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APPLICABILITY OF AUTOCLAVED AERATED CONCRETE (AAC) BLOCKS COMPARED TO CONVENTIONAL BRICKS AND BLOCKS WITHIN THE SRI LANKAN CONTEXT

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ABSTRACT

Autoclaved Aerated Concrete (AAC) blocks have gained increasing attention as a lightweight, energy-efficient, and sustainable alternative to conventional masonry materials. However, despite the growing demand for faster and environmentally sustainable construction practices, AAC block utilisation within the Sri Lankan construction industry remains limited due to low awareness and uncertainty regarding its applicability. Therefore, this study aims to assess the suitability of AAC blocks compared with conventional bricks and concrete blocks in terms of quality and time efficiency within the Sri Lankan context. A mixed-method research approach was adopted through a systematic literature review, questionnaire survey, and semi-structured interviews. Quantitative data were collected from 92 construction professionals using simple random sampling and analysed using Statistical Package for the Social Sciences software, while qualitative data were gathered from ten industry experts selected through purposive sampling and analysed using content analysis. The findings revealed that only 47.8% of respondents were aware of AAC blocks, indicating a considerable lack of industry awareness. Nevertheless, AAC blocks were identified as superior in terms of lightweight properties, thermal insulation, reduced labour requirements, faster construction, and environmental sustainability. Compared with conventional bricks and blocks, AAC blocks significantly reduced construction time due to their larger size, fewer joints, and absence of curing requirements. The study concludes that AAC blocks represent a viable and sustainable alternative for the Sri Lankan construction industry, although greater industry awareness is required for wider adoption.

Keywords: *Autoclaved Aerated Concrete (AAC) Blocks; Quality; Sri Lankan Construction Industry; Time.*

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1. INTRODUCTION

The construction industry is increasingly facing challenges related to environmental sustainability, resource consumption, rising material costs, and the demand for faster construction practices. Conventional masonry materials such as red clay bricks and concrete blocks continue to dominate the construction sector; however, these materials are associated with high energy consumption, environmental impacts, and extended construction durations. As a result, the industry has increasingly shifted its attention toward sustainable and lightweight alternative building materials capable of improving construction efficiency while minimising environmental impacts. AAC, known for its lightweight properties, has emerged as a prominent masonry material in the modern construction sector (Abhilasha et al., 2023). Recognised for its advantages in terms of time, quality, and cost parameters, AAC blocks have gained popularity in the market (Ghimire, 2022). With larger dimensions compared to traditional bricks, AAC blocks result in fewer joints, reducing the amount of mortar required and leading to significant savings in mortar usage (Nagavenkatasaikumar & Sathishchandra, 2017). The use of AAC blocks as a replacement for clay bricks has been found to result in faster construction and cost savings of up to 50% and 18% in single-family structures, respectively, making them a viable and cost-effective alternative (Bhandari et al., 2021). AAC blocks are also recognised as a contemporary Green material for construction in India, suitable for residential, industrial, and commercial buildings as a sustainable substitute for conventional red clay bricks (Sherin & Saurabh, 2018). Although AAC blocks have been widely recognised internationally for their lightweight properties, thermal insulation, construction efficiency, and environmental benefits, their adoption within the Sri Lankan construction industry remains limited. Existing studies mainly focus on the quality and time effectiveness of AAC blocks in international contexts, while limited research has examined their practical applicability within Sri Lanka. In addition, low industry awareness and uncertainty regarding implementation continue to restrict the wider adoption of AAC blocks in local construction projects. Therefore, this study aims to assess the suitability of AAC blocks compared with conventional bricks and blocks within the Sri Lankan context. In Sri Lanka, the construction industry encompasses a broad scope of intricate projects, thereby presenting numerous challenges (Salgadu et al., 2021). The integration of AAC blocks, tailored to contemporary technologies, within this industry can bring forth several advantages. One notable benefit is the preservation of environmental conditions. Moreover, society stands to gain from these strategies, as they facilitate a comprehensive understanding of the temporal and qualitative efficacy of AAC blocks, as well as their associated benefits (Mishra & Aithal, 2021). Both employers and contractors bear the consequences of employing AAC blocks, with significant outcomes such as reduced construction timelines, enhanced quality standards, prevention of project delays and cost overruns, among others (Usta & Zengin, 2021). The study aims to fulfil its research objectives by focusing on the following areas: evaluate the awareness and level of usage reduction of AAC blocks in the construction industry of Sri Lanka, analysis of the physical properties of AAC blocks and Conventional bricks and blocks affecting the quality, comparative analysis regarding time parameters of AAC blocks and Conventional bricks and blocks and finally, assess the suitability of AAC blocks in relation to time, and quality parameters. This study is confined to construction projects in the Sri Lankan sector, and AAC blocks, Solid Concrete, Hollow concrete blocks, and Red Clay bricks.

