



Analyzing the Financial Implications of Installing and Maintaining of Physical Access Control Systems for Security Enhancement in Gated Communities: A Case Study of Kitengela Township, Kenya.

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ABSTRACT

The study analyzed the financial implications of installing and maintaining physical access control systems (PACS) in gated communities, focusing specifically on Kitengela Town, Kenya, which has faced increasing security challenges due to rapid urbanization. As the demand for enhanced security measures in residential areas grew, the study examined the initial installation costs of various access control technologies, such as biometric systems and electronic gates, while also considering related expenses for infrastructure modifications and labor. The study also looked at the overall financial impact on various security measures associated with physical access control systems, such as shifts in property values and possible drops in crime rates, as well as continuing maintenance and operating expenses. The results showed that while each access control technology has unique benefits for improving security, there are notable cost differences between them. The study also found that there was a highly significant cost constraint related to routine maintenance, staff training, and technology updates that can have an impact on the overall efficacy and sustainability of security measures in gated communities. This study provides valuable insights into the long-term financial implications of investing in physical access control systems, offering a comprehensive perspective on their viability for enhancing gated community security. Ultimately, the findings provided a basis of ground on safety and security to community stakeholders, including residents, property managers, and local government, about the potential return on investment in security enhancements, contributing to the ongoing discourse on safety and the creation of secure environments in gated communities.

Keywords: Physical Access Control Systems, Gated Community, Insecurity, Biometric System, Crimes, Safety

I. INTRODUCTION

The rapid urbanization and population growth in Kenya have heightened concerns about security in residential areas, particularly in gated communities. As crime rates escalate, the need for strong security measures is growing, especially in residential areas, leading locals to spend more on cutting-edge access control technology, including automatic gates, perimeter walls, biometric systems, fencing, and obstacles. As a result, there is a growing need for improved security measures to protect their homes and families. Popular solutions include physical access control systems (PACS), which include automated and electronic gates, biometric scanners, locks, security cameras, fences, and barriers. But the financial effects of setting up and sustaining these systems are still not well understood, so a thorough assessment of their long-term viability and cost-effectiveness in the Kenyan context is required (Blakely & Snyder, 1997).

The concept of a physical access control system includes a range of technologies and practices designed to limit access and guarantee security in a designated area. Effective access management not only discourages unwanted entry but also enhances inhabitants' sense of security overall (Masoumzadeh et al., 2020). The purpose of this study is to assess the financial effects of installing such systems in gated communities, considering both the upfront installation and continuing maintenance costs. Both residents and community leaders must have a thorough understanding of these financial factors since they influence their decision-making when it comes to investing in security upgrades.

Branic and Kubrin (2017) point out that gated communities possess unique characteristics associated with tight security features that distinguish them from non-gated communities within society. These advanced security features



have important implications for crime rates and the effectiveness of physical access control systems. The presence of physical access control systems and barriers, such as automated gates and walls, regulates access to the community, significantly limiting opportunities for potential offenders and enhancing overall security within the estates. Additionally, residents in gated communities often share a common, strong investment in their neighborhood, fostering informal social control that further protects the community from criminal activities. However, while these features contribute to the safety and security of the area, it is essential to analyze the financial implications of installing and Maintaining of Physical Access Control Systems for Security Enhancement in Gated Communities.

Gated communities have distinct qualities linked to strict security measures that essentially set them apart from non-gated neighborhoods in the community (Newman, 1972). The effectiveness of physical access control systems and crime rates are significantly impacted by these cutting-edge security elements. Access to the community is controlled by physical barriers and access control devices, like automatic gates and walls, which greatly reduces possibilities for potential criminals and improves estate security in general. Residents in gated communities often share a common, strong investment in their neighborhood, fostering informal social control that further protects the community from criminal activities. Nevertheless, even if physical access control elements enhance the area's safety and security, it is crucial to consider the costs associated with installing and maintaining physical access control systems to ensure their effectiveness.

In Kenya, gated communities often represent a blend of luxury living and enhanced security. However, the financial burden associated with installing and maintaining access control systems can vary significantly among different communities. Previous studies, such as those conducted by Ajibola et al. (2011), highlight the challenges that residents face in balancing investments in security with the need for financial sustainability. This issue is particularly pressing as communities strive to enhance their safety while managing costs effectively.

