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Skilled Labor Shortage and Workforce Development for Infrastructure

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Abstract: ***The infrastructure sector is vital for national economic growth, yet it faces a critical shortage of skilled labor. This study investigates the skilled labor gap within the Indian infrastructure industry, specifically focusing on the Jalgaon region. Utilizing a quantitative survey of key stakeholders—including contractors, site engineers, and project managers—the research identifies root causes such as an aging workforce, negative industry perception among youth, and a mismatch between academic curricula and industry needs. Findings indicate that these shortages result in significant project delays, increased costs, and compromised safety standards. The study concludes that a collaborative approach between industry, government, and academia is essential for sustainable development.***

Keywords: Skilled Labor Shortage, Workforce Development, Infrastructure Performance, Vocational Training, Offsite Construction.

I. INTRODUCTION

While infrastructure projects are expanding, the supply of skilled labor has not kept pace. Companies often struggle to find workers with modern machinery skills and technical knowledge, leading to a reliance on unskilled labor. This causes project delays, cost overruns, and increased accident risks. possessing necessary expertise. In the United States, the industry faces a crisis, needing to attract hundreds of thousands of new workers annually to meet demand. Similarly, developed nations like Australia and the UK report significant disruptions to their construction supply chains and quality management systems due to labor gaps. Emerging economies, including Malaysia and Sri Lanka, struggle with a reliance on foreign labor and a lack of local participation.

A. General Background

Infrastructure projects like roads, bridges, and buildings require a large, trained workforce. India currently faces a growing shortage of skilled labor due to rapid urbanization and the introduction of new technologies. Factors contributing to this gap include a lack of vocational training, labor migration, and low interest among the younger generation.

B. Problem Statement

While infrastructure projects are expanding, the supply of skilled labor has not kept pace. Companies often struggle to find workers with modern machinery skills and technical knowledge, leading to a reliance on unskilled labor. This causes project delays, cost overruns, and increased accident risks

II. LITERATURE REVIEW

Current research highlights that labor shortages are a global issue :

1) India: Acute shortages are noted in finishing trades like painting and electrical work.
2) Canada: A national labor deficit of approximately 31,800 workers is projected by 2027.
3) United Kingdom: Challenges include Brexit, Covid-19, and an aging workforce.
4) USA: Labor shortages in MEP (Mechanical, Electrical, and Plumbing) trades have the most significant negative impact on project costs.

III. METHODOLOGY

This research utilized a descriptive design focusing on primary data collection through questionnaires distributed to 100 stakeholders, with 12 detailed responses analyzed for this phase.

1) Primary Data: Surveys conducted in Jalgaon with site supervisors, engineers, and project managers.
2) Analytical Tools: Percentage analysis, bar graphs, and pie charts were used to interpret the data.

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IV. DATA ANALYSIS AND RESULTS

The survey revealed several critical insights into the labor crisis:

1) Respondent Demographics: 50% of respondents were aged 25–35, and all were male.
2) Retention Challenges: 66.7% cited low wages compared to effort as the primary challenge in retaining skilled labor.
3) Workplace Perception: 50% of respondents believe working conditions strongly affect a laborer's interest in continuing work.
4) Younger Generation: The primary reason youth avoid the sector is unstable income and job insecurity (50%).
5) Safety: 50% considered safety concerns as an "extremely important" factor contributing to the shortage.

Table 5.1.1. Age of respondent

Sr.No,	Particulars	No. of Responses	Percentage
1.	18-25	2	16.7%
2.	25-35	6	50%
3.	35-45	3	25%
4.	More than 45	1	8.3%
Total		12	100

Source of Data: Primary Data

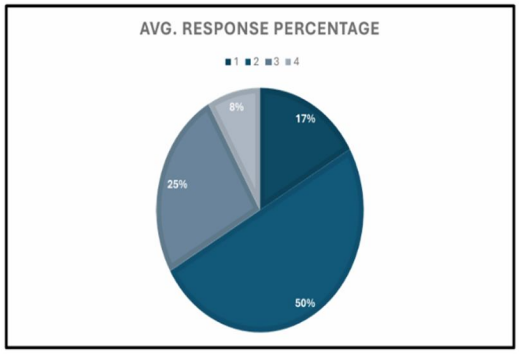


Chart 5.1.1. Age of respondent

Table 5.1.2. Gender of respondent

Sr.No,	Particulars	No. of Responses	Percentage
1.	Male	12	100%
2.	Female	0	0%
Total		12	100

