



## **THEFT AND VANDALISM CONTROL MEASURES ON CONSTRUCTION SITES**

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### **ABSTRACT**

**Purpose:** The goal of this study is to determine and improve the best security practices within Ghanaian construction sites to control theft and vandalism incidents.

**Design/Methodology/Approach:** A purposive sampling technique was adopted for the population which were indigenous small and medium-sized construction firms of D1KI and D2K2 categories to complete the semi-structured questionnaire. Out of the total of 80 questionnaires distributed, only 65 responses were retrieved for analysis. Descriptive statistics comprising, frequencies and mean scores were used.

**Findings:** The findings showed that the most effective and often utilized security measure on construction sites is the hiring of watchmen, with security cameras, alarm systems, and warning signs being the least frequently employed. Sites would most likely be protected from theft by effective implementation of the most important security measures while also guaranteeing that the value for money invested in site security is also realized.

**Research Limitation/Implications:** The effectiveness of theft and vandalism control measures may vary based on specific site characteristics, such as location, size, and type of construction. Generalising findings from one site to all construction contexts may not be applicable.

**Social Implication:** Incidents of theft and vandalism can lead to social tensions within the community, especially if residents perceive construction activities as a source of risk. Effective control measures mitigate these tensions, fostering a more harmonious relationship between construction companies and the local population.

**Practical Implication:** Minimizing the impact of theft and vandalism contributes to the timely completion of construction projects. Unanticipated delays due to security incidents can be avoided, ensuring that projects adhere to planned schedules and deadlines.

**Originality/ Value:** The originality of this paper lies in its targeted investigation into theft and vandalism control measures on small and medium-sized construction sites, offering innovative and contextually relevant solutions that address the unique challenges faced by SMEs in the construction industry.

**Keywords:** *Control. construction sites. security. theft. vandalism*



## **INTRODUCTION**

Among the many negative issues that have "afflicted" Ghana's construction industry is the theft of building materials, including plants and equipment, minor tools, appliances, and other items, from construction sites. Vandals and thieves may decrease a project's potential revenue as well as directly impact its success (Arijeloye, 2023). Theft from construction sites is a major problem and a persistent threat in the industry (Ablordepey, 2020).

Over the past 20 years, theft and vandalism incidents in the construction industry have evolved from straightforward theft and vandalism of tools and fixtures to more sophisticated crimes that target expensive building assets (Simukonda, & Kamwela, 2021). The impacts of theft and vandalism have an impact on the contractor both directly and indirectly (Simukonda, & Kamwela, 2021).

According to Navaratnam et al. (2022), contractors lose a significant amount of money each year due to theft and vandalism. Solutions to lessen theft and vandalism on building sites have been proposed by some writers. According to van den Berg et al. (2021), vandalism manifests itself as the breaking of glass, graffiti, and destruction of already-placed objects. It can also cause harm to construction sites. To lower costs related to theft and vandalism and to boost profitability, steady business growth, and stability, contractors must create appropriate security management strategies. Additionally, they are pressured to implement Security Management Practices (SMPs) (Simukonda, & Kamwela, 2021). Several strategies have been employed by other writers to reduce vandalism and theft at construction sites. Using secure storage areas, labelling plants with permanent marks, maintaining an inventory of construction equipment, and erecting perimeter fences are among the most popular ones (Ablordepey, 2020; Edike & Babatunde, 2017). However, their effectiveness has been called into question as theft and vandalism incidents on construction sites continue to rise. Other authors have lamented the underutilization of suitable safeguards including closed-circuit television (CCTV), alarm systems, and background checks on applicants' history (Edike & Babatunde, 2017).