2. LITERATURE REVIEW

The growing demand for sustainable, lightweight, and time-efficient construction materials has increased global interest in alternative masonry technologies. Among these alternatives, AAC blocks have gained considerable attention due to their lightweight properties, thermal insulation performance, reduced environmental impact, and construction efficiency (Khandve, 2016). AAC blocks are increasingly recognised as a sustainable alternative to conventional masonry materials such as red clay bricks and concrete blocks in residential, commercial, and industrial construction projects (Sherin & Saurabh, 2018). Furthermore, AAC blocks contribute to faster construction and reduced material consumption due to their larger size and fewer mortar joints compared with traditional bricks (Bhandari et al., 2021). Therefore, understanding the characteristics and applicability of AAC blocks in comparison with traditional masonry materials is essential for improving modern construction practices.

2.1 AUTOCLAVED AERATED CONCRETE BLOCKS

2.1.1 Introduction to AAC Blocks

AAC is a lightweight masonry material that has gained increasing attention as a sustainable alternative to conventional walling materials. AAC is recognised as an environmentally friendly construction material due to its recyclable, reusable, non-toxic, and energy-efficient characteristics (Khandve, 2016). AAC blocks are considered an effective alternative to conventional clay bricks because of their lightweight properties and reduced structural dead load (Ghimire, 2022). Furthermore, AAC blocks improve construction efficiency through larger block dimensions, fewer mortar joints, and faster installation processes (Bhandari et al., 2021).

2.2 CONVENTIONAL BRICKS AND BLOCKS

2.2.1 Red Clay Bricks

Red clay bricks are among the most widely used masonry materials due to their durability, compressive strength, and availability (PR, 2019). Their long history of use has made them a common construction material in Sri Lanka (Vyshnavi et al., 2015). Red clay bricks are widely utilised in many countries because of their accessibility and established acceptance within the construction industry (Ghimire, 2022). However, compared with modern masonry materials such as AAC blocks, red clay bricks generally require greater labour input and longer construction durations (Mishra & Aithal, 2021).

2.2.2 Solid Concrete Blocks

Solid concrete blocks are manufactured using cement, aggregates, sand, and water and are recognised for their strength, durability, and fire resistance (Raj et al., 2020). These characteristics make them suitable for structural and non-structural construction applications [Swiss Resource Centre and Consultancies for Development (SKAT), 2006]. However, their relatively high weight can increase handling effort and labour requirements during construction (Shah et al., 2017).

2.2.3 Hollow Concrete Blocks

Hollow concrete blocks were introduced to reinforce concrete block masonry to attain high structural stability (Niazi et al., 2020). Sand, gravel, and cement are the most common components of hollow or cavity-type blocks [Building Materials & Technology Promotion Council (BMTPC), 1990]. Hollow concrete has various benefits, including being bigger solid blocks and lighter than solid blocks; Wall construction is simple and rapid; steel bars and concrete can be used to fill the spaces, providing excellent seismic protection; the air gap provides good thermal insulation, Plumbing, and electrical installation are both possible in the cavities (SKAT, 2006).

2.3 LEVEL OF AWARENESS AND LEVEL OF USAGE REDUCTION OF AAC BLOCKS IN THE LOCAL CONTEXT

Burnt Clay Brick (BCB) is frequently used in the building sector. Because of its high strength, it is widely used (Chockalingam et al., 2021). Among the several precast concrete materials used in construction, solid concrete blocks are one of them (Raj et al., 2020). Hollow concrete bricks and blocks are more common today (BMTPC, 1990). This property makes AAC block a good wall-building material, but its acceptability by society also depends on economic and cultural factors. However, the market availability of materials and the non-commercial character of the AAC block are seen as the least relevant variables for utilisation (Mishra & Aithal, 2021). Few contractors are familiar with AAC, and professional masons must use thin-set mortar rather than standard cement-based mortar. Local government bodies such as the construction of buildings department, the design review department, and planning commissions are similarly 19 unfamiliar with AAC and must be educated on its capacity to meet local building requirements (Sherin & Saurabh, 2018). Although previous studies have identified awareness, technical familiarity, and market acceptance as important factors affecting AAC block adoption in international construction industries (Mishra & Aithal, 2021), limited research has specifically examined these issues within the Sri Lankan construction context. Furthermore, existing studies have mainly focused on the quality and technical performance of AAC blocks, while limited attention has been given to their practical applicability in relation to quality and time efficiency. Therefore, the present study contributes to the existing body of knowledge by evaluating the awareness, applicability, and practical suitability of AAC blocks among Sri Lankan construction professionals.

2.4 ANALYSIS OF THE PHYSICAL PROPERTIES OF AAC BLOCKS AND CONVENTIONAL BRICKS AND BLOCKS

Proper physical property consideration results in conservative and competent building design and servicing. AAC unit has many physical characteristics, including thermal expansion, shrinkage, thermal conductivity, sound absorption, density, moisture content, porosity, water absorption, permeability, capillarity, and initial absorption rate, among others (Raj, 2020). AAC blocks are a modern building material that weighs highly light compared to traditional brick (Jain et al., 2018). In filled wall construction, the base shear of AAC is 23.87% lower than that of solid concrete block and 22.53% lower than that of traditional red clay brick (Moktan et al., 2021). AAC blocks are more effective in insulating sound than traditional brick (Netula et al., 2017). According to recent research, AAC and wood-based construction materials may produce less CO_2 emissions than other building materials like concrete, brick, or steel (Gustavsson & Sathre, 2006). This study demonstrates that AAC blocks have considerably higher compressive strength than conventional clay bricks (Khandve, 2016). AAC blocks have a fire resistance capability of around seven hours, whereas clay bricks have a fire resistance capacity of roughly two hours (Sherin & Saurabh, 2018).

