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PERFORMANCE EVALUATION AND MARKET DYNAMICS OF NS-CERTIFIED INTERLOCKING CONCRETE PAVER INDUSTRIES IN NEPAL

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ABSTRACT

The interlocking concrete paver industry plays an important role in modern pavement construction due to its structural strength, modular construction, and ease of maintenance. In Nepal, the rapid growth of this sector has led to the introduction of Nepal Standard (NS 593) in 2021 to ensure quality control in paver manufacturing. However, limited research exists regarding the performance, market demand, and industrial challenges of NS-certified interlock pavers in Nepal.

The study employed a mixed research approach combining quantitative and qualitative analysis. Primary data were collected from 49 respondents, including 6 industry representatives, 29 engineers, 12 contractors, and 2 policy stakeholders, while secondary data were obtained from government reports, laboratory test results, and industry records.

Laboratory testing results indicate that NS-certified interlock pavers exhibit an average compressive strength of 41.74 MPa, exceeding the minimum NS standard requirement of 35 MPa.

Market analysis indicates a rapid growth in demand for interlock pavers, particularly 60 mm thickness blocks, which accounted for the majority of applications such as footpaths and community roads. Government demand remained high, reaching 857,991 m² in 2022 and 827,749 m² in 2023, while private sector demand increased significantly from 92,009 m² to 447,251 m² during the same period. Supply capacity also increased from 950,000 m² in 2022 to 1,275,000 m² in 2023, reflecting expanding industrial production.

The findings reveal that although the industry is still developing, NS certification has improved product strength and quality assurance, contributing to increasing market adoption. Nevertheless, challenges such as limited government support, high initial investment, quality control consistency, and low public awareness of certified products continue to restrict industry expansion.

The study concludes that NS-certified interlock pavers demonstrate superior compressive strength and increasing market demand, but improvements in durability perception, standard enforcement, and policy support are necessary to ensure sustainable industry growth in Nepal.

1. INTRODUCTION

The construction sector is a major contributor to economic growth in developing countries, supporting infrastructure development, employment generation, and urban expansion. In Nepal, rapid urbanization and increasing infrastructure demand have significantly expanded the use of modern pavement systems in urban roads, pedestrian pathways, parking areas, and public spaces. Among these systems, interlocking concrete pavers have gained considerable attention due to their structural performance, ease of installation, modularity, and maintenance advantages.

Interlocking concrete pavers are precast concrete units designed to transfer loads through mechanical interlock and joint sand interaction.

Globally, the growing use of interlocking pavers has led to the development of standardized quality control systems to ensure structural reliability and durability. International standards such as ASTM C936, EN 1338, and IS 15658 define requirements related to compressive strength, dimensional tolerance, abrasion resistance, and water absorption for concrete paving blocks. In Recognizing the need for improved quality assurance, the Government of Nepal introduced Nepal Standard (NS 593) for interlocking concrete pavers in 2021. This standard defines the technical requirements for compressive strength, durability, and dimensional tolerances of paving blocks manufactured within the country.

Despite the growing adoption of interlocking pavers in Nepal, limited research has been conducted on the industrial capacity, market demand, performance characteristics, and challenges faced by NS-certified paver industries. Understanding these factors is essential for assessing the current status of the industry and identifying opportunities for its sustainable development.

Therefore, this study investigates the production capacity, demand trends, performance characteristics, and challenges of the NS-certified interlock paver industry in Nepal.

2. METHODOLOGY

This presents the overall methodology adopted for the research work. The study began with a comprehensive review of relevant reference books, journal articles, and technical standards related to interlocking concrete blocks and paver block manufacturing practices.