This has been partly explained by the high capital expenditures associated with their implementation, which small and medium-sized contractors often have to bear (Ablordepey et al., 2020). Big contractors, however, find the cost-benefit analysis supporting the implementation of these SMPs to be sufficiently compelling. Sadly, Ablordepey et al. (2020) have observed that these SMPs are still disregarded and that theft and vandalism still cause large contractors to incur large losses. Even in industrialised countries, construction sites are often targeted by thieves and vandals. The construction sector has played a major role in the rapid economic growth of several



countries, including Ghana. Unfortunately, theft and vandalism are major problems in the field that come at a high cost to all parties concerned. Research by the Ghanaian Times (2019) estimates that the cost of theft and vandalism in Ghana's construction industry is estimated to be GH 50 million annually. Building sites are the most vulnerable to theft and vandalism in Ghana's construction industry (Abu et al., 2019). These tragedies result in significant financial losses and project delays, which lowers the sector's level of competition. The writers also made note of the fact that even with security measures like CCTV cameras and security guards, theft and vandalism still occur. This problem highlights how to provide practical answers, a comprehensive evaluation of the effectiveness of the existing regulatory systems is required. Therefore, the premise that theft on construction sites should be handled or, if possible, prevented forms the basis of this study. Thus, the study seeks to evaluate the elements that will contribute to the decrease in or even prevention of thefts and vandalism on construction sites.

## **OVERVIEW OF THEFT AND VANDALISM**

Theft is defined as the unauthorized removal of any material or equipment from a job site (Gransberg et al., 2006). A person is guilty of theft if he dishonestly appropriates property belonging to another to permanently deprive the other of it (Farinloye et al., 2013).

Vandalism is the crime of destroying or damaging something or property deliberately and for no good reason (Farinloye et al., 2013). Vandalism is generally a nuisance crime on construction sites, broken glass, graffiti, destruction of in-place materials and damage to construction equipment (Simukonda, & Kamwela, 2021).

Construction sites are often the scene of theft and vandalism, which causes significant financial losses, project delays, and property damage. Many control techniques have been developed in response to lessen these risks. They consist of both physical security measures like fencing and lighting as well as technologically driven solutions like CCTV and alarm systems. This study of the literature assesses the effectiveness of theft and vandalism prevention strategies on construction sites.

The Ghanaian Times (Ocran, 2019) reports that there appears to have been an uptick in theft and vandalism at construction sites in Accra, Ghana, recently. As a result, numerous approaches have been taken to address the problem. For example, some construction businesses use security guards to keep their workspaces safe, while others install CCTV cameras to keep an eye on occurrences. The effectiveness of these steps in lowering theft and vandalism incidences is unclear. As a result, construction companies experience significant financial losses and delays in project completion



(Albert, 2021). Examining the different measures that have been implemented to stop these incidents is crucial.

Several studies have shown how crucial it is to implement security measures on construction sites. Hossain et al. (2023), for example, suggest employing CCTV cameras, security guards, and access control systems to deter theft and damage. In a similar vein, Ellis et al. (2020) suggest securing the facility with physical barriers like locks and fences. Several studies have shown how crucial it is to implement security measures on construction sites. Hossain et al. (2023), for example, suggest employing CCTV cameras, security guards, and access control systems to deter theft and damage. In a similar vein, Ellis et al. (2020) suggest securing the facility with physical barriers like locks and fences. Vandalism and theft at construction sites are serious issues for construction companies located in Accra, with losses projected to be in the millions of Ghanaian cedis, according to research by Haas et al. (2022). This problem has been addressed in several ways, such as the installation of fencing, CCTV cameras, and security guards. The effectiveness of these strategies in preventing damage and theft is unknown.

### **Theft On Building Sites**

Ghanaian construction sites have a serious theft problem, according to a review of the literature conducted by Simpeh et al. (2022). The investigation shows that theft of tools and building supplies has a significant negative impact on construction projects in Ghana, with potentially dire financial and social consequences. The evaluation also demonstrated the effectiveness of theft prevention measures in reducing the incidence of theft on building sites, such as security personnel, CCTV cameras, and enough lighting.

### **Forms of Theft on Construction Sites**

Theft of construction-related materials is a frequent issue that can seriously harm ongoing construction projects. In this study of the literature, many research and reports on the problem of material theft focused on construction sites in Ghana (Bamfo-Agyei et al., 2021; Simpeh et al., 2022; Bamfo-Agyei et al., 2023). The degree of material theft in Ghana's construction industry was highlighted in a report by the Ghana Police Service in 2019; the research also revealed that Accra Metropolis and other metropolitan regions experienced particularly severe cases of the issue. According to the survey, among the most frequently stolen commodities were building supplies including iron rods, cement, and roofing sheets. Thieves frequently targeted unattended construction sites or those with insufficient security measures.