Source of Data: Primary Data

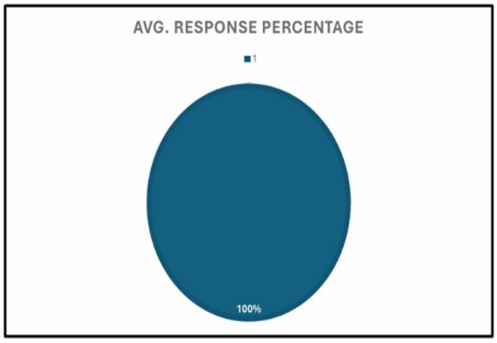


Chart 5.1.2. Gender of respondent

Table 5.1.3. Occupation of respondent

Sr.No,	Particulars	No. of Responses	Percentage
1.	Contractor	3	25%
2.	Site Engineer	3	25%
3.	Site Supervisor	4	33.3%
4.	Project Manager	2	16.7%
Total		12	100

Source of Data: Primary Data

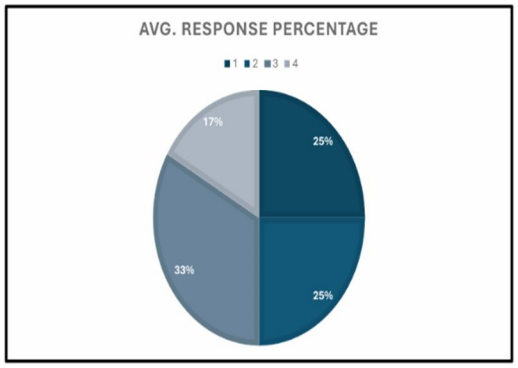


Chart 5.1.3. Occupation of respondent

Table 5.1.4. What is the biggest challenge you face in retaining skilled labor at site

Sr.No,	Particulars	No. of Responses	Percentage
1.	Low wages compared to effort	8	66.7%
2.	Poor working conditions and facilities	4	33.3%
3.	Lack of interest from younger gen	1	8.3%
Total		12	100

Source of Data: Primary Data

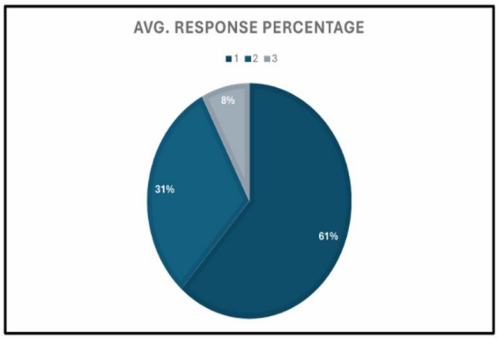


Chart 5.1.4. What is the biggest challenge you face in retaining skilled labor at site

Table 5.1.5. Do you feel wages in construction are fair compared to the effort and risks

Sr.No,	Particulars	No. of Responses	Percentage
1.	Yes, wages are fair enough	1	8.3%
2.	Somewhat fair, but could be improved	3	25%
3.	Not fair, wages are too low for the effort	8	66.7%
Total		12	100

Source of Data: Primary Data

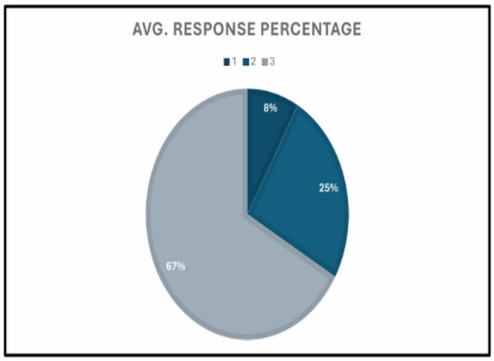


Chart 5.1.5. Do you feel wages in construction are fair compared to the effort and risks

Table 5.1.6. How do working conditions affect labor willingness

Sr.No,	Particulars	No. of Responses	Percentage
1.	No major impact, laborers are used too	1	8.3%
2.	Somewhat impacts their motivation	5	41.7%
3.	Strongly affects interest to continue work	6	50.0%
Total		12	100

