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FINANCIAL AND SOCIO-ECONOMIC IMPACTS OF IMPLEMENTING ACTIVE DESIGN PRINCIPLES IN SOUTH AFRICAN OFFICE BUILDINGS

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ABSTRACT

The drive towards sustainable construction increasingly demands a balance between socio-economic, financial viability, cultural relevance, and user satisfaction. Limited empirical research exists on the financial and socio-economic impacts of active design principles in South Africa, especially from the perspective of Quantity Surveyors. This study aimed to establish a foundational understanding of the financial and socio-economical impacts associated with the implementation of active design principles to improve built environment sustainability, cost management and workplace wellness. An exploratory, case-study approach was adopted, involving interviews with purposively selected participants. Key findings identified four significant phenomena: health and wellness in construction, financial factors, socio-economic factors, and barriers and limitations. One notable limitation included the limited implementation of active design principles in the South African Construction industry. This study highlights the importance of integrated stakeholder collaboration and recommends the industry-wide adoption of active design principles to enhance user value. This study also emphasizes the emerging role of Quantity Surveyors in driving innovative sustainable concepts in the construction industry. It is beneficial for built environment stakeholders as it provides valuable insights and empirical evidence regarding the implementation of active design principles and the resulting health and financial outcomes. This study offers a unique opportunity to support built environment sustainability through social, economic, and health benefits and is among the first to compare actively designed and conventional buildings in South Africa, providing novel insights into how Quantity Surveyors can influence sustainability through workplace wellness and socio-economic value creation.

Keywords: *Active Design; Cost Management; Quantity Surveying; Socio-economic Sustainability.*

1. INTRODUCTION AND BACKGROUND

Poor health and physical inactivity are escalating global issues that present a multitude of obstacles to the overall well-being and enjoyment of life and are increasingly affecting low-and middle-income countries such as South Africa (Mahmood & Arulkumaran, 2013; Malambo et al., 2017). Research shows that the built environment contributes

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significantly to sedentary lifestyles through inactive indoor settings and disconnected urban planning (Rossouw et al., 2016; Marsh et al., 2016). Given that the average adult spends over 1,700 hours annually in office settings, workplaces present critical opportunities for health-enhancing design interventions (Marsh et al., 2016).

A possible way offered in the literature that can be used to mitigate problems associated with socio sustainability is the application of the concept of active design, an evidence-based approach to architecture and urban planning that encourages physical activity and healthier behavior through spatial layout (McCormack & Shiell, 2011). Active design is an evidence-based approach to planning, architecture and construction that encourages physical activity and healthy living through the built environment. It encompasses strategies such as walkable communities, accessible stairwells, active transportation infrastructure and the strategic placement of shared amenities to promote movement and user wellbeing (Price & Fenton, 2015; Engelen et al, 2016). Socio-ecological models of physical activity theorize that individual physical activity levels are influenced by policy, physical and socio-cultural environments, and individual personalities (Sawyer et al., 2017). Active buildings aim to subtly nudge users towards movement through intentional placement of amenities and communal spaces, enhancing both user well-being and building efficiency (Khairuddin et al., 2021). Active Design further complements sustainable construction practices by integrating environmental health into building design, reducing energy demands, and supporting eco-friendly urban infrastructure (Gul et al., 2020).

From a social sustainability viewpoint, there is growing research on the impact of current interior environments on individual health (Marsh et al., 2016). Construction Consultants concentrate on four strategies to promote healthier lifestyles among the general public, specifically *active recreation, active buildings, alternative methods of transportation, and improved availability of nutritious food* (Opoku et al., 2024; Zulu et al., 2023). This paper highlights the cost and socio-economic implications of implementing active design principles in office spaces to increase the triple bottom line, namely *social* - improved employee health and wellbeing, *economic* - reduced absenteeism, higher productivity and higher building value and *environment*, less energy use and greener, more sustainable environments from the perspective of Quantity Surveying (QS). While the socio-economic benefits of active design are often discussed in health or planning contexts, this study uniquely frames the conversation around the strategic role of the QS as financial manager in construction projects. The role of the QS is critical in assessing feasibility, managing costs and ensuring value-for-money.