2.5 COMPARISON OF TIME PARAMETERS OF AAC BLOCKS AND CONVENTIONAL BRICKS AND BLOCKS

The use of AAC blocks rather than clay bricks may save construction time by 50% in single-family structures, respectively. As a result, AAC blocks are an appropriate and time-effective replacement for bricks. Similarly, the time necessary to do brickwork is three to four times more than the time required to complete AAC block construction (Mishra & Aithal, 2021).

Table 1: Days for one cumulative of infill wall

Infill Wall Materials	Mason Gd.1 Days			Mason Gd.2 Days			Labour Days			Labour Cost	Cost Saving
	Days	Rate	Total	Days	Rate	Total	Days	Rate	Total		
Red Clay Brick	0.763	632.5	482.5	0.763	575	438.7	2.792	460	1078.2	1999.542	51% in AAC compared to the conventional brick
Solid Concrete Block	0.763	632.5	482.5	0.763	575	438.7	2.792	460	1078.2	1999.542	
AAC Block	0.431	632.5	272.3	0.431	575	247.6	1.019	460	468.5	988.506	

Table 1 displays the quantity of work completed as expressed by the number of days needed by each worker to finish one cum of infill wall concerning the labour cost reduction (Moktan et al., 2021).

3. RESEARCH METHODOLOGY

This study adopted a mixed-method research design to comprehensively evaluate the applicability of AAC blocks within the Sri Lankan construction industry. The quantitative approach was used to assess the level of awareness and level of usage reduction of AAC block utilisation through questionnaire surveys conducted among construction professionals and the collected quantitative data were analysed using Correlation analysis. The qualitative approach was adopted to obtain expert perspectives regarding physical properties, time parameters, and the practical suitability of AAC blocks through semi-structured interviews while the collected qualitative responses were analysed using content analysis. The integration of both quantitative and qualitative methods enabled a broader understanding of the research problem by combining statistical analysis with expert insights. Authors used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) approach to systematically identify, screen, assess, and select relevant literature related to the applicability of AAC blocks and conventional masonry materials. Adopting PRISMA provides a transparent and structured procedure for conducting systematic literature reviews and ensures the inclusion of relevant studies related to the research topic (Page et al., 2021). The PRISMA 2020 flow diagram adopted in this study is presented in Figure 1.

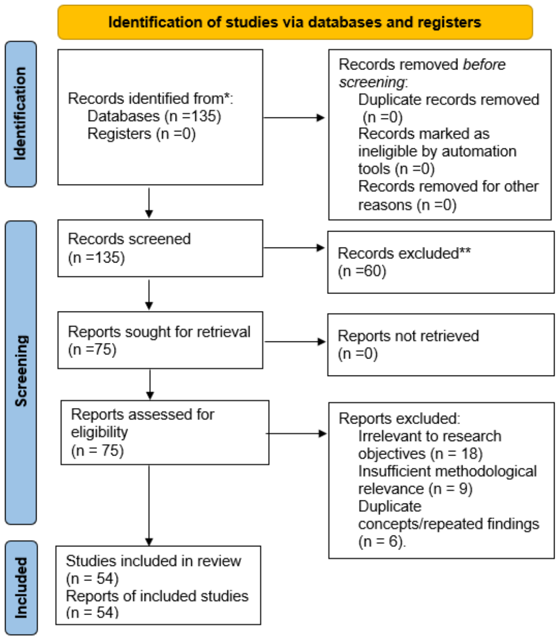

Figure 1: PRISMA research process (Page et al., 2021)

