recommended that engineering programs integrate business communication courses tailored for project management. These courses should focus on stakeholder engagement, conflict resolution, and presenting technical information in a clear and concise manner.

D. Improving Resource Management Expertise

The study found that 59.6% of employers strongly agreed and 40.4% agreed that graduates efficiently manage resources, while similar percentages were noted for ensuring appropriate allocation of resources. To reinforce this competency, educational institutions should include modules on financial management, supply chain coordination, and resource optimization techniques in engineering management courses. Simulation-based learning tools, where graduates manage hypothetical budgets, materials, and personnel in project scenarios, could further enhance their resource management capabilities.

E. Strengthening Project Monitoring and Control Practices

Graduates demonstrated strong capabilities in project monitoring and control, as 65.4% of employers strongly agreed and 34.6% agreed that graduates consistently monitor progress to keep projects on track. Similarly, 53.8% strongly agreed and 46.2% agreed that graduates adjust plans when deviations occur. However, ongoing improvement in this area can be achieved by training graduates in modern project management software such as MS Project, Primavera, or Trello, which provide advanced functionalities for tracking and controlling project milestones. Institutions should also emphasize the importance of conducting post-project reviews, as highlighted by 61.5% of employers who strongly agreed that graduates evaluate outcomes and identify areas for improvement.

F. Promoting Continuous Professional Development

To address evolving industry demands, graduates should be encouraged to pursue certifications such as Project Management Professional (PMP) or Certified Associate in Project Management (CAPM). These certifications will enhance their understanding of project management principles and methodologies, making them more competitive and effective in engineering roles. Employers can also play a role by offering in-house training programs and encouraging employees to attend industry conferences or workshops on project management trends and innovations.

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