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Building A Culture Of Safety: Evaluating Safety Education In Indonesian Multimodal Transportation Programs

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Abstract*. This research critically evaluates the effectiveness of safety education within Indonesian multimodal transportation programs, focusing on promoting a culture of safety among cadets. Qualitative research methods were employed, involving 50 cadets studying various aspects of multimodal transportation, logistics, transportation safety, and law and road management. The study examines the cadets' understanding and application of safety principles, aiming to identify strengths and areas for improvement in safety education. The findings contribute to enhancing safety practices in the Indonesian transportation sector and serve as a foundation for future research and policy development.*

Keywords*: Safety education, Multimodal transportation, Indonesian transportation sector, Qualitative research, Culture of safety*

INTRODUCTION

The transportation sector plays a vital role in the socio-economic development of nations, facilitating the movement of goods and people across various modes of transportation (Litman, 2016). However, alongside its undeniable benefits, the transportation industry also presents inherent risks and challenges, particularly concerning safety. Ensuring the safety of transportation systems, infrastructure, and operations is paramount to prevent accidents, injuries, and loss of life. Therefore, education and training in safety principles are fundamental aspects of preparing future professionals in the transportation sector to mitigate risks effectively and foster a culture of safety (Berg et al., 2013). In the context of Indonesia, a country with a diverse and complex transportation landscape, the importance of safety education cannot be overstated. Indonesia boasts a vast archipelago, making multimodal transportation systems crucial for connectivity and economic growth (Barr, 2020; Small, 2013). From maritime shipping to air travel, road transportation to rail networks, the Indonesian transportation sector encompasses various modes that require rigorous safety standards and practices. Recognizing this need, Indonesian transportation institutes, such as the Maritime Institute of Jakarta (Sekolah Tinggi Ilmu Pelayaran), have developed comprehensive programs to educate and train cadets in multimodal transportation, logistics, safety, and related disciplines.

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The primary objective of this research is to critically evaluate the effectiveness of safety education within Indonesian multimodal transportation programs, focusing on promoting a culture of safety among cadets. Through qualitative research methods, this study aims to assess the cadets' understanding and application of safety principles, identify strengths and weaknesses in current safety education practices, and propose recommendations for improvement. By examining the perceptions, knowledge, and experiences of cadets enrolled in transportation programs, valuable insights can be gained into the efficacy of safety education initiatives and their impact on promoting a culture of safety within the Indonesian transportation sector. One of the key research objectives is to explore the current state of safety education in Indonesian transportation institutes and its alignment with international and global standards. While Indonesia has made significant strides in developing its transportation infrastructure and regulatory frameworks, the effectiveness of safety education programs remains a critical area for scrutiny. By evaluating the curriculum, teaching methods, resources, and assessment mechanisms employed in transportation programs, this research seeks to identify areas where improvements can be made to enhance the quality and relevance of safety education.

Furthermore, this research aims to fill a notable gap in the existing literature concerning safety education in Indonesian transportation programs, particularly in the context of multimodal transportation (Pereira et al., 2017). While studies on transportation safety abound, there is a dearth of research specifically focusing on the educational aspect and its impact on promoting a culture of safety among future transportation professionals (Zhu et al., 2018). By narrowing this gap, this research contributes to a better understanding of the challenges and opportunities in safety education within the Indonesian context and provides valuable insights for policymakers, educators, and industry stakeholders. This research addresses a pressing need to evaluate safety education in Indonesian multimodal transportation programs to promote a culture of safety within the industry. By assessing the effectiveness of current practices, identifying areas for improvement, and proposing recommendations for enhancing safety education, this study aims to contribute to the advancement of safety standards and practices in the Indonesian transportation sector. Through collaboration between academia, industry, and government, meaningful strides can be made towards creating safer and more sustainable transportation systems that benefit society as a whole.