Through a systematic analysis following the PRISMA methodology, a comprehensive search using key terms such as AAC blocks, Conventional bricks, Conventional blocks, Construction Industry, applicability of AAC blocks within SL, applicability of Conventional bricks within SL, and applicability of Conventional blocks within SL yielded a total of 135 relevant articles. Initial screening was performed based on the abstracts of these articles, resulting in a subset of 75 articles. Subsequently, a critical analysis was conducted on this subset to further refine the selection. As a result, 42 articles were identified as directly pertinent to the study and were included for in-depth review. To augment the existing body of literature, additional references were sought from the selected 42 articles. A meticulous examination of these references led to the identification of 23 supplementary articles. Similar to the initial screening process, abstracts of these 23 articles were screened, followed by a comprehensive assessment, ultimately narrowing down the selection to twelve articles. In summary, a final corpus of 54 articles was meticulously chosen for the ultimate purpose of conducting a thorough review and analysis within the scope of this study. The selected literature was analysed to extract information related to the physical properties, thermal performance, fire resistance, compressive strength, environmental sustainability, construction time efficiency, and applicability of AAC blocks and conventional masonry materials. The extracted findings were used to support the comparative analysis conducted in this study and to develop the questionnaire survey and interview discussions. Furthermore, the literature findings were integrated with expert interview responses to evaluate the suitability of AAC blocks within the Sri Lankan construction industry. The quantitative analysis was used to evaluate the awareness and level of usage reduction of AAC blocks in the Sri Lankan construction industry. Quantitative data was collected through a questionnaire survey with two sections. The first section collects demographic information about the firm, responder, and projects, including details such as profession, construction industry experience, position in the project, and areas of competence. The second section consists of closed-ended questions about the independent variables of the study, presented on a Likert scale. There were Likert scale questions such as Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The questions were developed based on a literature review of previous research. The questionnaire was prepared using google forms and distributed to construction industry professionals through emails and social media. An online-based questionnaire format was chosen to save time and increase the response rate. The qualitative analysis was used to fulfill the second, third and fourth objectives of the study. The semi-structured interviews were conducted, and it comprised two sections. The first section focuses on gathering basic information about the interviewee, such as their profession, experience in the construction industry, position in the project, and the company's areas of competence. The second section consists of open-ended questions that analyse the physical properties of AAC blocks and conventional bricks, as well as the impact on quality and a comparative analysis of time parameters, and suitability of AAC blocks. Conducting interviews with industry experts adds to the reliability of the data, as it is based on their expertise and current involvement in the field. The interviewees were selected using purposive sampling, and ten expert professionals, including project managers, architectures, quantity surveyor and engineers engaged in AAC blocks in Sri Lanka, were chosen for the interviews. The interviews were conducted through phone calls, zoom meetings, and face-to-face interactions. Recording the interviews was done to prevent data loss and save time during the discussion, particularly for online and phone conversations. Furthermore, the evaluation of physical properties and time-related comparisons was primarily based on expert interpretations and findings derived from the systematic literature review. Simple random sampling was adopted for the questionnaire survey to obtain quantitative responses from construction professionals regarding awareness and barriers affecting AAC block adoption within the Sri Lankan construction industry. The purposive sampling was employed for the semi-structured interviews to select experienced industry experts with practical knowledge of AAC blocks and conventional masonry materials. Construction professionals, including project managers, engineers, quantity surveyors, architects, and technical officers employed within construction organisations, were considered the target population for this study. The use of different sampling techniques enabled the collection of both broad quantitative data and in-depth qualitative insights relevant to the research objectives. The adopted mixed-method research design enabled the achievement of the research objectives through the integration of multiple data collection and analysis techniques. The systematic literature review was utilised to identify the physical properties, environmental benefits, time efficiency factors, and applicability characteristics of AAC blocks and conventional masonry materials. Questionnaire surveys and correlation analysis using Statistical Package for the Social Sciences (SPSS) were employed to evaluate the level of awareness, usage reduction, and barriers affecting AAC block adoption among construction professionals. Prior to conducting the statistical analysis, reliability testing was performed to evaluate the internal consistency of the questionnaire items using Cronbach's Alpha in SPSS software. The obtained Cronbach's Alpha value was 0.931 for 33 questionnaire items, exceeding the acceptable threshold of 0.70 and indicating a high level of reliability and internal consistency of the measurement scale. In addition, semi-structured interviews and content analysis were used to obtain expert insights regarding the practical suitability, construction efficiency, and implementation challenges associated with AAC blocks within the Sri Lankan construction industry. The combined findings supported the overall evaluation of AAC block applicability and provided practical implications for improving awareness and future adoption within the local construction sector.

4. RESEARCH FINDINGS

This section evaluated the data collected through questionnaires, observations, semi-structured interviews, and secondary data. The questionnaire survey findings provided quantitative insights regarding the level of awareness, usage reduction, and barriers affecting AAC block adoption within the Sri Lankan construction industry. The semi-structured interviews conducted with industry experts generated qualitative insights related to the physical properties, time efficiency, practical applicability, and overall suitability of AAC blocks compared with conventional masonry materials. The integration of both respondent groups enabled the study to evaluate AAC block applicability from both statistical and practical industry perspectives.

Table 2: Respondents results

Profession	No. of Respondents
Quantity Surveyors	42
Engineers	34
Architects	8
Project Managers	6
Technical officers	2

The questionnaire survey was distributed among 110 construction professionals, but only 92 respondents received an 83.63% response rate (refer Table 2).

Table 3: Respondents' Result based on Interviews

Profession	Code of the Respondents	Years of Experience
Project Manager	PM1	18
Project Manager	PM2	05
Engineer	CE1	20
Engineer	CE2	14
Engineer	CE3	13
Architecture	AR1	15
Architecture	AR2	04
QS	QS1	15
QS	QS2	05
QS	QS3	05

Ten expert professionals currently engaged in the AAC block industry in Sri Lanka were selected to participate in semi-structured interviews to obtain their perspectives (refer Table 3).