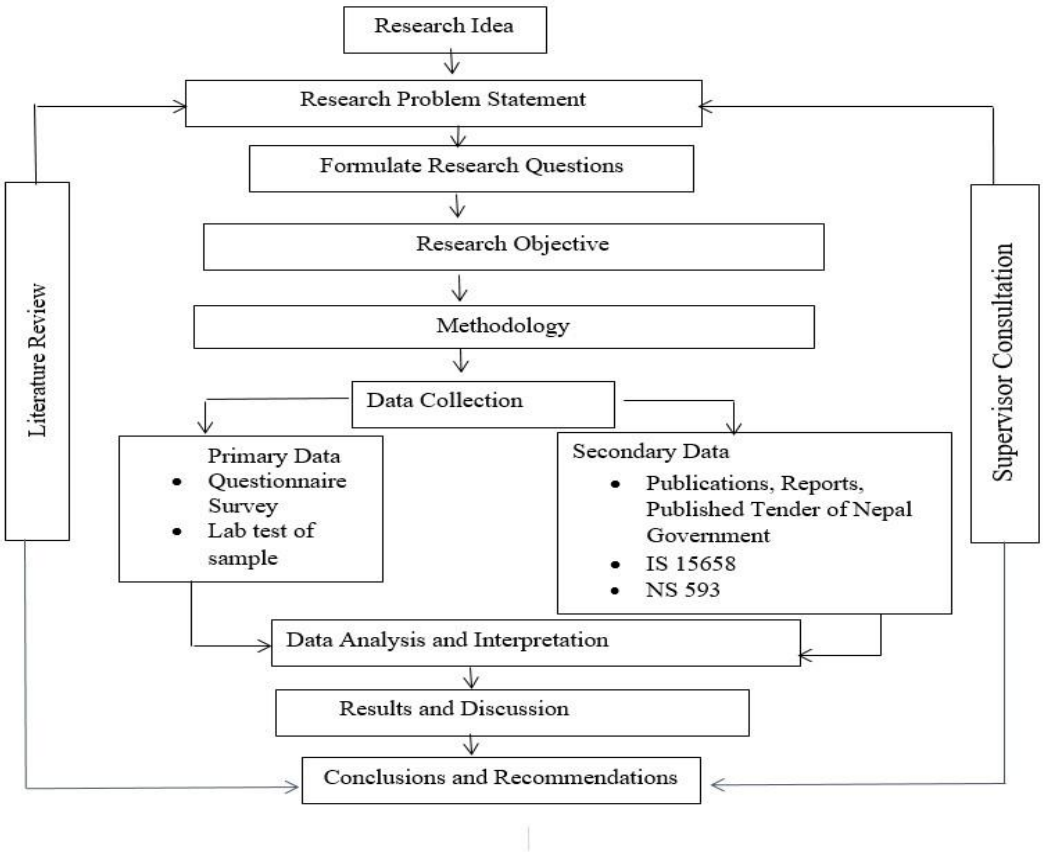

Figure: Research Process Flow Chart.

Research Design

Primary data for the study was collected through a structured questionnaire survey conducted among professionals associated with paver manufacturing industries and related construction sectors.The collected data were systematically compiled and analyzed using the statistical software SPSS (Statistical Package for the Social Sciences) version 25. Appropriate statistical methods were applied to interpret the responses and to draw meaningful conclusions regarding the factors influencing the performance and quality of paver blocks.

3. RESULTS AND DISCUSSION

This presents the results and discussion of the study. The collected data were analyzed and interpreted in different sections and subsections to address the research objectives.

Technical Performance

Laboratory results confirmed that NS-certified products are technically superior to non-certified alternatives:

- **Compressive Strength:** The average strength was **41.74 MPa**, ranging from 40.24 MPa to 42.9 MPa. This is 15% to 22.6% above the NS requirement.
- **Comparative Strength:** Interlock pavers (41.74 MPa) showed higher strength than asphalt (27.6 MPa), stamped concrete (24.13 MPa), and RCC (21.5 MPa).
- **Durability Perception:** Interestingly, while laboratory strength is high, practitioners perceive a shorter service life (avg. 7.05 years) compared to asphalt (15 years) or RCC (30 years).