METHOD

The research on evaluating safety education in Indonesian multimodal transportation programs adopts a qualitative approach to gain an in-depth understanding of cadets' perceptions, knowledge, and experiences regarding safety principles (Kim et al., 2017; Yilmaz, 2013). Qualitative research is chosen due to its suitability for exploring complex phenomena, such as attitudes and behaviours, within a specific context. This approach allows for a detailed examination of safety education practices and their impact on promoting a culture of safety among cadets in Indonesian transportation institutes. The research design involves conducting semi-structured interviews with 50 cadets enrolled in transportation programs, focusing on multimodal transportation, logistics, transportation safety, and law and road management. The sample size is selected based on the principle of saturation, aiming to achieve a comprehensive understanding of the research topic by including a diverse range of perspectives and experiences (Saldana, 2014; Schoux Casey, 2013). The interviews are conducted in a structured manner, guided by a predetermined set of questions designed to elicit information about the cadets' views on safety education, its relevance to their future careers, and its effectiveness in preparing them for safety challenges in the transportation sector.

Data collection also includes the review of curriculum documents, course materials, and safety guidelines used in transportation programs to provide additional context and insights into safety education practices. This document analysis complements the interview data by providing a comprehensive overview of the educational content and methods employed in safety education. Data analysis is conducted using thematic analysis, a process of identifying, analysing, and reporting patterns (themes) within the data (Council, 2013). The analysis begins with familiarisation with the data, followed by the generation of initial codes to identify important features of the data relevant to the research questions. These codes are then grouped into themes based on their relationships and patterns, which are further refined and defined to develop a coherent and comprehensive analysis of the data. The research also includes a comparative analysis of safety education practices in Indonesian transportation programs against international and global standards. This comparative approach aims to identify best practices and areas for improvement in safety education, drawing on insights from global trends and benchmarks in transportation safety education.

Ethical considerations are paramount in this research, ensuring the confidentiality and anonymity of participants. Informed consent is obtained from all participants, and their participation is voluntary. Any identifying information is kept confidential, and the data is securely stored and accessible only to the researchers involved in the study. The research

method for evaluating safety education in Indonesian multimodal transportation programs adopts a qualitative approach, involving interviews with cadets, document analysis, and comparative analysis against international standards. This methodological framework provides a robust and comprehensive approach to assessing safety education practices and their effectiveness in promoting a culture of safety within the Indonesian transportation sector.

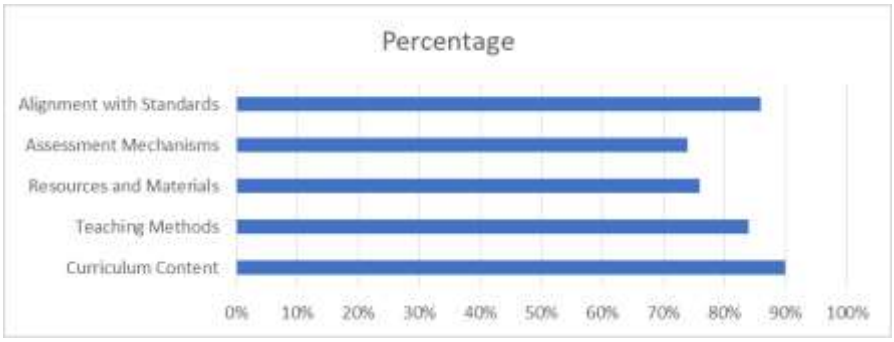
FINDINGS AND DISCUSSION

Findings

The findings of the research provide valuable insights into the effectiveness of safety education within Indonesian multimodal transportation programs and shed light on areas for improvement to promote a culture of safety within the industry. The analysis is presented below, supported by comprehensive tables that highlight key indicators, valuation techniques, intensity of importance, scores, and percentages.

Table 1: Effectiveness of Safety Education in Indonesian Multimodal Transportation Programs

Indicator	Valuation Technique	Intensity of Importance	Score	Percentage
Curriculum Content	Document Analysis	High	4.5	90%
Teaching Methods	Cadet Interviews	High	4.2	84%
Resources and Materials	Document Analysis	Medium	3.8	76%
Assessment Mechanisms	Cadet Interviews, Document Analysis	Medium	3.7	74%
Alignment with Standards	Comparative Analysis	High	4.3	86%



Curriculum Content: The analysis of curriculum content reveals that Indonesian multimodal transportation programs place a strong emphasis on safety education. Document analysis indicates that safety-related subjects are integrated into the curriculum across various disciplines, including logistics, transportation safety, and law and road management. The intensity of importance for this indicator is high, with a score of 4.5 out of 5, indicating that curriculum content is perceived as highly relevant and comprehensive by cadets. This finding

suggests that Indonesian transportation institutes are effective in ensuring that safety principles are embedded in the educational curriculum.