4.1 EVALUATE THE AWARENESS OF USAGE REDUCTION OF AAC BLOCKS IN THE CONSTRUCTION INDUSTRY OF SRI LANKA

4.1.1 Level of Awareness

As mentioned, the questionnaire was distributed to construction industry professionals, of whom only 92 respondents were aware of AAC blocks, representing an awareness rate of 47.8%. This section included a question to check whether the respondent knows about the AAC blocks since it's no use to ask about the barriers if they do not know about the technology.

$$\frac{Number\ of\ completed\ responses}{Total\ number\ of\ responses} x\ 100 =\ Awareness \tag{01}$$

= (44/92) * 100%

= <u>47.8%</u>

4.1.2 Level Of Usage Reduction of AAC Blocks in the Sri Lankan Construction Industry

Using SPSS statistical analysis software, the likert scale data collected from the questionnaire survey were evaluated. Analysis was done to determine the relationship between identified barriers and the level of usage reduction of AAC blocks in the Sri Lankan construction industry. Independent variables are Average of Attitudinal Barriers (AAB), Average of Knowledge Barriers (AKB), Average of Finance Barriers (AFB), Average of Technical Barriers (ATB), and the Dependent variable is AAP (Average Level of usage reduction of AAC blocks) (refer Figure 2).

		AAB	AKB	AFB	ATB	AAP
AAB	Pearson Correlation	1	.790**	.674**	.594**	.683**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	44	44	44	44	44
AKB	Pearson Correlation	.790**	1	.601**	.670**	.680**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	44	44	44	44	44
AFB	Pearson Correlation	.674**	.601**	1	.570**	.511**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	44	44	44	44	44
ATB	Pearson Correlation	.594**	.670**	.570**	1	.607**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	44	44	44	44	44
AAP	Pearson Correlation	.683**	.680**	.511**	.607**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	44	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 2: Correlation Analysis

Based on the data analysis, all the significant values for independent variables were less than 0.05, indicating that all independent variables have a relationship with the dependent variables.

4.2 ANALYSIS OF PHYSICAL PROPERTIES OF AAC BLOCKS AND CONVENTIONAL BRICKS AND BLOCKS AFFECTING THE QUALITY

Expert interviews were conducted with ten professionals, including project managers, engineers, architects, and quantity surveyors, each with 4-20 years of experience in the Sri Lankan construction industry. All participants agreed that the manufacturing process of AAC blocks requires precise dosing, mixing, pouring, and pre-curing. According to PM1 and CE1, this controlled process ensures higher quality and dimensional accuracy compared to traditional brick production. Every expert acknowledged that AAC blocks are lighter in weight, which reduces dead loads and facilitates faster construction. CE2 and QS1 noted that AAC blocks are approximately one-third the weight of conventional bricks, improving ease of handling and transportation. Most respondents agreed that AAC blocks are larger in size, allowing faster wall construction with fewer joints. Project managers (PM1, PM2) mentioned that this feature saves both time and labour costs, enhancing productivity. Experts further emphasised the high compressive strength and low thermal conductivity of AAC blocks. Engineers and architects confirmed that AAC offers adequate strength for low- to mid-rise structures while improving indoor comfort and energy efficiency. Environmental sustainability was another strongly supported factor. AR2 and QS3 highlighted that AAC blocks reduce raw material use and solid waste generation, aligning with sustainable construction practices. However, opinions were more varied regarding the initial setting time, curing process, and maintenance benefits. Only a few experts were aware that AAC blocks require minimal curing and lower water consumption, indicating limited field familiarity with these aspects. Architects and quantity surveyors identified sound insulation and smooth finishes as additional advantages, noting that AAC can reduce plastering needs and improve acoustic performance. In summary, experts expressed a strong positive perception of AAC blocks, particularly emphasising their lightweight nature, large size, thermal insulation, and environmental advantages. However, practical aspects such as curing, maintenance, and energy efficiency require further awareness and industry exposure to maximise AAC adoption in Sri Lankan construction projects.

4.3 COMPARATIVE ANALYSIS REGARDING TIME PARAMETERS OF AAC BLOCKS AND CONVENTIONAL BRICKS AND BLOCKS

4.3.1 Time Parameters Analysis

Time performance is a critical factor in construction projects, as the selection of appropriate building materials can significantly influence construction efficiency and project duration. The use of these elements saves both the owner and the contractor time and money on building expenditures. As a result, it allows the investor's contractor to construct structures faster and more precisely. In the manufacturing timeframe, expert interviewees PM1, CE1, CE2, CE3, AR2, QS1, and QS3 mentioned, "Typically cement/concrete blocks take about 28 days to release into the market after production. But AAC blocks can be released to the market within one day after manufacturing". According to the interviewees, the following factors were identified as the most time-effective factors. Such as, the weight of an AAC block is about three to four times less than that of a traditional brick, as a result, AAC blocks require only fewer joints, and there is no curing requirement.

4.4 ASSESS THE SUITABILITY OF AAC BLOCKS IN RELATION TO TIME AND QUALITY PARAMETERS

The fourth objective of this research is to assess the suitability of AAC blocks with respect to time and quality parameters. This objective is addressed through the findings obtained from expert interviews. The time and quality aspects were analysed based on these expert responses. The results indicate that both time and quality are key factors when selecting building materials, and their importance varies according to client and contractor requirements. For instance, if a client prioritises completing a project quickly, materials that reduce construction time should be chosen. In the context of the Sri Lankan construction industry, commonly used materials include AAC blocks, red bricks, solid blocks, and hollow blocks. According to the study, when quality is the primary concern, AAC blocks are the most effective choice compared to the other options. Additionally, AAC blocks require less time for laying, making them both time-efficient and quality-effective. Based on the findings of objectives one through three, the ranking of building materials in terms of combined quality and time efficiency is as follows: AAC blocks as the highest, followed by hollow blocks, red bricks, and solid blocks.