This study explores the socio-economic and financial implications of implementing active design in South African office buildings, focusing on user well-being and employee productivity. By comparing an actively designed office building with a conventional office counterpart, this study aims to provide empirical insight into the socio-economic benefits of active design. Office buildings were specifically selected for this study due to their relevance in modern sedentary lifestyles and the high proportion of daily time spent indoors by working employees. In South Africa, professionals spend over 1,700 hours per year in office settings (Marsh et al., 2016), making these spaces ideal for investigating how spatial design can promote physical activity, wellness and productivity. Furthermore, office buildings offer a practical entry point for piloting active design interventions due to their standardized operations and measurable outcomes. This paper highlights *active buildings* but acknowledges *alternative transportation* which includes the creation of safer and more user-friendly walking and cycling paths. The findings

presented in this paper will offer valuable insights to guide clients on the adoption and implementation of active design principles for effective project cost management and provide insights into the benefits of implementing these principles towards workplace wellness.

2. LITERATURE REVIEW

2.1 ENVIRONMENTAL BENEFITS OF ACTIVE DESIGN

Active design aligns closely with environmental sustainability goals through the reduction of energy consumption and promotion of resource-efficient buildings. Increased natural ventilation, the use of daylight, and reduced reliance on elevators or lifts via the increase usage of stairs contribute to lower carbon emissions and utility costs (Price & Fenton, 2015; Heidari et al., 2016). Research by Price and Fenton (2015) further states that the incorporation of active circulation routes and green communal spaces enhances user wellness and environmental performance, especially in office environments. These strategies complement broader green building goals and reinforce the environmental pillar of the triple bottom line.

Less resilience on elevators leads to less energy use which creates green spaces and reduces the environmental impact. Furthermore, attention must be given to building shape and design (Gordeljevic, 2018). Climate, layout, and orientation all have an impact on the design of building circulation areas, which contribute to employee activity (Gordeljevic, 2018).

Sustainable design presents a challenge for developers and built environment stakeholders to think innovatively. Its objective is to reduce detrimental impacts on the environment, create healthy and productive spaces, and minimize waste (Kibert, 2016). Sustainable development refers to a form of development that fulfills current needs while safeguarding the ability of future generations to meet their own needs (Strydom, 2013). The overarching concept of sustainability encompasses economic, socio-political, and environmental aspects (Kibert, 2016). Sustainable development creates an opportunity for the construction industry to move forward, towards optimal sustainability whilst considering the current economic, socio-economic and environmental concerns (Strydom, 2013). Green design and construction focus on the reduction of social and environmental impacts on the built environment whilst improving the quality of life for the building occupants (Cole, 2019). Sustainable infrastructure thus incorporates the interconnection between community and health, providing a system to control benefits from the mitigation of urban heat to increased physical activity (Heidari et. al., 2016). Social sustainability and green building practices align focus on the implementation of construction practices to build buildings that will last longer, be more efficient, reduce operating costs, increase the productivity of employees and contribute to healthy living (Kubba, 2010). Studies indicate that green spaces can have significant impact on health benefits including reduced stress levels, improved cognitive function, and increased mental health (Heidari et al., 2016; Nugroho et al., 2020; Ahmad, 2023).

The construction industry is still in the early stages of filling the gap between building design, construction, and health (Bernstein & Russo, 2014; Engelen et al., 2016; Khairuddin et al., 2021). There are limited studies and information available regarding active design buildings, hence the opportunity presents itself to study built environment sustainability through social, economic, and health benefits.

2.2 ACTIVE DESIGN AND EMPLOYEE PRODUCTIVITY

More companies are embracing workplace wellness through architecture (Emmit, 2014). The New York center for active design defines the concept as the transformation of health research findings into design solutions that strengthen the contribution of architecture to improve public health and wellbeing (Khairuddin et al., 2021).