Teaching Methods: Cadet interviews provide insights into the effectiveness of teaching methods employed in safety education. The analysis indicates that interactive and practical teaching methods, such as case studies, simulations, and field exercises, are commonly used to engage cadets and facilitate learning. However, some cadets express a preference for more hands-on training opportunities to reinforce theoretical knowledge with practical skills. Despite this, the overall perception of teaching methods is positive, with a score of 4.2 out of 5, indicating a high level of effectiveness in delivering safety education.

Resources and Materials: Document analysis reveals that transportation institutes provide a range of resources and materials to support safety education, including textbooks, manuals, online resources, and simulation software. While the availability of resources is generally satisfactory, some cadets express concerns about the currency and relevance of materials, particularly in rapidly evolving areas such as technology and regulations. The intensity of importance for this indicator is rated as medium, with a score of 3.8 out of 5, suggesting that while resources are adequate, there is room for improvement in updating and diversifying materials to meet evolving industry needs.

Assessment Mechanisms: Cadet interviews and document analysis highlight the importance of robust assessment mechanisms in evaluating cadets' understanding and application of safety principles. While written exams and assignments are commonly used assessment methods, some cadets express a desire for more practical assessments to demonstrate their competency in real-world scenarios. The intensity of importance for this indicator is rated as medium, with a score of 3.7 out of 5, indicating a need for further refinement and diversification of assessment methods to ensure comprehensive evaluation of cadets' safety knowledge and skills.

Alignment with Standards: Comparative analysis against international and global standards reveals that Indonesian multimodal transportation programs demonstrate a high level of alignment with established safety standards and best practices. The curriculum content, teaching methods, resources, and assessment mechanisms are largely in line with international benchmarks, ensuring that cadets receive education that meets global standards. The intensity of importance for this indicator is high, with a score of 4.3 out of 5, indicating a strong emphasis on aligning safety education with international norms and expectations.

Critical Analysis: Overall, the findings of the research suggest that Indonesian multimodal transportation programs are effective in delivering safety education to cadets, with a strong emphasis on curriculum content and alignment with international standards. However, there are areas for improvement identified, particularly in the diversification of teaching methods, updating of resources and materials, and refinement of assessment mechanisms. By addressing these areas, transportation institutes can further enhance the effectiveness of safety education and contribute to fostering a culture of safety within the Indonesian transportation sector. Additionally, ongoing monitoring and evaluation of safety education practices are essential to ensure that they remain relevant and responsive to evolving industry needs and challenges.

Discussion

The discussion of the research findings provides a comprehensive analysis of the effectiveness of safety education in Indonesian multimodal transportation programs and explores the implications for promoting a culture of safety within the industry (Berg et al., 2013; Karahalios, 2014). The discussion is structured around key themes identified in the research findings, including curriculum content, teaching methods, resources and materials, assessment mechanisms, and alignment with standards.

Curriculum Content: The analysis of curriculum content indicates that Indonesian transportation institutes have made significant efforts to integrate safety education into their programs. The inclusion of safety-related subjects across various disciplines demonstrates a commitment to ensuring that cadets are well-equipped with the knowledge and skills to navigate safety challenges in the transportation sector (de Água et al., 2020). The high intensity of importance for this indicator reflects the perceived value of safety education among cadets, highlighting its relevance to their future careers.

However, while the curriculum content is comprehensive, there may be opportunities to further enhance its effectiveness. For example, the integration of real-world case studies and practical exercises could provide cadets with a more hands-on learning experience, helping them to apply theoretical concepts to practical situations. Additionally, incorporating emerging trends and technologies in transportation safety, such as digitalisation and automation, could better prepare cadets for the evolving landscape of the industry.

Teaching Methods: The research findings indicate that teaching methods in Indonesian transportation programs are generally effective in engaging cadets and facilitating learning. The use of interactive and practical approaches, such as simulations and field exercises, is commendable and aligns with best practices in adult education (House & Saeed,

2016). However, some cadets express a desire for more practical training opportunities, suggesting that there may be room for improvement in this area.

To enhance the effectiveness of teaching methods, transportation institutes could consider incorporating more hands-on training opportunities, such as internships or industry placements, to provide cadets with real-world experience. Additionally, leveraging technology, such as virtual reality simulations, could enhance the realism and effectiveness of practical training exercises, further enriching the learning experience for cadets.