Source of Data: Primary Data

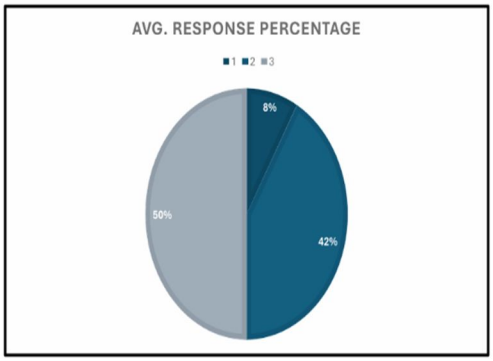


Chart 5.1.6. How do working conditions affect labor willingness

Table 5.1.7. Why do you think younger generations are less interested in site labor jobs

Sr.No,	Particulars	No. of Responses	Percentage
1.	Lack of respect for labor jobs in society	4	25.0%
2.	Physical strain and health risks	3	66.7%
3.	Unstable income and job insecurity	6	8.3%
Total		12	100

Source of Data: Primary Data

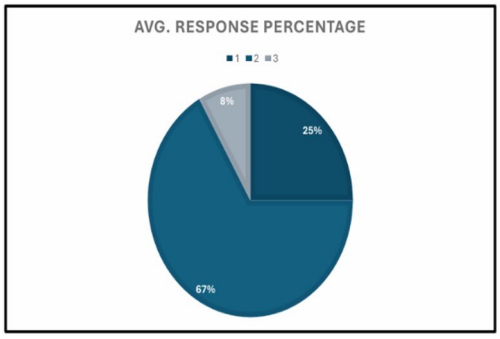


Chart 5.1.7. Why do you think younger generations are less interested in site labor jobs

Table 5.1.8. How important are safety concerns in discouraging laborers

Sr.No,	Particulars	No. of Responses	Percentage
1.	Somewhat important, but manageable	2	33.3%
2.	Very important, workers fear accidents	4	25.0%
3.	Extremely important, major factor in shortage	6	50.0%
Total		12	100

Source of Data: Primary Data

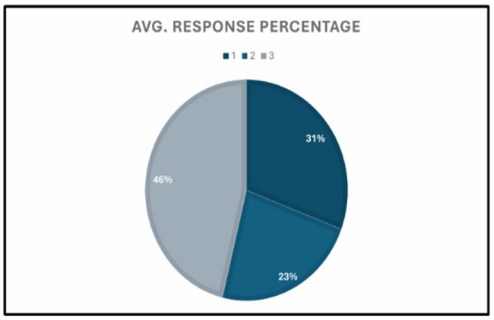


Chart 5.1.8. How important are safety concerns in discouraging laborers

Table 5.1.9. How does project-based/seasonal work affect labor availability

Sr.No,	Particulars	No. of Responses	Percentage
1.	Sometime affect, but they return after breaks	4	16.7%
2.	Strong affect, workers shift to other industries	4	33.3%
3.	Major problem, causes continuous shortages	4	50.0%
Total		12	100

Source of Data: Primary Data

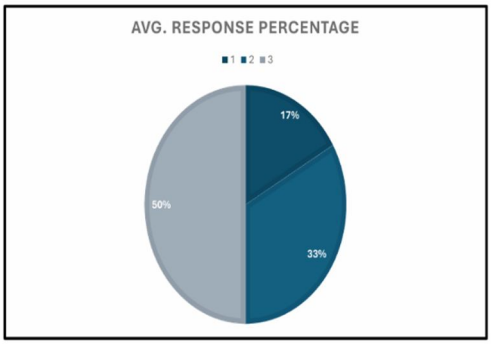


Chart 5.1.9. How does project-based/seasonal work affect labor availability

Table 5.1.10. Do you think laborers get enough respect and recognition for their work

Sr.No,	Particulars	No. of Responses	Percentage
1.	Some respect, but not equal to other jobs	3	25.0%
2.	Very little recognition from society	6	50.0%
3.	Almost no respect, seen as low-status jobs	3	25.0%
Total		12	100

Source of Data: Primary Data

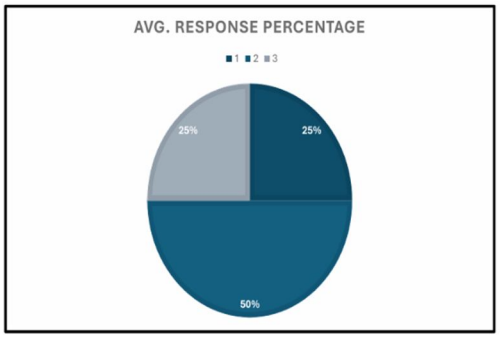


Chart 5.1.10. Do you think laborers get enough respect and recognition for their work