Similarly, Ablordeppey et al. (2020), equipment theft on construction sites in Ghana is a significant problem that has a detrimental effect on the industry's output and efficiency. The study listed power tools, welding equipment, generators, compressors, and compressors as some of the most



commonly stolen types of machinery. The study unearthed that poor lighting, a dearth of security cameras, and insufficient site security as reasons for the high prevalence of equipment theft. In a different study, Oswald et al. (2020) looked into equipment theft in the Ghanaian construction industry and discovered that among the main causes of equipment theft were poor site management, insufficient security precautions, and low wages offered to construction employees. Ablordeppey et al. (2020) discovered that equipment theft causes monetary losses, delays in projects, and harm to the reputation of construction companies. To stop equipment theft, the authors advised construction enterprises to put in place strong security measures, such as the employment of security guards and video cameras (Lee et al., 2020).

### **Security Loss and Control**

A key component of construction management is safety and loss control, which is recognising and reducing risks and hazards that could cause injury to people, property damage, or even fatalities. The security and damage control laws that can be applied to reduce these risks have been the subject of several studies. For instance, the research by Lu and Yu (2019) examined security and loss prevention on building sites. The authors surveyed to investigate the security measures implemented on building sites in China. The report stated that CCTV cameras, security guards, and access control systems were the most often used security measures. The building project's size and complexity positively correlated with the use of security measures; the investigators also found Safety and loss management, which comprises identifying and mitigating risks and hazards that could result in property damage, personal injury, or even fatalities, is an essential part of construction management. When evaluating the effectiveness of a specific building site security policy, the area where the construction is taking place must also be taken into account. According to a recent study on theft and vandalism, location is a key risk factor that undoubtedly affects construction site security (Yates et al., 2022).

#### *On-site security*

Because of the large number of fatalities and injuries, the construction business is considered the most hazardous in the world. On-site security is essential for the construction industry because it ensures the safety of employees, visitors, and the general public. Construction sites can be made more secure by adding human elements, like security guards. Security guards are usually assigned to construction sites to provide on-site security. According to Zhang et al. (2017), security professionals can monitor the surroundings, react to emergencies and security violations, and serve as a visual warning to possible violators. However, as demonstrated by Yu et al.'s (2019) study, determined criminals can avoid access control devices when they know that they will only be used to restrict access to authorised individuals. Access control systems are another popular security measure for limiting access to authorised individuals; in construction sites, they have been shown

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to lower the risk of theft and unlawful access (Han et al., 2021). This is because hiring access control systems is expensive for building companies.

### *Perimeter Control*

Fencing, also known as perimeter control, is commonly used to prevent theft on construction sites. Fencing is a tangible barrier that can be erected around the site's perimeter to prevent unauthorised access. Construction sites are notorious for being targets of theft and vandalism, especially during the night. A lot of construction companies have erected fences to prevent such occurrences from happening. A fence surrounding a site's perimeter should be at least 2.4 metres high and made of sturdy material, such as steel, to create a stronger barrier (Post, & Jack, 2021). The study suggested that the barrier should be tall, conspicuous, and difficult to climb. The evaluation suggests a fence as well as several other theft-prevention measures, including security cameras, lighting, and security personnel, for construction companies. The chance of theft and vandalism can be reduced by 90% by doing this (Goh & Liang, 2016).

### **Security Control Measures**

Theft and vandalism represent serious dangers to construction companies because they involve costly tools and supplies, which can result in large financial losses and project completion delays. To address these issues, a variety of security control techniques have been developed and implemented on construction sites. Adequate lighting is another security feature that could help deter theft and vandalism on building sites. Fotios et al. (2021) indicate that when there is enough lighting, there is a reduction in criminal incidents on construction sites.