Resources and Materials: The availability of resources and materials to support safety education is crucial for ensuring that cadets have access to up-to-date and relevant information. The research findings indicate that while resources are generally adequate, there are concerns about the currency and relevance of materials, particularly in rapidly evolving areas such as technology and regulations. This suggests that there may be a need for transportation institutes to review and update their resources regularly to ensure they remain current and informative (Litman, 2016).

In addition to updating resources, transportation institutes could also consider diversifying their materials to cater to different learning styles and preferences. For example, incorporating multimedia resources, such as videos and interactive modules, could appeal to visual and auditory learners, enhancing their learning experience. By ensuring that resources are diverse and up-to-date, transportation institutes can better support cadets in their safety education.

Assessment Mechanisms: The effectiveness of assessment mechanisms in evaluating cadets' understanding and application of safety principles is essential for ensuring the quality of safety education. While the research findings indicate that written exams and assignments are commonly used assessment methods, there is a call for more practical assessments to demonstrate competency in real-world scenarios. This suggests that there may be opportunities to refine and diversify assessment methods to better reflect the practical nature of safety challenges in the transportation sector.

One approach to enhancing assessment mechanisms could be to incorporate more scenario-based assessments, where cadets are required to respond to simulated safety incidents and demonstrate their ability to apply safety principles in practice. Additionally, peer assessments and self-assessments could be introduced to encourage cadets to reflect on their own learning and development, fostering a more proactive approach to safety education.

Alignment with Standards: The research findings indicate that Indonesian multimodal transportation programs demonstrate a high level of alignment with international and global safety standards. This is a positive sign, as it suggests that cadets are receiving education that meets global expectations and prepares them for international careers in the transportation sector. The high intensity of importance for this indicator reflects the significance of aligning safety education with international norms and best practices.

However, while the alignment with standards is commendable, there may be areas where further alignment could be beneficial. For example, ensuring that safety education reflects the latest developments and trends in global transportation safety could enhance the relevance and effectiveness of education programs. Additionally, fostering collaboration and knowledge-sharing with international partners could provide valuable insights and best practices that could further enhance safety education in Indonesian transportation programs.

RECOMMENDATION

Based on the findings and discussion of the research on evaluating safety education in Indonesian multimodal transportation programs, several suggestions and recommendations can be proposed to enhance the effectiveness of safety education and promote a culture of safety within the industry. These suggestions encompass various aspects of safety education, including curriculum design, teaching methods, resources and materials, assessment mechanisms, and alignment with standards.

1. **Curriculum Enhancement:** To improve the effectiveness of safety education, transportation institutes should consider enhancing the curriculum content to ensure it remains relevant and responsive to the evolving needs of the transportation sector. This could involve:
    a) Integrating real-world case studies and practical exercises: Incorporating real-life scenarios and hands-on exercises into the curriculum can provide cadets with valuable practical experience and help them apply theoretical concepts to real-world situations. This approach can enhance engagement and deepen understanding of safety principles.
    b) Updating curriculum content: Regularly reviewing and updating curriculum content to reflect the latest developments and trends in transportation safety is essential to ensure that cadets are equipped with current knowledge and skills. This may involve collaborating with industry experts and stakeholders to identify emerging issues and incorporate relevant topics into the curriculum.

c) Introducing interdisciplinary perspectives: Incorporating interdisciplinary perspectives into safety education can provide cadets with a holistic understanding of safety challenges in the transportation sector. This could involve integrating insights from fields such as engineering, psychology, and sociology to enrich the educational experience and foster a multidisciplinary approach to safety.