Table 5.1.11. What is the most common reason laborers leave construction jobs

Sr.No,	Particulars	No. of Responses	Percentage
1.	Better wages in other sectors	8	66.7%
2.	Health issues/physical strain	7	58.3%
3.	Lack of career growth opportunities	2	16.7%
Total		12	100

Source of Data: Primary Data

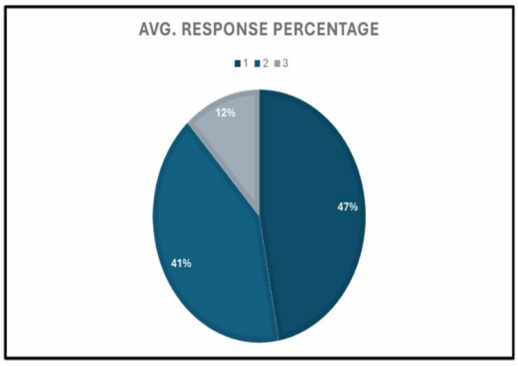


Chart 5.1.11. What is the most common reason laborers leave construction jobs

Table 5.1.12. How do site facilities (housing, sanitation, rest areas) influence labor retention

Sr.No,	Particulars	No. of Responses	Percentage
1.	Some role, better facilities improve morale	3	25.0%
2.	Strong role, poor facilities push workers	8	66.7%
3.	Very strong role, basic facilities are a must	1	8.3%
Total		12	100

Source of Data: Primary Data

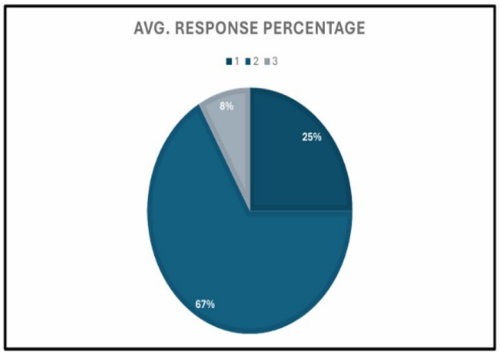


Chart 5.1.12. How do site facilities (housing, sanitation, rest areas) influence labor retention

Table 5.1.13. Do workers get enough skill development or growth opportunities

Sr.No,	Particulars	No. of Responses	Percentage
1.	Yes, sufficient opportunities exist	1	8.3%
2.	Some opportunities, but not enough	7	58.3%
3.	Very limited opportunities for growth	4	33.3%
Total		12	100

Source of Data: Primary Data

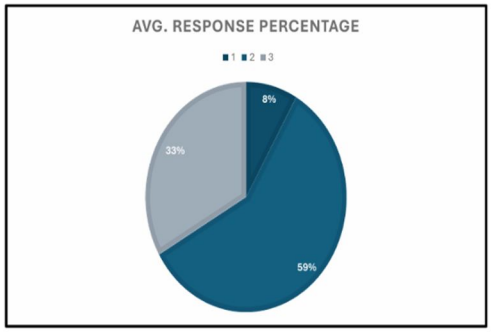


Chart 5.1.13. Do workers get enough skill development or growth opportunities

Table 5.1.14. How do you see technology/machinery affecting demand for manual labor

Sr.No,	Particulars	No. of Responses	Percentage
1.	No effect, labor demand remains same	1	8.3%
2.	Some reduction, but labor still needed	7	58.3%
3.	Strong reduction in manual labor demand	4	33.3%
Total		12	100

Source of Data: Primary Data

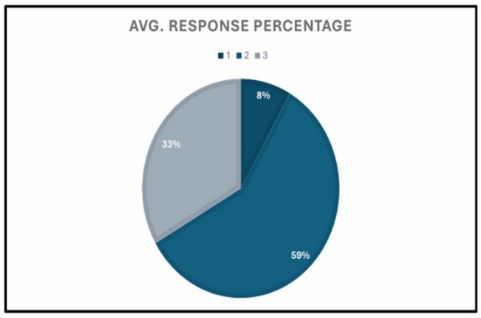


Chart 5.1.14. How do you see technology/machinery affecting demand for manual labor