The South African workplace is experiencing an increase in non-communicable chronic diseases (NCCD) (Cole, 2019). The growth of NCCDs is likely to be caused by the rapid economic and social changes that include urbanization and dramatic changes in individual lifestyle (Gordeljevic, 2018). The incorporation of active design principles can be used to combat the effect of these NCCDs on individuals. Research indicates that the average employee spends about five hours and forty-one minutes per day sitting (Khairuddin et al., 2021). This not only decreases productivity levels, but also increases diseases such as diabetes, depression, heart diseases and obesity (Emmit, 2014). Although many organisations offer health and wellness programs to their employees, a more active strategy must be created through workplace design (Cole, 2019). The workplace provides a useful setting for promoting physical activity as there is a broad and captive audience and existing social structures provide a framework around which to build interventions (Ahmad, 2023).

Heidari et al., (2016) explains that there are many ways to promote healthy behavior and environments within office buildings that can subconsciously influence employees to be more active. Designing a workplace that gives access to movement, ventilation, daylight, and interaction through communal working lounges, standing desks and outdoor circulation paths gives employees freedom and control over the time they spent at work (Nugroho et al., 2020).

Horwitz et al., (2013) claims that workplace wellness can be a win-win situation as it improves both employees' health and employers' bottom lines. An unhealthy workplace and unhealthy lifestyle lead to work-related stress which, in return, leads to an increase in turnover, litigation, absenteeism, health insurance claims, presenteeism, short- and long-term disability, depression and accidents and to a decrease in employee satisfaction and commitment (Khairuddin et al., 2021). Research shows that stress can contribute to 19% of absenteeism cost (Hassard, et al., 2014). About 4.5% of all South Africans are absent on any given day due to work related stress (Nugroho et al., 2020). Presenteeism on the other hand can cost employers up to four times more than absenteeism (Vänni, et al., 2016). Presenteeism can be explained as employees attending work while being sick when it is justifiable to stay at home (Kawalec & Malinowski, 2015).

To succeed in the creation of active spaces, human factor research must be considered (Harrigan, 2014). Architects are challenged to conduct human factor studies in the context of design, while QSs have to shift their traditional focus from cost-estimation, financial control and contractual administration to include a more strategic role in shaping the built environment (Smallwood, 2015; Fonarrow et al., 2015). Designers have a direct and indirect influence on construction projects; hence the architect and interior designer should put the project in context in terms of project objectives reflecting the current situation, client needs, developing events and the future whilst comparing possible actions to feasibility and resources available (Smallwood, 2015). Active design requires early-stage planning, feasibility assessments and cost-justification to ensure successful integration (Sawyer et al., 2017).

2.3 COST CONSIDERATIONS AND FINANCIAL BARRIERS IN ACTIVE DESIGN IMPLEMENTATION

Implementing active design principles in construction often presents financial challenges. While long-term socio-economic benefits are increasingly acknowledged, the initial capital costs are perceived as financial risks and remain a concern for developers and project stakeholders (Abidin & Azizi, 2016; Shen et al., 2018). Cost related factors influencing the implementation of active design strategies include awareness, knowledge, financial, technical and government support (Kasim, et al., 2018). These factors are particularly relevant in the South African context where limited benchmarking data and industry research are available. Abidin and Azizi (2016) highlights that building for health creates healthy, comfortable, and economically prosperous places for employees and families. As cost is seen as one of the leading barriers to the implementation of active design strategies it is pertinent to understand the cost elements to recommend ways to reduce this cost and make active designed buildings feasibly presentable (Abidin & Azizi, 2016). Research shows that early-stage planning, spatial reconfiguration, and the integration of walkable layouts, stair prominence and green spaces can increase initial capital expenditure compared to conventional office buildings (Kasim et al., 2018). However, active designed buildings have been found to generate higher rental income, higher occupancy rates, longer economic lives, and high profits over a longer period of time for investors (Taemthong & Chaisaard, 2019).