### *Inventory Control and Access Control Measures*

On construction sites, inventory control measures like inventory tracking and material management systems are employed as theft prevention strategies (Oke et al., 2023). To make sure that everything is present and accounted for, these systems can keep an eye on the items and equipment entering and leaving the site. Botchway et al. (2023) revealed that the implementation of access control methods resulted in a reduction in theft incidents on construction sites. Additionally, the use of biometric access control systems can increase the effectiveness of access control measures by limiting access to only authorised personnel (Goncalves, 2023).

### **Communication**

Effective communication is critical in preventing theft and vandalism on construction sites (Simpeh et al., 2022). Any suspicious activity or individuals by employees should be reported to the site manager or security personnel. Staff workers can learn how to prevent theft and vandalism as well as what to do in the event of an incident by receiving regular safety and security training.

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### ***Security Personnel***

Security guards can be an effective deterrent against damage and theft on building sites. A Fitriani et al. (2022) study found that the presence of security guards decreased the rate of theft cases in construction sites. Additionally, skilled security personnel can increase the efficacy of security control mechanisms by identifying potential threats and taking appropriate action (Wang & Li, 2018).

### ***Surveillance Systems***

Surveillance systems effectively deter theft and vandalism at construction sites. Cheng et al. (2022) found that installing security cameras resulted in a decrease in crime on construction sites. Furthermore, the efficiency of security systems is increased by the use of remote access to video footage and live CCTV monitoring (Chen, Huang, & Huang, 2020).

## **METHODOLOGY**

A quantitative strategy was adopted in this investigation. The study population was based on the medium and small construction firms (D1K1 and D2K2) categories of construction firms. Given this, the target audience for the study consists of experts working in the construction industry, namely civil engineers, builders, quantity surveyors, and project managers who are involved in structures that are now under construction. Respondents from the targeted category have to be employed full-time and in a position to fulfil every objective of the study. Since a quantitative approach offers an unbiased appraisal of the problem, it was chosen for this study. The effectiveness and frequency of the current security protocols or measures on construction sites, the impact of location on the degree of theft, the kinds of theft cases that occur and the susceptibility of the plants, materials, and equipment to theft and vandalism were examined using a quantitative approach.

Data collection from the full population is frequently impractical or impossible once the population has been established. As a result, we use sampling procedures to gather data and choose an amount of the population that is representative of the entire. To ensure that every person in the population at large has an equal chance of getting chosen, increasing the sample's representativeness, random sampling is a technique that is frequently utilized, according to Bryman (2016). The population of a rather small group of building professionals was researched, hence a purposeful sampling strategy was adopted. Out of the total 80 questionnaires distributed and 65 responses were obtained, indicating a response rate of 82%, were completed by building industry professionals.



Descriptive statistics comprising, frequencies and mean scores are used to analyse the data, using the Statistical Programme for Social Sciences (SPSS).

## RESULTS AND DISCUSSION

### Demographic Information

The demographic of the respondents refers to the specific characteristics within a given population. In line with this study, Table 1 shows that the majority of respondents (84.62% overall) were male, and 15.38% were females. All respondents who participated had post-secondary education. The respondents include construction professionals such as Architects, Quantity Surveyors, Engineers, Site supervisors and foremen engaged in small and medium-sized construction forms. The study was a questionnaire survey. The study leverages the information from construction professionals such as Architects because they are always structured as heads of most construction project teams and therefore, they have an in-depth understanding of what goes into site security management on building sites. Quantity Surveyors on the other hand were involved in the study because they often price the adopted security strategy for particular building projects with their deep understanding of site security. Hence the involvement of the Quantity Surveyors. Engineers, Site Supervisors and Foremen were involved in this study because these professionals are in charge of installing the specified site security strategy and therefore have a deeper understanding of site security for a particular building project. Also, most of the respondents representing 74% had over six years of experience, this demonstrates that the respondents have the necessary skills and expertise to provide data that could be used to conclude parameters of providing accurate control measures of theft and vandalism cases on construction sites.