Table 5.1.15. If one improvement could reduce labor shortage, what would you choose

Sr.No,	Particulars	No. of Responses	Percentage
1.	Increase wages and benefits	7	58.3%
2.	Ensure safety and health security	4	33.3%
3.	Provide stable and continuous employment	2	16.7%
Total		12	100

Source of Data: Primary Data

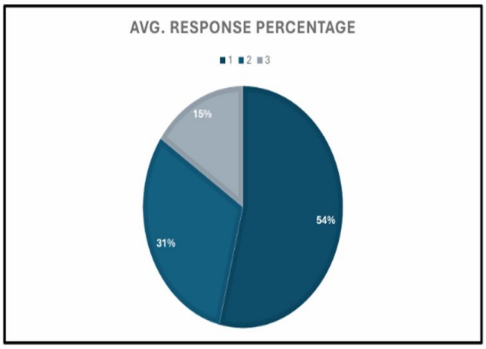


Chart 5.1.15. If one improvement could reduce labor shortage, what would you choose

Table 5.1.16. What type of training program do you think is the most effective to reduce skill shortage in construction

Sr.No,	Particulars	No. of Responses	Percentage
1.	Vocational/technical education	7	58.3%
2.	Apprenticeship program	6	50.0%
3.	Online/ digital learning	1	8.3%
Total		12	100

Source of Data: Primary Data

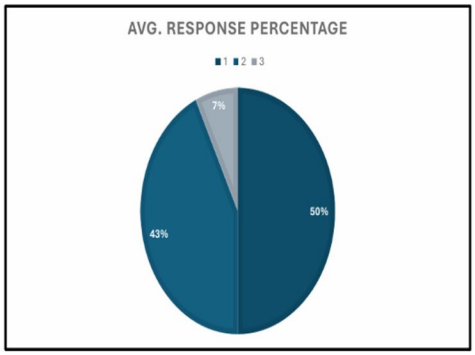


Chart 5.1.16. What type of training program do you think is the most effective to reduce skill shortage in construction

Table 5.1.17. Which workforce development strategy would be most effective for the construction sector

Sr.No,	Particulars	No. of Responses	Percentage
1.	Skill certificate programs	5	41.7%
2.	Modernizing training with new technology (AI, VR, BIM)	3	25.0%
3.	Public awareness campaigns about career opportunities	4	33.3%
Total		12	100

Source of Data: Primary Data

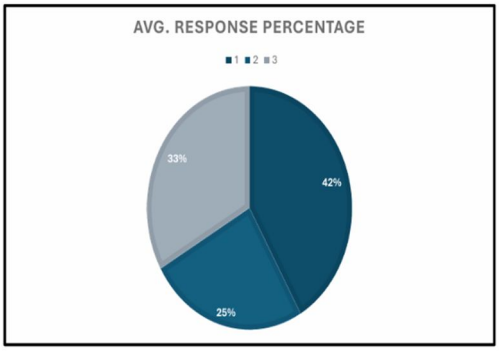


Chart 5.1.17. Which workforce development strategy would be most effective for the construction sector

Table 5.1.18. How do delayed payments or informal hiring affect labor moral

Sr.No,	Particulars	No. of Responses	Percentage
1.	Some affect, causes dissatisfaction	3	25.0%
2.	Strong affect, workers lose trust & leave	4	33.3%
3.	Major factor, causes shortage & unrest	5	41.7%
Total		12	100

Source of Data: Primary Data

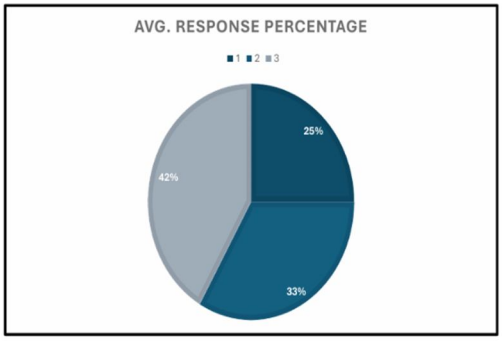


Chart 5.1.18. How do delayed payments or informal hiring affect labor moral

Table 5.1.19. How do construction working hours affect labor interest

Sr.No,	Particulars	No. of Responses	Percentage
1.	Somewhat difficult, but manageable	4	33.3%
2.	Strong affect, too long and tiring	5	41.7%
3.	Major reason workers avoid construction	3	25.0%
Total		12	100