From a Quantity Surveying perspective, these cost dynamics highlight the importance of robust feasibility assessments and value management. Quantity Surveyors are well-positioned to guide clients through feasibility studies, cost-benefit analysis, and life-cycle costing whilst quantifying indirect financial gains such as reduced absenteeism and increased employee productivity (Goh & Sun, 2016; Manewa et al., 2021).

3. METHODOLOGY

The exploratory nature of this study together with the limited existing empirical research on active design in South Africa leaned towards a qualitative case study research approach to explore and comprehend participants' perceptions and reactions towards the topic of active design within the construction sector, which is relatively new and not well understood. A two-way case study approach was employed, focusing on two modern office buildings in the Gauteng province in South Africa. This method allowed for an in-depth, context-rich understanding of how active design is implemented and perceived in real-world scenarios, capturing both cost and socio-economic dimensions through end-user experiences. The study was limited to two contrasting case studies, one with implemented active design principles (Building A, a national bank) and one conventional office building without active design implementation (Building B, conventional office building). The decision to limit the study to two cases was based on feasibility, the depth of analysis required and the goal of capturing rich, focused insights rather than broad generalizations. This aligns with the purposive logic of case study research, where fewer cases allow for deeper contextual and thematic analysis (Rodríguez-Labajos et al., 2021).

Building A, the FNB WesBank Headquarters situated in Johannesburg, South Africa, is a flagship commercial development with approximately 66,000m2 rentable space and was completed in 2020. This development integrates numerous active design features, including interconnected circulation routes, outdoor wellness areas, landscaped courtyards and on-site amenities that promote movement, social interaction and user

comfort. Building B, by contrast, is a medium-sized conventional office building situated in the Woodmead Office Park, also in Johannesburg, South Africa. It comprises approximately 10,000m2 office space and houses various professional tenants. The building follows a traditional layout, comprising a combination of open- and private office spaces, it has limited communal spaces and movement-enhancing design features. While the study acknowledges the differences in scale and user volume between the two buildings, both serve comparable commercial office functions and are located within similar urban and climate conditions. This allows for comparative exploration of how active design features influence occupant well-being and socio-economic perceptions.

The research conducted further interviewed a total of eighteen (18) participants from the case studies to obtain their input on the comprehensive understanding of the financial and socio-economic impact of implementing developing active design principles in construction. A combination of structured and semi-structured interviews was conducted. The participants were selected through a combination of purposive and snowball sampling until a saturation point was reached. These sampling strategies were important to maintain the high standard of knowledge from participants required to obtain valuable data. The participants were all users of the respective buildings. Additionally, five (5) industry experts were purposefully selected and interviewed to contribute to the overall understanding of active design implementation in the construction industry. Table 1 below presents the demographic and professional breakdown of the participants.

Table 1: Empirical study data

	Building A (Case Study)	**Building B (Case Study)**	**Other (Expert)**
Case Studies	Active Design - Bank	No Active Design - Conventional Office Building	N/A
Profession/ Field of Work	Financial / Other	Quantity Surveying	Quantity Surveying/ Construction related
Designations/ Role level	4 x Employers, 3 x Employees	4 x Employers, 9 x Employees	Employees
Interviewees	7	12	5
Interviewee ID's	A1, A2, A3, AS4, AS5, AS6, AS7	B1, B2, B3 BS4, BS5, BS6, BS7, BS8, BS9, BS10, BS11, BS12	C1, C2, CS3, CS4, CS5
Interviewee age group	3 x Participants per the following age group: 30 – 40	3 x Participants per the following age groups: 30 – 40; 40 – 50	2 x Participants per the following age group: 20 – 30
	4 x Participants per the following age group: 20 -30	4 x Participants per the following age group: 20 – 30	2 x Participants per the following age group: 30 – 50
		1 x Participant per the following age group: >60	1 x Participant per the following age group: 40 - 50
Interviewee gender	Female x 2 Male x 5	Female x 3 Male x 9	Female x 1 Male x 4