*Table 1: Demography of Respondents*

Description	Frequency	Percentage
<b>Gender</b>		
Male	55	84.62
Female	10	15.38
Total	65	100
<b>Educational Qualification</b>		
Higher National Diploma	14	22
Bachelor degree	18	28
Master degree	22	34
Doctor of Philosophy	11	17
<b>Total</b>	<b>65</b>	<b>100</b>
<b>Professionals</b>		
Supervisor	7	11
Quantity surveyor	10	15
Architect	12	18

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Project Manager	12	18
Engineer	15	23
Foreman	9	14
<b>Total</b>	<b>65</b>	<b>100</b>
<b>Years of experience</b>		
1-5	17	26
6-10	19	29
10-15	14	22
Over 15yrs	15	23
<b>Total</b>	<b>65</b>	<b>100</b>

Source: Authors' work

### Analysis of Research

The average rating for each item from each respondent was determined. To determine respondents' opinions of the questionnaire, the computed mean ratings for each item were compared to the 4.0 mean rating that was presumed to be the average. Any estimated mean for the study question above 4.00 denotes respondents' positive opinion expression, whereas mean values below 4.00 denote respondents' negative opinion expression.

### Intensity of Security Measures in Preventing Theft on Construction Sites Based on the Location.

Table 2: Intensity of Security Measures in Preventing Theft on Construction Sites Based on the Location.

Variables	Strongly disagree. . . strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
Fencing and locking gates	4	4	13	27	17	4.14	1.087	1
Lighting the site at night	2	7	12	20	24	4.00	1.089	2
Security cameras	2	7	11	25	18	3.88	1.13	3
Use of warning signs	2	1	24	9	30	3.78	1.28	4
Watchman/ Security man	2	5	11	20	27	3.45	1.10	5
Marking all plant and equipment	4	5	13	18	24	3.69	1.24	6
Alarm Systems	4	6	10	26	18	3.68	1.25	7

Source: Authors' work (2023)

According to Table 2, the influence of construction sites' locations on the frequency of theft was examined by asking participants to rate the efficacy of different security measures when applied



to sites situated in disparate locations.

Contractors oppose the use of fencing and gate locking as a security measure to lessen or prevent theft from construction sites in both densely and sparsely populated areas. This implies that they can lessen theft wherever it occurs when compared to other security measures in the research field. Security cameras and site lighting came in second and third, respectively. Hence this information complies with the existing literature by Ablordeppey et al. (2019). Further, Rey-Merchán et al. (2019) ascertained that perimeter fencing is the most essential strategy implemented on building sites, particularly within urban regions. Similarly, Goh and Liang (2016) supported that theft and vandalism are reduced by 90 percent when fencing, cameras, lightning systems and security personnel are introduced by construction companies at sites. Hence this augments a high intensity of improving theft and vandalism occurrences at building sites. This implies that to minimise theft, you must have security cameras and lighting on your property even when you are just installing fencing.

### **Vulnerability of Plant, Materials and Tools to Theft**

*Table 3: Vulnerability of Plant, Materials and Tools to Theft*

Variables	Strongly disagree. . . strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
General building materials	1	5	7	24	27	4.04	1.11	1
Small tools and equipment	0	2	14	31	17	3.92	0.92	2
Heavy plant and machinery	8	9	14	23	10	3.23	1.31	3

*Source: Authors' work (2023)*

Furthermore, data was collected in Table 3 about the vulnerability of specific plants, equipment, and supplies to theft on building sites. It will be easier to determine which materials, plants, and instruments need special attention and the best and most efficient security measures to implement if we can identify those that are frequently the target of theft. The ordinal scale has five levels: "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." Common building supplies are most vulnerable to theft on a project site, according to the levels that show how frequently theft occurs. The heavy plant was ranked last when it comes to theft on building sites, while small tools and equipment came in second place, indicating that they are less likely to be taken there. The literature by Gupta, Jha and Vyas (2022) opined that equipment and material theft on building sites has a significant output and efficiency impact on the construction industry. The study further unearthed that general materials are the highest vulnerable items usually affected by theft at the site as confirmed by the findings of the current study.



## Level of Security Measures in Protecting Plant, Building Materials and Tools from Theft.

Table 4: Level of Security Measures in Protecting Plant, Building Materials and Tools from Theft.