Despite the importance of this study, few studies have explored the dynamics of the financial implications of installing and maintaining physical access control systems for security enhancement in gated communities, leaving a gap in understanding the financial implications of adopting advanced

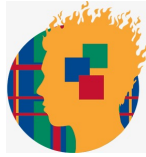
security measures. A comprehensive examination of the costs and benefits associated with physical access control systems is needed to provide valuable insights for community stakeholders. By addressing this gap, future research can inform better decision-making regarding security investments, ultimately leading to more sustainable and secure living environments in gated communities.

II. STATEMENT OF THE PROBLEM

The increasing rates of insecurity in gated communities, particularly in Kitengela Town, Kenya, highlight a critical gap in effective security measures, prompting the need for a thorough analysis of the financial implications associated with installing and maintaining Physical Access Control Systems (PACS). Despite the perceived benefits of enhanced safety and reduced crime rates, many communities face significant financial barriers that hinder the adoption of such systems, including high installation costs, ongoing maintenance expenses, and the need for technical expertise. Furthermore, the lack of comprehensive funding strategies and support from both governmental and non-governmental organizations exacerbates the situation, leaving many communities vulnerable to security threats. This study seeks to address the problem by examining not only the direct financial burdens but also the long-term economic impacts and potential benefits of PACS, thereby providing a holistic understanding of how these systems can be effectively integrated into community security frameworks while ensuring financial viability for residents and stakeholders.

III. LITERATURE REVIEW

Globalization and the rise in the spread of neoliberal models towards urban restructuring across the world have led to the rise of gated communities (Atkinson & Blandy, 2005). Within this context, the financial implications of security measures in these gated communities are multifaceted and require a nuanced understanding of both direct and indirect costs. Initial installation costs typically encompass expenses related to purchasing equipment, installation labor, and potential modifications to existing infrastructure. These costs can vary significantly depending on the sophistication of the technology and the scale of the community. The evolution of gated communities within the urban center has been influenced by various factors such as technological advancements in security systems, changing demographics, and shifting preferences in lifestyle and housing options,



which have a financial implication towards the installation and maintenance of these advanced security features (Blakely & Snyder, 1997; Low, 2003).

The major objective associated with safety and security measures in gated communities is to give inhabitants privacy and protection. The existence of regulated access points, like gates or barriers, that are watched over by security guards or electronic systems is a crucial component (Crawford & Evans, 2017). By limiting admission to those who are permitted, these precautions lessen the possibility of unwanted intrusions. The cost of setting up and maintaining these systems has drawn more attention, particularly considering Kenya's growing security concerns. Although most of the material currently in publication focuses on industrialized nations, a more specialized examination of Kenya's distinct socioeconomic environment is necessary.

In the context of enhancing physical safety and security through the application of physical access control systems in gated communities, the adoption of advanced physical access control systems presents a compelling solution. These PACS, especially CCTV and biometric recognition systems, offer a higher level of security by accurately identifying individuals based on their unique facial features. This not only reduces the risk of unauthorized access but also enhances overall safety and security for residents, especially in gated communities (Low, 2003). Additionally, integrating video intercom features allows for efficient communication with visitors, enabling residents to verify identities before granting access. The implementation of such technology can significantly mitigate security risks in areas that require stringent access controls, making it an attractive option for communities seeking to enhance their safety protocols despite the high cost of installing the systems.

In gated communities, budgetary decisions are heavily influenced by the perceived safety benefits of physical access control systems put in place. Increased construction efforts have resulted from the growing demand for these communities, especially in metropolitan locations where homebuyers place a higher priority on amenities, safety, and privacy. Property values and community fees are directly impacted by inhabitants' feelings of safety and security. Residents are more likely to make improvements to their homes and contribute to community expenses for improved security when

they feel safe. Therefore, assessing the observable financial advantages for both residents and the community requires an understanding of the perceived value of physical access control systems.

Gated community inhabitants are very concerned about proactive and efficient security, which includes CCTV monitoring systems, controlled access points, and round-the-clock security guards. However, putting these security measures into place will have a big financial impact. Since physical access control system investments are essential to establishing a safe environment, most gated communities require carefully thought-out infrastructure that accounts for these expenses. According to Chen et al. (2018), community decision-makers must comprehend the financial implications of these security measures to assess the overall worth and viability of such investments.

Moreover, the relationship between physical security measures and crime rates is critical to understanding the overall effectiveness of access control systems. Previous research indicates that enhanced security can lead to a decrease in crime, thereby influencing property values positively (Hedayati-Marzbali *et al.*, 2017). By examining this relationship, this study assessed whether the financial investments in physical access control systems yield tangible benefits in terms of improved safety and increased property values in gated communities.