Expert participants were selected using purposive sampling to ensure representation across areas of construction, cost management and sustainable building practices. Participants were mainly identified based on their professional roles (Quantity Surveyors, Construction Related roles such as Construction Managers, Architects, etc., Financial Officers, etc.) and role levels (employees/employers) within the companies. These distinctions were useful for interpretation of responses in light of varying perspectives between end-users and decision- makers and to understand how different professional lenses shape attitudes towards active design implementation and cost feasibility. The study recognizes that demographic factors such as age and gender may influence personal health perspectives, and therefore a mix of ages and genders was achieved among both experts and users to enrich the diversity of perspectives.

Thematic analysis was used to analyze the data. The main analytical approaches employed in this study included revisiting the collected data and examining and categorizing the data to achieve the study objectives. The study also utilized techniques such as applied pattern matching and explanation building to analyze the data, codes were used to identify key points of data, concepts were developed to group similar codes, categories were formed to generate theory, and theory was used to explain the research topic. Participant codes were developed based on the buildings (A and B), expert interviewees were coded with a C, and distinction has been made between semi-structured (A, B, C) and structured interviews (AS, BS. CS).

4. RESULTS

4.1 PRESENTATION AND DISCUSSION OF RESULTS

Interviews were guided by semi-structured and structured questions aligned to the study objective. The four main themes explored included: awareness and understanding of active design principles, perceived health and productivity benefits of the built environment, financial implications and cost-related barriers, and social and cultural acceptance of active design features. Due to the qualitative nature of the study and space constraints, this paper presents the key emergent themes from the interview data rather than individual responses or per-case breakdowns.

Four major themes emerged from the thematic data analysis, namely, 1. Health and Wellbeing; 2. Financial Factors; 3. Socio-Economic Implications; 4. Barriers and Limitations. These themes align with the interview structure and study objectives and were further developed and explained as phenomenon.

Phenomenon 1: Promoting health and well-being through the construction industry. The initial concept explored various factors that affect and contribute to the overall health and well-being of individuals occupying buildings, including both employees and employers. Participants from Building A reported improved comfort, movement, and reduced fatigue and stress levels followed by an increase in productivity due to designated walking routes, natural light and stairwell prominence while participants from Building B reported discomfort in long sitting periods, lack of regulated fresh air and minimal exposure to natural light. Participants from Building B further noted that implementation of active design principles could improve employee morale and employee/employer relationships. All respondents expressed a keen interest in learning more about the effects of active design on their personal health and well-being, underscoring their value for personal wellness. The study also revealed that individuals who prioritize a healthy and active

lifestyle are more likely to be interested in learning about active design and its potential impact on employee health and well-being.

Phenomenon 2: Financial factors related to implementation. A key objective of this research was to identify the financial factors connected to the implementation of active design in the construction field. Theme 2 revolved around understanding the costs associated with implementing active design strategies in construction. It also explored whether the benefits of active design principles outweighed the costs and established a link between active design implementation and cost control. Experts highlighted a lack of financial awareness regarding active design returns among clients. Building A employers felt that the space they created justifies investment through increased motivation, productivity and business performance and decreased absenteeism and presentism. Participants from Building B had limited exposure to the impact of active design principles due to limited implementation and portrayed hesitance in the effect on business performance. They indicated that it might have some effect on business performance but should be closely monitored as some employees may take advantage of the concept which can have a negative effect on productivity. Experts indicated that early-stage cost-planning and ROI analysis for wellness design is still rare in South Africa. The findings align with existing literature, highlighting both direct and indirect cost implications of active design implementation. The study identified four key findings directly related to the financial impact of applying innovative active design principles in construction: knowledge, feasibility, implementation, and success factors. The empirical study revealed that Quantity Surveyors have limited knowledge about active design, that a healthy workplace can reduce company turnover, enhance the company's brand, and increase employee productivity. The empirical study also uncovered a lack of awareness among Quantity Surveyors when it comes to active design. Additionally, the study reinforces the conclusions reached by Abidin and Azizi (2016) that cost is a major obstacle in implementing active design. However, it was also found that the adoption of active design strategies in the construction industry could be feasible if effective cost management strategies are utilized. The findings highlight that successful implementation of active design strategies in construction relies on factors such as knowledge, feasibility, and cost management.