Variables	Strongly disagree. . . strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
Watchman/ Security man	2	5	5	30	23	4.033	1.01	1
Fencing and locking gates	3	7	8	23	24	4.00	0.98	2
Security cameras	2	9	13	22	19	3.89	1.16	3
Lighting the site at night	2	3	10	28	22	3.85	1.19	4
Alarm Systems	2	7	8	25	22	3.72	1.13	5
Marking all plant and equipment	6	9	11	23	15	3.57	1.29	6
Use of warning signs	6	7	6	31	14	3.45	1.32	7

Source: Authors' work (2023)

One of the questions asked about the extent of security measures in place to deter theft of different types of plants, materials, and instruments on construction sites. Respondents were provided with a list of security techniques that construction companies can use to assess the effectiveness of each technique in preventing the theft of building supplies. Based on the contractor's comments, the different security measures were scored, and the approaches were ranked from 1st to 7th (1st - 7th) according to how well they stopped the theft of the tools, supplies, and plants. The results are summarised in Table 4. Watchmen/Security men had the highest mean, fencing and locking of gates were second and the last was the use of warning signs. These results indicate that if you want to protect your plant, materials, and tools on-site you must use security men locking gates and security cameras. The findings of this study comply with the study by Bajjou and Chafi (2020). which highlights that security personnel at the site improves on-site security as this was ranked the highest by the findings. Also, the findings conformed with existing literature by Wang and Li (2018) on perimeter fencing which accentuates that installing fencing discourages theft at sites as this was ranked high. Further, the study of Chen, Huang and Huang (2020) was in line with the findings of this current study as it indicated that the efficiency of security is increased when security systems are installed.



## Perpetrators of Theft at Construction Sites

Table 5: Perpetrators of Theft at Construction Sites

Variables	Strongly disagree. . .strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
Collaboration	1	6	11	26	21	3.98	1.08	1
Insiders	2	5	16	32	10	3.92	1.00	2
outsiders	0	2	15	23	24	3.66	0.94	3

Source: Authors' work (2023)

A comparison of the frequency of thefts at the location by insiders and outsiders was also disclosed by the poll. The most prevalent type of theft at the construction site was "collaboration." The respondents ranked "insiders" and "outsiders" second and third, respectively. Table 5 indicates that the majority of construction sites experience thefts committed by employees, which has an impact on their day-to-day operations. The findings are supported by that of Bajjou and Chafi (2020), that stolen items from the construction site involve collaborators.

## The Frequency of Use and the Efficiency of Various Security Measures in Combating Theft on Construction Sites.

Table 6: The Frequency of Use and the Efficiency of Various Security Measures in Combating Theft on Construction Sites.

Variables	Strongly disagree. . . strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
Watchman/ Security man	2	5	7	17	34	4.14	1.087	1
Lighting the site at night	3	11	8	26	16	4.00	1.089	2
Fencing and locking gates	6	12	12	19	16	3.88	1.13	3
Marking all plant and equipment	1	10	8	23	23	3.78	1.28	4
Security cameras	1	8	11	20	25	3.45	1.10	5



Use of warning signs	4	9	15	23	14	3.69	1.24	6
Alarm Systems	3	5	16	27	14	3.68	1.25	7

Source: Authors' work

The contractors' thoughts or opinions on how frequently the various security measures are used on construction sites and how effective these security measures are in decreasing theft on construction sites are shown in Table 6 of the data description. Seven security measures were ranked after being graded based on their respective averages and standard deviations. The most frequently used security measure on construction sites was watchman employment, which came in first place. Alarm systems, warning signs, and security cameras were the least used security measures on construction sites in the research area, placing seventh, sixth, and fifth, respectively. This indicates that security measures like watchmen and lighting at night are the most used measures on a construction site in combating theft on construction sites. The findings of this study accordingly complied with the existing literature on the use of the security control personnel which can increase the efficacy of the security control mechanism by identifying potential threats and taking appropriate action hence its highest ranking in the current study. The literature by Yılmaz and Kanıt (2018) opined that fencing is an essential security strategy for building sites as this is frequently used on most building sites.