Effective physical access control systems bolstering a safe and secure environment for residents strongly relate to the long-term sustainability of property values in gated communities. The growing popularity of these developments has led to increased property values, making them attractive options for homebuyers and investors alike (Savills, 2020). Physical access control systems contribute to lower crime rates and enhanced safety, further increasing the desirability of these neighborhoods. Gated communities with robust security measures tend to maintain higher property values over time, even during broader economic fluctuations. This stability is crucial for residents, as it protects their investments and contributes to the overall financial health of the community.

IV. METHODOLOGY

This study used random and stratified sampling techniques as part of the descriptive research design employed in this study. Data were



gathered using questionnaires and a key informant interview guide purposefully drawn based on their experience and knowledge on security challenges affecting gated communities, especially in urban centers. This study sample size was 150 respondents drawn from gated community residents within Kitengela Town and 10 key informants drawn from gated communities' association management. The data was analyzed quantitatively and qualitatively, and the results were presented using tables.

V. RESULTS AND DISCUSSIONS

Study Findings on Impact on Crime Reduction and Property Values

The findings of this study reveal a significant correlation between the installation of physical access control systems in gated communities and a reduction in crime rates. Data collected from gated communities reveals that there was a decrease in reported incidents of burglary, vandalism, and trespassing after the implementation of physical access control systems. This aligns with previous research by Saragi et al. (2022), which highlights that enhanced security measures create a deterrent effect, making communities less attractive targets for criminal activity.

Furthermore, the study indicates that the perception of safety among residents improved substantially following the installation of physical access control systems. Respondents highlighted that 85% felt more secure in their homes, which directly influenced their willingness to invest in property improvements, particularly in physical access control systems, thus having a direct relation to financial implications. The findings strongly imply that enhanced security not only protects residents but also fosters a sense of community trust and cohesion, positively impacting property values.

An analysis of property values in the study sample demonstrated a positive trend linked to the introduction of physical access control systems. Properties within gated communities that had implemented such systems experienced an average increase in financial expenses towards the purchase, installation, and maintenance of the physical access control systems to deliver the expected results towards enhancing crime prevention within the estates. This increase is attributed to heightened demand for homes in secure environments, as potential buyers prioritize safety in their purchasing decisions. The study's findings support the assertion that investments in physical security can yield substantial returns for homeowners and the

community at large, as highlighted by Admani (2016).

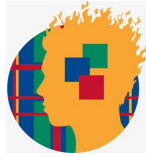
Finally, the findings from this study reveal that the financial implications of reducing crime rates were examined in relation to insurance premiums for insuring properties. The study found that homeowners in gated communities with effective physical access control systems reported a decrease in their insurance costs due to enhanced security features in the area. Insurers recognized the reduced risk associated with these properties, leading to lower premiums. This not only provides immediate financial relief to residents but also reinforces the economic benefits of investing in security measures, thereby enhancing the overall attractiveness of the community for prospective buyers.

Financial Implications on Initial Costs of Installing Physical Access Control Systems

The study findings reveal that the initial costs associated with installing physical access control systems in gated communities in Kenya are significantly high and can vary based on the technology employed and the community's specific needs for enhancing a secure environment for residents. The financial costs increase based on the various technologies required for the physical access control systems, such as automated electronic gates, biometric readers, and advanced surveillance cameras, all of which contribute to the overall expenditure. These financial implications are critical for community decision-makers as they evaluate the feasibility of such security investments.

Labor costs constituted a significant portion of the overall installation expenses, averaging 30% of the total budget. This includes costs associated with hiring skilled technicians for system installation, training for personnel, and ongoing support. According to the findings, communities that opted for advanced biometric systems tended to incur higher labor costs due to the specialized expertise required for installation and maintenance. This highlights the need for careful planning and budgeting to ensure that communities can meet the financial demands of implementing sophisticated security measures.

Infrastructure modifications also played a vital role in determining the initial costs of access control systems. Many gated communities required upgrades to existing infrastructure, such as roadways and electrical systems, to accommodate



new technologies. The finding from this study found that these modifications could add to total installation costs, thus posing a great impact on the financial impact on securing the environment. Gated communities with older infrastructure faced higher costs, emphasizing the importance of conducting a thorough assessment before implementation.