5. DISCUSSION

This chapter has organized the collected data in a way that will aid in the achievement of the stated objectives of the current research, and it can be shown that the essence of the literature of this study exists when applied to the Sri Lankan construction industry. Overall, this chapter explains the relationship between the Applicability of AAC blocks and conventional bricks and blocks in the Sri Lankan context. From the first objective, determine the relationship between identified barriers and the degree of AAC blocks utilisation reduction in the Sri Lankan building sector. The findings revealed that only 47.8% of respondents were aware of AAC blocks, indicating a comparatively low level of awareness within the local construction industry. Limited technical familiarity and lack of professional exposure are significant barriers affecting AAC block adoption in developing construction sectors (Sherin & Saurabh, 2018). Awareness and social acceptance strongly influence the utilisation of AAC blocks (Mishra & Aithal, 2021). The present study further highlights that despite the global recognition of AAC technology, awareness and practical implementation within Sri Lanka remain comparatively limited. In the second objective, quality factors derived from expert interviewers were explored. As a result, AAC blocks provide advantages in terms of lightweight properties, thermal insulation, and construction speed, although their compressive strength is generally lower than that of conventional clay bricks and concrete blocks. This notion is well supported by scholars as well. The AAC unit has many physical characteristics, including thermal expansion, shrinkage, thermal conductivity, sound absorption, density, moisture content, porosity, water absorption, permeability, capillarity, and initial absorption rate, among others (Raj, 2020). AAC blocks are more effective in insulating sound than traditional brick (Netula et al., 2017). There are no environmental issues with the production of AAC blocks. AAC is a recognised eco-friendly building material that may be utilised for commercial, industrial, and residential construction since it is permeable, nontoxic, reusable, renewable, and recyclable (Khandve, 2016). AAC benefits when recycling, sustainability, and energy are considered since it requires fewer natural resources (Usta & Zengin, 2021). Compared to clay bricks, AAC blocks perform thermally significantly better and insulate sound and fire better. Additionally, the AAC blocks' low thermal conductivity and strong thermal resistance, which result in reduced energy consumption, make them much more energy efficient than clay bricks in terms of thermal performance (Khalil, 2020). These findings are consistent with the present study, where industry professionals identified thermal insulation, lightweight properties, and environmental sustainability as major advantages of AAC blocks within Sri Lankan construction projects. Furthermore, the current study extends previous findings by emphasising the practical advantages of AAC blocks in improving labour efficiency and reducing deadloads in modern construction applications. Thirdly, determine the most time-effective material among AAC, Solid, Hollow, and red bricks from interviews. This notion is well supported by scholars as well. Similarly, the time necessary to do brickwork is three to four times more than the time required to complete AAC block construction (Mishra & Aithal, 2021). AAC blocks are identified as a time-efficient alternative due to reduced mortar joints, lightweight handling, and faster installation processes (Bhandari et al., 2021). Expert interviewees in the current study also emphasized that AAC blocks reduce construction duration due to their larger size and minimal curing requirements, thereby improving overall project efficiency within the Sri Lankan construction industry. The fourth objective examined the suitability of AAC blocks based on the findings from Objectives one to three derived from expert interviews. As a result, advantages such as lightweight properties, thermal insulation, and faster construction are offered by AAC blocks; however, their compressive strength is generally lower than that of conventional clay bricks and concrete blocks. Proving the opinions of expert interviewees, the applicability of AAC blocks based on dry density, compressive strength, the weight of the AAC block, water absorption, size variation, and fire-resistant qualities (Khanal et al., 2020). Currently, the utilisation of Autoclaved Aerated Concrete in high-rise structures is expanding daily (Vats, 2019). Direct costs will decrease by 20% (Khan, 2019). While previous international studies have primarily focused on the technical and economic advantages of AAC blocks, the present study contributes specifically by evaluating their applicability within the Sri Lankan construction industry. The findings demonstrate that AAC blocks have strong potential to support faster, higher-quality, and environmentally sustainable construction practices in Sri Lanka, although increased industry awareness and technical adaptation remain necessary for wider implementation.