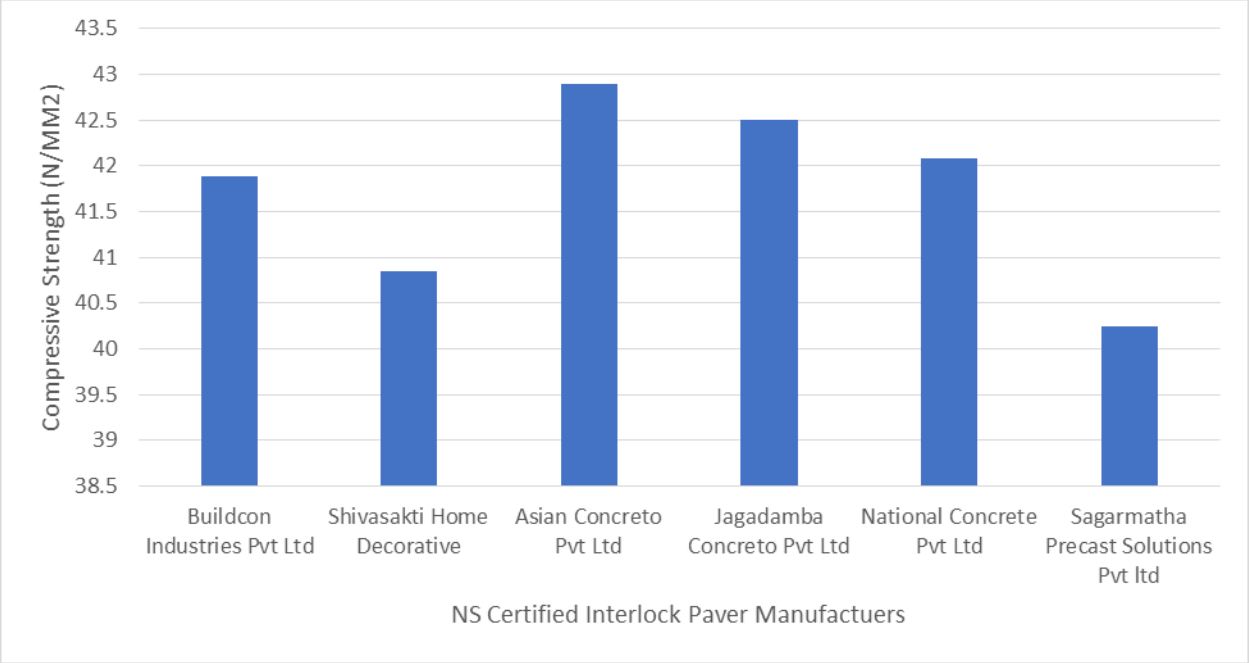

Figure: Average Compressive Strength of NS Certified Pavers Industry Obtained From Lab Test.

Market Dynamics

The industry is experiencing a shift from public to private sector dominance:

- **Demand Growth:** Total supply rose from 950,000 m² in 2022 to 1,275,000 m² in 2023.

- **Sector Shift:** While government demand slightly declined, private sector demand surged from 92,009 m² to 447,251 m² in just one year.
- **Product Preference:** The 60 mm thickness block is the most widely produced and utilized for footpaths and community roads.

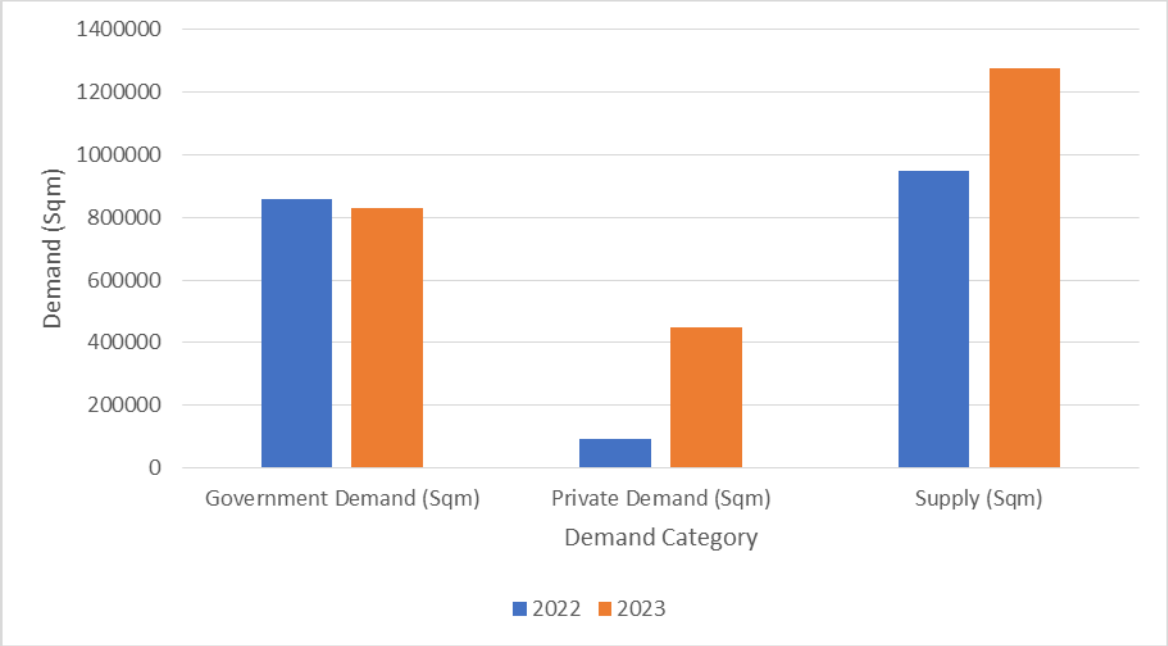

Figure: Overall Demand and Supply Comparison for Years 2022 and 2023.

Industrial Challenges

Despite growth, several barriers persist:

- **Quality Consistency:** 62.1% of engineers identified maintaining uniform quality across batches as the primary challenge.
- **Operational Barriers:** High initial investment, long wait times for certification, and lack of government subsidies were cited by 83.3% of industry respondents.
- **Consistency Test:** Lab data showed a range-spread higher than 15% for all manufacturers, confirming the engineers' concerns regarding consistency.