### Efficiency of Current Security Measures in Reducing Theft on Construction Sites

Table 8: Efficiency of Current Security Measures in Reducing Theft on Construction Sites

Variables	Strongly disagree. . . strongly agree					Mean score	SD	Rank
	1	2	3	4	5			
Security cameras	3	1	10	23	27	4.14	1.087	1
Watchman/ Security man	2	1	11	19	31	4.00	1.089	2
Fencing and locking gates	2	5	13	18	26	3.88	1.13	3
Lighting the site at night	3	0	10	27	24	3.78	1.28	4
Alarm Systems	3	1	10	25	25	3.45	1.10	5
Marking all plant and equipment	4	8	12	26	15	3.69	1.24	6
Use of warning signs	4	4	10	29	17	3.68	1.25	7

Source: Authors' work

Based on the comments from the respondents, it was also determined and ranked how effective

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various security methods are at preventing theft on construction sites. The use of security cameras had the highest mean score and was placed first (1st). The fact that watchman/security man employment was placed second (2nd) suggests that people believed these two security measures to be the most effective at decreasing theft on construction sites and that they should be offered or employed first before other security measures. The installation of alarm systems is the only security measure with a negative rating (mean below 4.0); hence it is thought that they are not always effective. Security cameras had a mean of 4.20 and watchmen had 4.11 this means that when it comes to the efficiency of current security measures on their site these two are the most used. The findings of this study complied with the literature by Kim (2019) which supports that the use of cameras decreases crime by 50 percent. Undoubtedly, the use of cameras was ranked the highest from the findings of this current study.

## CONCLUSION

Even though temporary labour staffing allows many construction companies to keep costs down, theft from construction sites can quickly accumulate thousands of dollars. The expense of replacing components and equipment, along with the time it takes to obtain new materials, can result in a significant loss of production and income, regardless of the tools or construction equipment involved. For these reasons, preventing theft and maintaining construction site security are crucial to minimising expenses and delays.

An analysis was conducted on seven (7) primary security measures to determine how effective they were at reducing construction-related thefts. When it comes to plants, materials and tools being vulnerable to theft, general building materials were ranked first and heavy plants were ranked last in terms of the intensity of security measures in place to prevent theft on construction sites. Based on the location, fencing and gate locking were ranked first and alarm systems were ranked last. Additionally, those who commit theft at building sites are ranked first in collaboration, while outsiders are ranked third. The top-ranking security methods are those that safeguard plants and watchmen, while the lowest-ranking uses warning signs. The frequency of using current security measures on a construction site was taken into consideration watchmen/ security men were ranked first and alarm systems were last. Lastly, Security cameras were ranked first when it came to the efficiency of current security measures in reducing thefts on construction sites and the use of warning signs was last.

The study also concludes that the use of warning signs was either last or second to last this indicates that warning signs are not considered when it comes to security on site. The originality of this paper lies in its targeted investigation into theft and vandalism control measures on small and medium-sized construction sites, offering innovative and contextually relevant solutions that address the unique challenges faced by SMEs in the construction industry.

### *Practical Implications*

Minimizing the impact of theft and vandalism contributes to the timely completion of construction projects. Unanticipated delays due to security incidents can be avoided, ensuring that projects

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adhere to planned schedules and deadlines.

Practical implications involve the integration of technology such as surveillance cameras, motion sensors, and alarms. Implementing these technologies allows for real-time monitoring of construction sites, enabling quick responses to potential security threats.

Implementing robust security measures can result in significant cost savings for construction companies by reducing the financial losses associated with theft and vandalism. This includes savings on stolen materials, equipment replacement costs, and the expenses related to repairing or replacing vandalized structures.

### *Social Implications*

Construction projects are significant contributors to local economies, providing job opportunities for residents. Theft and vandalism control measures help ensure the smooth progress of projects, safeguarding employment opportunities and economic benefits for the community.

Vandalism on construction sites can result in environmental damage, affecting local ecosystems and wildlife. Control measures help protect the environment, demonstrating a commitment to ecological sustainability and garnering support from environmentally-conscious community members.

Incidents of theft and vandalism can lead to social tensions within the community, especially if residents perceive construction activities as a source of risk. Effective control measures mitigate these tensions, fostering a more harmonious relationship between construction companies and the local population.

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