6. CONCLUSIONS AND RECOMMENDATIONS

The study was initiated to identify the Applicability of AAC blocks compared to conventional bricks and blocks within the Sri Lankan context. In the process, the data collection was carried out to cover the objectives through primary and secondary collection techniques. Both qualitative and quantitative data were gathered. As a result, this research employs both qualitative and quantitative methodologies. The study revealed that, for objective one, the correlation analysis was tested to identify the relationship between identified barriers and the level of usage reduction of AAC blocks in the Sri Lankan construction industry. The study demonstrated a clear link between independent and dependent variables. The data obtained from expert interviews were analysed using content analysis under Objective Two. For the third objective of the thesis, typical data collection methods were used other than those site visits, and observations were accompanied. The gathered data were subjected to content analysis. According to the study, AAC blocks are more Time-effective than conventional bricks and blocks. In the final objective, the quality and time parameters were analysed based on the results obtained from objectives one to three and the expert interviews. According to the study, AAC blocks provide advantages in terms of lightweight properties, thermal insulation, and construction speed, although their compressive strength is generally lower than that of conventional clay bricks and concrete blocks. Considering the results, AAC blocks are the best when considering the quality factor. Since the size is big, plastering is unnecessary, the weight is low, and the time is less. It is easy for the labourers to handle the AAC block quickly, hence labour hours are reduced. Due to the economic crises in Sri Lanka, the correct blocks are AAC blocks because the amount of cement used for Solid and Hollow blocks is higher, and the cement prices are high. AAC block does not need to be plastered, so less cement is required compared to other blocks and bricks. Depending on the situation (time, and quality), the above findings can be used as a guide when considering the applicability of AAC blocks. This study was limited to evaluating the applicability of AAC blocks within selected Sri Lankan construction projects and primarily considered the perspectives of construction professionals involved in private-sector projects. The findings were mainly derived from questionnaire surveys, semi-structured interviews, and systematic literature review findings, if respondents possessed sufficient knowledge and experience related to AAC blocks and conventional masonry materials. Furthermore, the conference paper scope mainly focused on awareness, physical properties, time efficiency, and practical applicability aspects of AAC blocks. Future research may investigate solutions for barriers affecting AAC block adoption, evaluate the long-term sustainability and structural performance of AAC blocks, and develop comprehensive frameworks to assess AAC block suitability in relation to cost, time, and quality parameters within different construction contexts.

7. REFERENCES

Abhilasha, Kumar, R., Lakhani, R., Mishra, R. K., & Khan, S. (2023). Utilization of solid waste in the production of autoclaved aerated concrete and their effects on its physio-mechanical and microstructural properties: Alternative sources, characterization, and performance insights. *International Journal of Concrete Structures and Materials, 17*(1). 6. https://doi.org/10.1186/s40069-022-00569-x

Bhandari, M., Academy, M., & Aithal, S. (2021, January). Socio-economic suitability of AAC block in Nepal. *Solid State Technology, 64*(2), 575-595.https://doi.org/10.5281/zenodo.6538149

Building Materials & Technology Promotion Council, India (1990). *Techno economic feasibility report on concrete hollow & solid block*. Ministry of Housing & Urban Poverty Alleviation. https://www.bmtpc.org/DataFiles/CMS/file/02_Concrete%20Hollow%20&%20Solid%20Blo

Chockalingam, M. P., Palanisamy, N., Padmavathy, S. R., Mohan, E., Winsly, B. W., & Santhappan, J. S. (2021). Techno-economic feasibility study on the application of downdraft gasifiers in small-scale red clay bricks industries. *Applied Nanoscience*. *13*(2), 1155-1166 https://doi.org/10.1007/s13204-021-01942-0

Ghimire, S. (2022). Sustainability of autoclaved aerated concrete blocks over burnt clay brick. *International Journal of Engineering Applied Sciences and Technology, 6*(12), 293–298. https://doi.org/10.33564/IJEAST.2022.v06i12.048

Gustavsson, L., & Sathre, R. (2006). Variability in energy and carbon dioxide balances of wood and concrete building materials. *Building and Environment, 41*(7), 940–951. https://doi.org/10.1016/j.buildenv.2005.04.008

Jain, U., Jain, M., & Mandaokar, S. (2018). Comparative study of AAC blocks and clay brick and costing. *International Journal of Research in Engineering, Science and Management, 1*(9), 539–543. Retrieved from https://www.ijresm.com/Vol_1_2018/Vol1_Iss9_September18/IJRESM_19_129.pdf

Khalil, E. A. S. (2020). *Impact of autoclaved aerated concrete (AAC) on modern constructions: A case study in the New Egyptian Administrative Capital* [Master's thesis, The American University in Cairo]. AUC Knowledge Fountain. https://fount.aucegypt.edu/etds/804

Khalil, E. A., & AbouZeid, M. N. (2020). Environmental impact of autoclaved aerated concrete in modern construction: A case study from the New Egyptian Administrative Capital. *International Journal of Civil and Environmental Engineering, 14*(1), 1–6. Retrieved from https://publications.waset.org/10010972/environmental-impact-of-autoclaved-aerated-concrete-in-modern-construction-a-case-study-from-the-new-egyptian-administrative-capital

Khanal, D., Mishra, A. K., & Ghimire, B. (2020). Technical suitability assessment of autoclaved aerated concrete block as alternative building wall construction material: A case of Nepal. *Saudi Journal of Civil Engineering, 4*(5), 55–67. https://doi.org/10.36348/sjce.2020.v04i05.002

Rathi, S. O., & Khandve, P. V. (2016). Cost effectiveness of using AAC blocks for building construction in residential buildings and public buildings. *International Journal of Research in Engineering and Technology, 5*(5), 517–520. https://doi.org/10.15623/ijret.2016.0505097