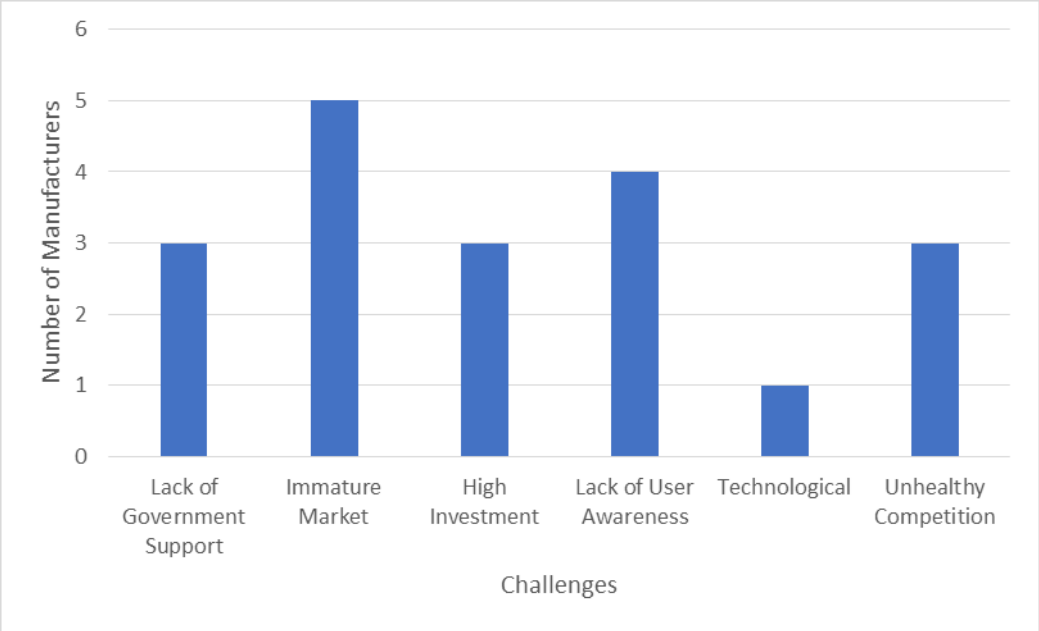

Figure: Current Challenges Experienced by Industry.

4. CONCLUSION AND RECOMMENDATIONS

The construction industry plays a significant role in supporting economic growth and infrastructure development in developing countries. Within this sector, interlocking concrete pavers have emerged as an important pavement solution due to their structural strength, ease of maintenance, and environmental benefits. The introduction of the Nepal Standard (NS 593) in 2021 represents a major step toward improving product quality and standardization within Nepal's interlocking paver industry.

Overall, the results indicate that NS-certified interlocking pavers have strong technical performance and growing market potential in Nepal. However, long-term growth of the industry will depend on improvements in quality monitoring, technological advancement, skilled workforce development, and supportive government policies aimed at strengthening the domestic manufacturing sector.

However, there are several challenges like lack of government support, immature market, high investment, and difficulty in ensuring consistency in quality which could be hinderance to growth for the companies in realizing the opportunities that exist in terms of future market growth thanks to ease of supplies, repair and maintenance, ground water recharge, and most importantly durability. All the engineers unanimously agreed to the notion that interlock pavers provide benefits in strength and durability. This view is further strengthened by the majority of the contractors believing that the interlock pavers has durability of 9 years.

Key Recommendations:

1. **Policy Support:** The government should provide subsidies and mention NS certification in all public project specifications.
2. **Industry Collaboration:** Establishing a "Pavers Association Forum" is necessary for sharing best practices and addressing common challenges.
3. **Awareness:** Targeted campaigns are needed to bridge the gap between high technical strength and low durability perception among end-users.

REFERENCES (Selected)

1. Nepal Standard 593 (2077) Precast Concrete Blocks for Paving Specifications.
2. Dhakal, N.C.P. (2022). A Glimpse of industrialization in Nepal: reality and challenges.
3. Indian Road Congress (2004). Guideline for the use of Interlock Concrete Block Pavement.
4. Confederation of Nepalese Industries (2920) Comparison between asphalt and concrete road. https://cni.org.np/storage/publication/wJl6zJAAN1i4DlZ4hcqgEhqJGZdI4SEyYJVYHm23.pdf.
5. Advantages and disadvantages of reinforced concrete (no date). https://civiltoday.com/civil-engineering-materials/concrete/23-advantages-and-disadvantages-of-reinforced-concrete.
6. Engineering (2010) How many years is the average life time of standard asphalt pavements?Does it contain partial rehabilitation? - Engineering.com. https://www.engineering.com/how-many-years-is-the-average-life-time-of-standard-asphalt-pavementsdoes-it-contain-partial-rehabilitation/#:~:text=Roads%20built%20on%20organic%20peaty,full%20depth%20reconstruction%20is%20needed.