Source of Data: Primary Data

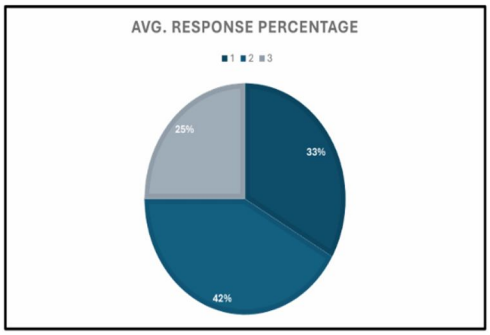


Chart 5.1.19. How do construction working hours affect labor interest

Table 5.1.20. What changes could make site labor jobs more attractive

Sr.No,	Particulars	No. of Responses	Percentage
1.	Higher wages and timely payments	8	66.7%
2.	Better safety and working conditions	8	66.7%
3.	Career development & training programs	5	41.7%
Total		12	100

Source of Data: Primary Data

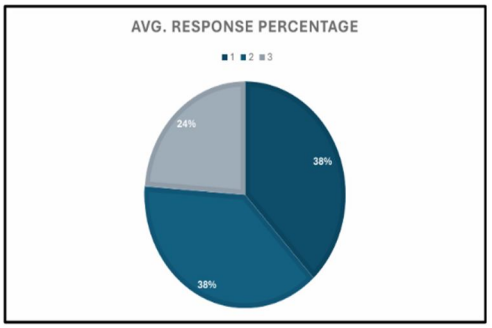


Chart 5.1.20. What changes could make site labor jobs more attractive

V. DISCUSSION AND RECOMMENDATIONS

The results indicate that the "skill gap" is a major threat to quality workmanship. To mitigate this:

1) Wages and Payments: 66.7% of respondents identified higher wages and timely payments as the most effective way to make site jobs attractive.

2) Training: 58.3% believe vocational and technical education is the most effective training program.

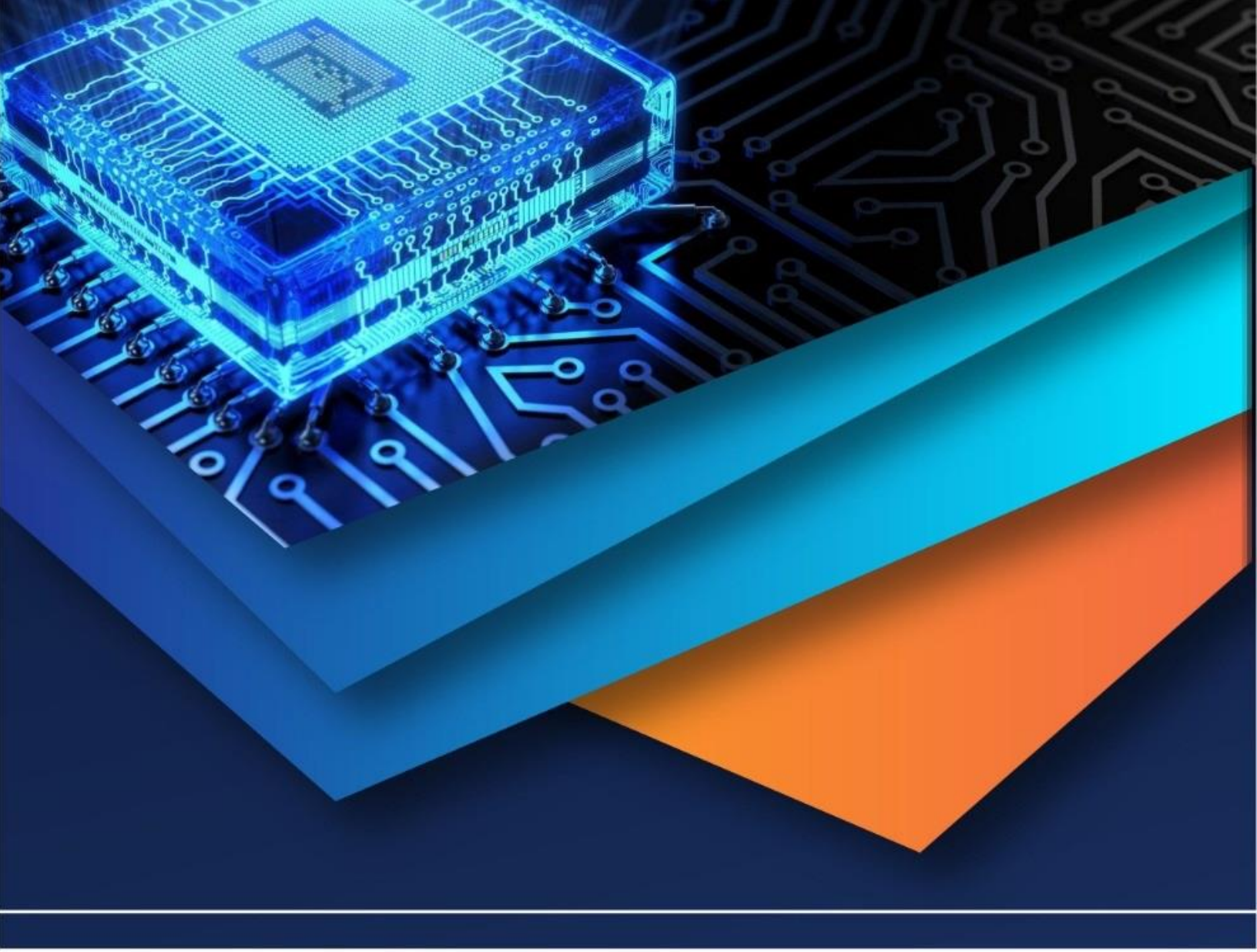
3) Certification: Skill certificate programs were viewed as the most effective development strategy (41.7%).