According to the study's findings, there is a tendency toward more complete security packages that include integrated surveillance systems, alarm monitoring services, and physical access control. Despite being more costly at first, these packages gave households greater general security and peace of mind. Residents within gated communities made investments in these all-inclusive solutions and reported paying more for these services, but they also felt more satisfied and secure, which eventually made the initial expenditure worthwhile. This result emphasizes how crucial it is to weigh both short-term and long-term advantages when assessing installation costs.

In summary, the findings of this study provide a comprehensive overview of the initial costs associated with installing physical access control systems in gated communities in Kenya. The analysis highlights the significant expenditures related to equipment, labor, and infrastructure modifications, emphasizing the need for careful financial planning and community engagement. As security concerns continue to rise, understanding these costs will be essential for communities considering investments in physical access control systems, enabling them to make informed decisions that balance security needs with financial sustainability.

Financial Implications on Ongoing Maintenance and Operational Costs of Physical Access Control Systems

According to the study's findings, physical access control systems in gated communities require a substantial financial commitment for continuous maintenance and operation. The results showed that the anticipated outcomes of addressing crime reduction and preventing unauthorized entry to the residential portions of gated communities resulted in an increase in the average yearly maintenance cost. The results showed that routine inspections, necessary repairs, and training of personnel in charge of system management accounted for expenses incurred. Routine inspections emerged as a critical aspect of maintaining the effectiveness of physical access control systems.

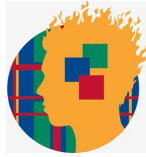
The study revealed that communities that conducted regular inspections and repaired the systems reported fewer system malfunctions and a lower incidence of security breaches. The findings revealed that these inspections and maintenance costs were very high depending on the complexity of the system and the number of access points. This proactive approach not only extends the lifespan of the equipment but also enhances overall gated communities' safety and security, thus justifying the ongoing expenditure.

The results of this study show that the expense of repairing the physical access control systems had a negative financial impact despite the required outcome from the physical access control system put in place. Majority of respondents believed that large costs were associated with repairs because of deterioration, vandalism, or technical issues. Because of their complexity, systems that used cutting-edge technologies, such as biometric scanners, typically had greater repair costs. This emphasizes how important it is for communities to include a sufficient budget for possible repairs in their total security measure budget.

The study's findings also showed that training new hires and offering refresher courses to currently existing contracted security employees was very expensive. Proper training guarantees that contracted security staff or employees within are aware of the systems in place, which reduces operational errors and maximizes the effectiveness of security measures. Investing in staff training not only helps reduce potential vulnerabilities but also fosters a culture of security awareness within the community.

In conclusion, the study's findings emphasize that ongoing maintenance and operational costs for physical access control systems in gated communities are significant and multifaceted. Routine inspections, repair expenditures, and staff training all contribute to the total cost of ownership for these security systems. By understanding and planning for these ongoing costs, community leaders can make informed decisions that ensure the long-term viability of security investments. This financial foresight is essential for enhancing safety and maintaining property values within gated communities in Kenya.

VI. SUMMARY



This study evaluated the financial implications of installing and maintaining physical access control systems in gated communities in Kenya, focusing on initial costs, ongoing maintenance, crime reduction, and the impact on property values. The findings revealed that while the upfront installation costs are significant, the long-term benefits, including reduced crime rates, increased property values, and lower insurance premiums, can justify the investment. Ongoing maintenance costs, although substantial, are essential for ensuring the effectiveness of these security measures. Overall, the research highlighted the importance of balancing financial considerations with community safety needs.

VII. CONCLUSION

In conclusion, the financial implications of installing and maintaining physical access control systems in gated communities in Kenya are complex but ultimately favorable when viewed through the lens of long-term safety and financial sustainability. While initial costs can be a barrier, the reduction in crime rates, enhancement of property values, and potential decreases in insurance premiums present a compelling case for investment. By prioritizing ongoing maintenance, staff training, and resident engagement, gated communities can not only enhance their security but also ensure the financial viability of their investments. This study underscores the importance of informed decision-making in the face of evolving security challenges and the need for communities to adapt their strategies to meet both financial and safety objectives effectively.

Communities are encouraged to adopt a proactive approach in budgeting for both initial and ongoing costs associated with physical access control systems. Engaging residents in discussions about security investments can foster a shared commitment to community safety and ensure sustainable financial planning. Ultimately, the study underscores that investing in physical security not only enhances safety but also contributes to the overall financial health and desirability of gated communities in Kenya, making them a vital consideration for community leaders and stakeholders.

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