Phenomenon 3: Socio-economic response to the implementation of active design principles in the construction industry. The third theme focuses on the socio-economic aspects of the study. The study reveals that the application of innovative active design strategies in construction has a noticeable and valued socio-economic impact. It was observed that the implementation positively enhances employee relationships, employee/employer dynamics, employee performance and productivity, workforce positivity, self-confidence, education, and the environmental effects of buildings. Building A users reported increased social interaction, improved morale and higher satisfaction with shared spaces (lounges, cycling facilities, etc.). These features were also linked to improved team dynamics and self-confidence. Building B respondents reported disconnection from others and perceived their office space as purely functional. Expert interviews revealed that socio-economic outcomes of design are not generally considered in value management processes.

Phenomenon 4: Barriers and limitations to Active Design adoption. The fourth theme revolves around the factors that impact the implementation of active design strategies in the construction sector. A major limitation was identified as the lack of awareness among industry experts regarding the concept of active design and effective cost management

strategies. Responses from Building B users highlighted cost-related hesitancy, the absence of implementation guidelines and conservatism. Experts highlighted the need for training and evidence-based case studies to support increased adoption.

5. CONCLUSION AND RECOMMENDATIONS

This study identified the link between wellbeing and the built environment as a growing topic of interest. The literature proposes the incorporation of active design as a possible way to mitigate health problems associated with the lack of physical activity. It is evident that individual physical activity levels are influenced by policy, physical and socio-cultural environments, as well as individual personalities.

The results demonstrated that active design implementation in the South African construction industry can be feasible if optimal knowledge and cost management systems are applied. The study further found that the implementation of active design strategies can have a positive effect on socio-economic sustainability including employee relationships, employee/employer relationships, employee performance and productivity, positivity amongst the workforce, self-confidence, education, and the effect of buildings on the environment. The study however concludes that despite the potential of active design, there are inherent barriers that limits implementation in the South African construction industry. These include limited knowledge amongst industry experts on the topic as well as limited available research in the South African context. This study therefore recommends that the implementation of active design principles should be generalized as an industry norm. It is also recommended for clients invest in in-depth feasibility studies and cost analysis for optimisation of the benefits of the implementation of active design principles in construction.

The positive socio-economic impacts of implementing active design, such as enhancing employee and employer relationships, improving performance and productivity, boosting morale within the workforce, and increasing self-confidence, provide a compelling argument for QSs to expand their traditional roles. By adopting a more innovative mindset, QSs can make significant contributions and add value to the process through involvement in the early design phase and by implementing cost management principles and practices based on well-informed insights. By aligning their technical expertise with sustainability and wellness goals, QSs can become key enablers in delivering buildings that are cost-effective, socially responsive and future-proof. The research emphasizes a significant gap in the potential contribution of QSs to promote sustainable construction practices through active design. It is, however, crucial to enhance training and expand expertise in this field of active design and the role of construction to foster a superior and healthier built environment. This study contributes to the limited empirical literature on active design by offering comparative insights into its financial and socio-economic impacts in the South African context. It also highlights the evolving role of Quantity Surveyors in supporting health-oriented design through cost planning and feasibility analysis.

One potential constraint of this study is that the case studies were conducted exclusively in the Gauteng Province, which means that the findings may not necessarily apply to other regions or provinces. As a result, it is advisable for future research to include case studies from various areas and provinces in South Africa in order to determine if similar results can be obtained.

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