VI. CONCLUSION

The shortage of skilled labor is a multifaceted issue that leads to project delays and cost overruns. Addressing this requires a shift toward formal workforce development, including modernized training (AI, VR, BIM) and public awareness campaigns to improve the industry's image among the youth.

REFERENCES

[1] Abdulhafedh, A. (2023) The US Labor Shortage in Construction Industry: An Overview International Journal of Management and Commerce Innovations, 11(2), 193 207 https://doi.org/10.5281/zenodo.10435724
[2] Akomah, B. B., Ahinaquah, L. K., & Mustapha, Z. (2020). Skilled Labour Shortage in the Building Construction Industry Within the Central Region [Ghana] Baltic Journal of Real Estate Economics and Construction Management, 8(1), 83-92. https://doi.org/10.2478/bjreecm-2020-0006
[3] Deshmukh, V. R. & Waysal, S. M. (2025). Skilled Labor Shortage and Workforce Development for Infrastructure Projects. International Journal of Research Publication and Reviews.
[4] Elbashbishy, T. S. & El-adaway, I. H. (2024). Assessing the Impact of Skilled Labor Shortages on Project Cost Performance. Construction Research Congress.
[5] Kumarage, N., et al. (2024). Strategies to alleviate Canada's impending construction labor shortage. Canadian Journal of Civil Engineering.
[6] Galina V. Merkuryeva, Riga Technical University, Maksims Kornevs, Royal Institute of Technology, "Water Flow Forecasting and River Simulation for Flood Risk Analysis" Information Technology and Management Science doi: 2478/itms-2013-0006. https://doi.org/10.1016/j.asej.2023.102396
[7] G. A. S. K., Warnakulasuriya, B. N. F., & Arachchige, B. J. H. (2018), A Review of the Skill Shortage Challenge in Construction Industry in Sri Lanka Silva International Journal of Economics, Business and Management Research, 2(1), 75-89.
[8] Maqbool, R., et al. (2024). Coping with skill shortage within the UK construction industry. Ain Shams Engineering Journal. http://dx.doi.org/10.28991/CEJ-2023-09-02-08
[9] M. J., Jie, F., Sisombat, S., & Bandlamudi, B. S. (2023). Impact of the Skill Shortage on the Construction Supply Chain Performance in Australia Ding Civil Engineering Journal, 9(2), 356-371.
[10] Zaki, S. A., Mohamed, S. F., & Yusof, Z. M. (2012), Construction Skilled Labour Shortage: The Challenges in Malaysian Construction Sector OIDA International Journal of Sustainable Development, 4(5), 87-98. http://www.ssrn.com/link/OIDA-Intl-Journal-Sustainable-Dev.html



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