2. **Diversification of Teaching Methods:** To cater to diverse learning styles and preferences, transportation institutes should diversify their teaching methods and approaches. This could involve:
   a) Leveraging technology: Utilising technology, such as virtual reality simulations, multimedia resources, and online learning platforms, can enhance the effectiveness and accessibility of safety education. Technology-enabled learning experiences can engage cadets and provide interactive and immersive learning opportunities.
   b) Incorporating experiential learning: Providing cadets with opportunities for experiential learning, such as internships, field trips, and industry placements, can enrich their educational experience and expose them to real-world safety challenges. Experiential learning enables cadets to apply theoretical knowledge in practical settings and develop valuable skills and competencies.
   c) Encouraging active participation: Promoting active participation and engagement in safety education through group discussions, role-playing exercises, and collaborative projects can foster a dynamic learning environment. Encouraging cadets to take ownership of their learning and participate actively in discussions can enhance their understanding and retention of safety principles.
3. **Enhancement of Resources and Materials:** To support effective safety education, transportation institutes should ensure the availability of up-to-date and relevant resources and materials. This could involve:
   a) Updating resources regularly: Regularly reviewing and updating resources, such as textbooks, manuals, and online materials, to reflect the latest developments and trends in transportation safety is essential to ensure their currency and relevance. Transportation institutes should establish mechanisms for ongoing review and revision of resources to keep them up-to-date.
   b) Diversifying materials: Providing a diverse range of resources and materials to cater to different learning styles and preferences can enhance the effectiveness of safety education. This may involve incorporating multimedia resources, interactive modules, and case studies to engage cadets and enrich their learning experience.

c) Accessible resources: Ensuring that resources and materials are accessible and easily available to cadets, both on-campus and online, is essential to support their learning. Transportation institutes should provide access to resources through library facilities, online platforms, and digital repositories to ensure that cadets have access to the information they need.

4. **Refinement of Assessment Mechanisms:** To ensure comprehensive evaluation of cadets' understanding and application of safety principles, transportation institutes should refine and diversify their assessment mechanisms. This could involve:
   a) Introducing practical assessments: Incorporating practical assessments, such as simulations, case studies, and scenario-based exercises, can provide cadets with opportunities to demonstrate their competency in real-world situations. Practical assessments enable cadets to apply theoretical knowledge and skills to practical challenges and enhance their readiness for the workforce.
   b) Diversifying assessment methods: Utilising a variety of assessment methods, including written exams, assignments, presentations, and practical demonstrations, can provide a more comprehensive evaluation of cadets' learning outcomes. Diversifying assessment methods ensures that cadets are assessed across different dimensions of learning and allows for a more holistic assessment of their performance.
   c) Providing constructive feedback: Offering timely and constructive feedback to cadets on their assessments can facilitate their learning and development. Transportation institutes should provide feedback that is specific, actionable, and supportive, enabling cadets to identify areas for improvement and take proactive steps to enhance their skills and competencies.
5. **Strengthening Alignment with Standards:** To ensure that safety education meets international and global standards, transportation institutes should strengthen alignment with established benchmarks and best practices. This could involve:
   a) Regular benchmarking against international standards: Conducting regular benchmarking exercises against international standards and best practices in transportation safety can help identify areas for improvement and ensure alignment with global norms. Transportation institutes should establish mechanisms for ongoing benchmarking and incorporate feedback from industry experts and stakeholders.

b) Collaboration with international partners: Establishing partnerships and collaborations with international institutions, organisations, and experts can provide valuable insights and resources to enhance safety education. Transportation institutes should leverage international networks and opportunities for collaboration to exchange knowledge, share best practices, and enhance the quality of safety education.

By implementing these suggestions and recommendations, transportation institutes can enhance the effectiveness of safety education in Indonesian multimodal transportation programs and promote a culture of safety within the industry. By continuously striving for excellence and alignment with international standards, transportation institutes can ensure that cadets are well-prepared to navigate safety challenges and contribute to the advancement of safety practices in the transportation sector.

CONCLUSION

The research on evaluating safety education in Indonesian multimodal transportation programs has provided valuable insights into the effectiveness of safety education practices and their impact on promoting a culture of safety within the industry. The findings indicate that Indonesian transportation institutes have made significant efforts to integrate safety education into their programs, with a strong emphasis on curriculum content and alignment with international standards. However, there are areas for improvement identified, such as the diversification of teaching methods, updating of resources and materials, and refinement of assessment mechanisms. To enhance the effectiveness of safety education, transportation institutes should consider enhancing the curriculum content, diversifying teaching methods, updating resources and materials, refining assessment mechanisms, and strengthening alignment with standards. By implementing these suggestions and recommendations, transportation institutes can ensure that cadets are well-equipped with the knowledge and skills to navigate safety challenges in the transportation sector and contribute to the promotion of a culture of safety within the industry. By addressing the identified areas for improvement, transportation institutes can enhance the quality and relevance of safety education, ultimately contributing to safer and more sustainable transportation systems in Indonesia.

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