Salgadu, M. D., Devapriya, K. A., & Gowsiga, M.. (2021). Applicability of innovative building materials for wall structures to maximise the energy efficiency of buildings in Sri Lanka. In M. Thayaparan (Ed.) *Conference Proceedings-FARU* (pp. 23-31) FARU https://doi.org/10.31705/FARU.2020.2

Mishra, A. K., & Aithal, P. S. (2021). Socio-economic suitability of AAC block in Nepal. *Solid State Technology, 64*(2), 575–595. Retrieved from https://www.researchgate.net/profile/Anjay-Mishra/publication/348742861_Socio-Economic_Suitability_of_AAC_Block_in_Nepal/links/600ea28da6fdccdcb87aed7c/Socio-Economic-Suitability-of-AAC-Block-in-Nepal.pdf

Moktan, P. D., Dema, T., & Sonam Tenzin, U. D. (2021). Structural and cost comparative analysis of RC framed building by using various infill wall materials. *Gross National Happiness Journal of Construction Technology and Management, 2*, 157–168. Retrieved from https://www.researchgate.net/profile/Tshewang-Dorji-7/publication/356611896_3938_3986_4017_3939_3851_95_3937_3964_95_3908_3942_3851_95_3921_3906_3936_3851_95_3942_3984_4017_3954_95_3921_3851_95_3921_3924_3939_3851_95_3936_3931_3964_95_3928_3942_3851_95_3904_3984_4017_3954_95/links/61a4d67dc6494c310e78d988/3938-3986-4017-3939-3851-95-3937-3964-95-3908-3942-3851-95-3921-3906-3936-3851-95-3942-3984-4017-3954-95-3921-3851-95-3921-3924-3939-3851-95-3936-3931-3964-95-3928-3942-3851-95-3904-3984-4017-3954-95.pdf#page=168

Nagavenkatasaikumar, P., & Sathishchandra, D. (2017). Environmental conditions monitoring of AAC blocks usage of high rise buildings at Tadepalli, Andhra Pradesh. *International Journal of Civil Engineering and Technology, 8*(1), 189–198. Retrieved from http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=8&IType=1

Netula, O., Singh, S. P., & Bhomia, E. R. (2017). Study and comparison of structures having different infill material (bricks, AAC blocks and hollow concrete blocks) using E-Tabs. *International Journal of Engineering Technology Science and Research, 4*(12), 403–411. Retrieved from https://www.irjet.net/archives/V7/i8/IRJET-V7I8155.pdf

Niazi, Z., Khanna, P., Gupta, S., & Sirohi, R. (2020). *Concrete block (CB): Production and construction guide*. Development Alternatives.

Fernando, P. R., Madushani, L. D., Praththana, M., & Nanayakkara, H. M., (2019). Synthesis and characterization of clay brick using waste groundnut shell ash. *Journal of Waste Resources and Recycling, 1*(1), 1–8. https://doi.org/10.15744/2766-5887.1.101

Raj, A., Borsaikia, A., & Dixit, U. (2020). Evaluation of mechanical properties of autoclaved aerated concrete (AAC) block and its masonry. *Journal of The Institution of Engineers (India): Series A, 101*, 315–325. https://doi.org/10.1007/s40030-020-00437-5

Sherin, K., & Saurabh, J. K. (2018). Review of autoclaved aerated concrete: Advantages and disadvantages. In *Proceedings of the National Conference on Advanced Structures, Materials and Methodology in Civil Engineering (ASMMCE–2018)* (pp. 35–39). https://www.researchgate.net/publication/329013600_An_Overview_of_Advantages_and_Disadvantages_of_Autoclaved_Aerated_Concrete

Swiss Resource Centre and Consultancies for Development (SKAT). (2006). *Concrete blocks*. Building Materials Leaflet. Retrieved June 24, 2026, from https://www.slideshare.net/slideshow/concrete-blocks-238111207/238111207#2

Sohrabi, C., Franchi, T., Mathew, G., Kerwan, A., Nicola, M., Griffin, M., Agha, M., & Agha, R. (2021). PRISMA 2020 statement: What's new and the importance of reporting guidelines. *International Journal of Surgery, 88*, 39–42. https://doi.org/10.1016/j.ijsu.2021.105918

Shah, H. U., Nadeem, M., Ur-Rehman, Q. F., & Ur-Rehman, E. W. (2017). Design and shape optimization of solid concrete blocks for masonry structures in northern areas of Pakistan. *International Journal of Scientific and Research Publications, 7*(9), 355–362. https://doi.org/10.13140/RG.2.2.27514.85446

Usta, P., & Zengin, B. (2021). The energy impact of building materials in residential buildings in Turkey. *Materials, 14*(11). 2793. https://doi.org/10.3390/ma14112793

Vats, F. (2019). Autoclaved aerated concrete: Versatile building material. *International Journal of Advance Research, Ideas and Innovations in Technology, 5*(3), 2092–2098. https://www.ijariit.com/manuscripts/v5i3/V5I3-2006.pdf